

Oregon Institute of Technology

University Catalog
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www.oit.edu
(541) 885-1000
3201 Campus Drive, Klamath Falls, OR 97601-8801

Hands-on education for real-world achievement.

Welcome to Oregon Tech

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User's Guide

To assist you in navigating the 2015-16 University Catalog, we have organized its contents into nine major areas. The index at the end of this catalog can help in locating specific information. The general catalog is printed annually and available on the web at www.oit.edu.

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General Information

The Oregon Tech Admissions Office is located on the first floor of the College Union on the Klamath Falls campus. It is open weekdays from 8 a.m. to 5 p.m. to serve prospective students, applicants and their families, as well as high school guidance counselors, college-transfer advisors and teachers.

If you are interested in seeing the Klamath Falls campus, the Admissions Office's visit coordinator can arrange for you to meet with a faculty member and an admissions counselor, tour the residence halls and the rest of the campus, sit in on a class and/or talk with one of our coaches. To set up a campus visit, call (800) 422-2017 or (541) 885-1150. Hearing-impaired persons may call the TTY number: (541) 885-1072. You also can request a campus visit at www.oit.edu or by emailing oit@oit.edu. If you wish to visit one of Oregon Tech's other campuses, the Admissions Office can provide you with a contact person who can make arrangements for you.

Non-Discrimination Policy

Oregon Institute of Technology does not discriminate on the basis of race, color, ethnicity, national origin, gender, disability, age, religion, marital status, sexual orientation or gender identity in its programs and activities. The following person is designated to handle inquiries and complaints regarding this non-discrimination policy: Affirmative Action Officer, Oregon Tech, 3201 Campus Dr., Klamath Falls, OR 97601-8801; (541) 885-1108; Fax (541) 851-5200; email: ron.mccutcheon@oit.edu.

Students with Disabilities

Oregon Institute of Technology is committed to accommodating the academic and programmatic needs of qualified students with disabilities. Students with disabilities who anticipate needing accommodations should contact Services for Students with Disabilities, LRC 223, as soon as possible in advance

of enrollment, to ensure timely provision of services. Questions may be directed to: Services for Students with Disabilities, Oregon Tech, 3201 Campus Dr., Klamath Falls, OR 97601-8801. (541) 885-1129.

Alternate Format

This publication is available in an alternate format for persons with disabilities. Please contact Services for Students with Disabilities at (541) 885-1129.

Accreditation

Oregon Institute of Technology is accredited by the Northwest Commission on Colleges and Universities (NWCCU), 8060 165th Avenue, N.E., Suite 100, Redmond, WA 98052-3981. NWCCU is an institutional accrediting body recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education. Accreditation, licensure or approval of individual programs are listed in departmental sections. Copies of accreditation documents are available in the Office of the Vice President for Academic Affairs/Provost, Oregon Tech, 3201 Campus Dr., Klamath Falls, OR 97601-8801.

General Catalog Production

The 2015-16 General Catalog was produced by the Registrar's Office and the Marketing and Communication Department at Oregon Tech. Wendy Ivie, University Registrar; Dana Henry, Program Representative; Ashley Van Essen, Public Relations Representative; typesetting and cover design by Bill Goloski, Publications and Graphic Design Manager. Information in this catalog was accurate at the time of publication, but is subject to change without notice and does not constitute a contract between Oregon Tech and the student or applicant. The general catalog is printed annually and available on the web at www.oit.edu.

History at a Glance

- 1947 – July 14, Under the direction of Winston Purvine, the first classes were held in a deactivated World War II Marine Corps hospital three miles northeast of Klamath Falls.
- 1950 – KTEC radio went on the air.
- 1953 – Associate degree programs in the Surveying and Structural Engineering Technologies were first accredited by the Engineers' Council for Professional Development.
- 1956 – KOTI television opened on campus.
- 1957 – The institute was made a separate division of the State Board of Education and an engineering study was begun to determine whether to repair or rebuild the facilities.
- 1960 – The institute was transferred to the jurisdiction of the State Board of Higher Education.
- 1962 – The institute was accredited by the Northwest Association of Secondary and Higher Schools.
- 1964 – The campus moved to newly constructed buildings on a geothermal site overlooking Upper Klamath Lake.
- 1966 – The institute received authorization to grant bachelor's degrees.
- 1970 – Bachelor's degree programs first accredited by ABET.
- 1975 – Geo-Heat Center established.
- 1976 – Kenneth Light appointed President upon Purvine's retirement.
- 1983 – Larry Blake appointed President and the Metro Center was established in Portland.
- 1984 – Small Business Development Center established.
- 1988 – Portland Metro Center moved to its first permanent facilities on Southeast Harmony Road near Clackamas Town Center.
- 1989 – State Board authorized Oregon Tech to grant master degrees.
- 1991 – Lawrence J. Wolf appointed President.
- 1995 – Master's degree first offered.
- 1998 – Martha Anne Dow appointed President.
- 2001 – Oregon Renewable Energy Center established.
- 2005 – Oregon Center for Health Professions established.
- 2008 – Christopher G. Maples appointed President.
- 2012 - Wilsonville Campus opens.
- 2015 – Oregon Institute of Technology became an independent public body governed by Board of Trustees.

President's Welcome



Dr. Christopher G. Maples
Oregon Tech President

Welcome to Oregon Tech! You have chosen a university that will challenge you, excite you, and provide you with many opportunities to excel while on campus, and after you begin your chosen career. Oregon Tech graduates are known for their ability to excel immediately in the private, public and nonprofit sectors, or in graduate and professional schools if you choose to continue your education. Because of the applied approaches used in our degree programs, Oregon Tech graduates earn some of the highest starting salaries in the nation – now about \$54,000 a year – and are among the top 15% in mid-career salaries as well.

The small class size and hands-on approach to education at Oregon Tech are perfectly tailored to a learning environment that encourages communication, collaboration, and competency. Oregon Tech is focused on students, student satisfaction, and student success. We are proud of our students' accomplishments and their post-graduation successes as alumni.

Our tagline, "Hands-on education for real-

world achievement," is more than a slogan – it truly is the way we do business. Faculty members bring their real-world problem-solving experiences into the classroom, and Oregon Tech students have myriad opportunities to gain hands-on experience outside the classroom through externships, internships, cooperative programs, and capstone projects.

By attending Oregon Tech, you have chosen an education and a future that we know will be filled with learning, success, satisfaction, and a lifelong connection to the university and to each other. By attending Oregon Tech, you have chosen rigor, quality, and relevance. By attending Oregon Tech, you are part of the excellence, innovation, and success that have served Oregon Tech's graduates well and have continuously increased our reputation and rankings in Oregon, the Pacific Northwest, and nationally.

Welcome to the Oregon Tech Family – we're glad you're here and we very much look forward to helping you achieve your own personal success while you are here as students and after you graduate as alumni!

Mission Statement and Core Themes

Mission Statement

Oregon Institute of Technology offers innovative and rigorous applied degree programs in the areas of engineering, engineering technologies, health technologies, management, and the arts and sciences. To foster student and graduate success, the university provides an intimate, hands-on learning environment, focusing on application of theory to practice. Oregon Tech offers statewide educational opportunities for the emerging needs of Oregon's citizens and provides information and technical expertise to state, national, and international constituents.

Core Themes

Oregon Institute of Technology:

- Applied Degree Programs
- Student and Graduate Success
- Statewide Educational Opportunities
- Public Service

Essential Learning Outcomes for Students

Oregon Tech's Essential Student Learning Outcomes (ESLOs) support Oregon Tech's institutional mission and core themes. The outcomes and associated criteria reflect the rigorous applied nature of Oregon Tech's degree programs.

The ESLOs reflect the common expectations about the knowledge, skills, and abilities that Oregon Tech students will acquire and are reflected in the General Education require-

ments that lay the foundation upon which the major curricula build. Engaging in these ESLOs will support Oregon Tech graduates in developing the habits of mind and behaviors of professionals and lifelong learners.

Oregon Tech students will:

- **communicate** effectively orally and in writing;
- engage in a process of **inquiry and analysis**;
- make and defend reasonable **ethical** judgments;
- collaborate effectively in **teams** or groups;
- demonstrate **quantitative literacy**;
- explore **diverse perspectives**.

About Oregon Tech

For nearly 70 years, Oregon Institute of Technology (Oregon Tech) has focused on changing the lives of Oregonians by preparing them to meet the technical and management needs of business, industry and healthcare agencies, and is accredited by the Northwest Commission on Colleges and Universities. Individual programs also are accredited by the appropriate professional organizations. Today, Oregon Tech offers Bachelor of Science programs in engineering, health technologies, management, communication and the applied sciences. These include bachelor degree-completion programs offered online and over 20 bachelor and master programs that can be entirely completed at the Wilsonville Campus. Oregon Tech also offers a number of associate degree programs, both online and in Salem and La Grande, Oregon.

With a mission to deliver technology education throughout the Pacific Northwest, we partner with business and industry leaders to ensure our programs adapt to new technologies and workforce demands. Oregon Tech's real-world focus gives our students a competitive edge: nearly 90 percent are employed or in graduate school within six months of graduation. Year after year, our baccalaureate graduates garner the highest starting salaries in Oregon and among the highest in the nation.

Our applied approach to teaching, which blends theory and practice, is the main reason our graduates and alumni are so avidly recruited. Oregon Tech students have amazing opportunities to apply what they learn in lab-based classes, clinics, externships and workplaces. Oregon Tech's faculty and staff,

who come to Oregon Tech with relevant business, industrial, or clinical experience, reinforce this practical focus in the classroom. And in every program, a relevant general-education core underscores major studies, broadening students' understanding of the world and teaching them to communicate effectively, solve problems, and think for themselves. This student-focused approach to teaching and learning provides many benefits of a private education at a public price.

One Oregon Tech, Two Primary Campuses, Program-Specific Branch Campuses, and E-Learning, too!

Oregon Tech is one institution with multiple locations. Established in 1947, Oregon Tech offers degree programs at locations throughout the State of Oregon and even beyond to meet the needs of students seeking a top quality, hands-on education.

The main, residential campus is located in **Klamath Falls** in beautiful Southern Oregon. Our campus in Klamath Falls is nestled on the eastern slope of the Cascade Mountains. The 190-acre campus offers spectacular views of Upper Klamath Lake, pine-studded knolls and snow-capped peaks from nearly every building. Klamath Falls, a city of about 20,000 residents (45,000 in the urban growth area), is located in Klamath County in south-central Oregon, about 20 miles from the California border and in the same county that has Crater Lake National Park. Known as Oregon's "City of Sunshine," Klamath Falls enjoys about 300 days of blue skies each year.

Our campus in **Wilsonville**, located just south of the greater Portland metro area, offers degree programs in a state-of-the-art facility designed to provide an industry-focused, urban university experience at the heart of "Silicon Forest". The Wilsonville campus offers over 20 high-demand degree programs at the BS and MS level. The campus is easily accessible to business professionals and provides excellent opportunities for students seeking internships and employment while completing their degrees. Oregon Tech serves students and employers in the Portland metropolitan area by offering university degree programs at the Oregon Tech Wilsonville campus and the Willow Creek Center (WCC) in Beaverton.

Oregon Tech offers online programs through the **Online Learning** department. Oregon Tech understands that working professionals are busy and ready to advance their education as quickly and conveniently as possible. Oregon Tech Online lets you finish your certificate, associate, or bachelor's degree without leaving your home or office and without the hassles of travel, childcare or giving up your current job. The primary mission of Oregon Tech Online is to offer convenient programs and courses to admitted and non-admitted students.

Oregon Tech Online students who wish to be admitted to Diagnostic Medical Sonography, Echocardiography, Radiologic Science, Respiratory Care or Vascular Technology must meet all the regular admission requirements and be professionals working in their chosen field. This will assure access to clinical sites as required in these programs. Though Dental Hygienists

must hold professional credentials to be eligible for admission to the program, employment in the field is not a requirement of admission.

Since 2005, Oregon Tech has partnered with Oregon Dental Service and Eastern Oregon University to provide Oregonians the opportunity to obtain an Associate of Applied Science degree in Dental Hygiene in **La Grande**. The university also offers a baccalaureate program in dental hygiene in **Salem** through a partnership between Oregon Tech and Chemeketa Community College. The classrooms and dental hygiene clinic are located in Chemeketa's new, state-of-the-art Health & Sciences Building. The program requires one year of prerequisite (pre-dental hygiene) coursework prior to acceptance.

Oregon Tech **Seattle at Boeing** offers Bachelor and Master of Science Degrees in Manufacturing Engineering Technology, as

well as a Bachelor of Science Degree in both Mechanical Engineering and Mechanical Engineering Technology to employees of The Boeing Company at sites in the Puget Sound area. Also offered are review classes for the Society of Manufacturing Engineers' CMfgT and CMfgE exams and three Certificates of Completion; two in Composites, and one in Computer Aided Design.

Oregon Tech is accredited by the Northwest Commission on Colleges and Universities. Additional accreditations, licensure and approvals of individual programs are listed in the appropriate program sections of this catalog. Copies of accreditation documents are available in the Office of the Vice President for Academic Affairs/Provost, Oregon Institute of Technology, 3201 Campus Dr., Klamath Falls, OR 97601-8801.

As of January 2015, Oregon Tech Online is an approved institutional participant in the

National Council for State Authorization Reciprocity Agreements (NC-SARA) initiative, which allows for increased access to online courses for many out of state students. Oregon Tech Online is authorized by the Washington Student Achievement Council and meets the requirements and minimum educational standards established for degree-granting institutions under the Degree-Granting Institutions Act. This authorization is subject to periodic review and authorizes Oregon Institute of Technology to offer field placement components for specific degree programs. The Council may be contacted for a list of currently authorized programs. Authorization by the Council does not carry with it an endorsement by the Council of the institution or its programs. Any person desiring information about the requirements of the act or the applicability of those requirements to the institution may contact the Council at P.O. Box 43430, Olympia, WA 98504-3430.

Academic Programs

Degree Programs

Klamath Falls

Master of Science

Civil Engineering
Manufacturing Engineering Technology

Bachelor of Applied Science

Technology and Management

Bachelor of Science

Applied Mathematics
Applied Psychology
Biology
Biology-Health Sciences
Civil Engineering
Communication Studies
Computer Engineering Technology
Dental Hygiene
Diagnostic Medical Sonography
Echocardiography
Electrical Engineering, with emphasis in:
 Electrical Power
 Microelectronics
 Renewable Energy
Embedded Systems Engineering
 Technology
Environmental Sciences
Geomatics, with options in:
 Geographic Information Systems
 Surveying
Health Care Management with options in:
 Administration
 Clinical
 Radiologic Science Management
Health Informatics
Information Technology
Management, with options in:
 Accounting
 Entrepreneurship/Small Business
 Management
 Marketing
Manufacturing Engineering Technology
Mechanical Engineering
Mechanical Engineering Technology
Nuclear Medicine Technology
Nursing (*through OHSU School of Nursing*)
Operations Management
Radiologic Science
Renewable Energy Engineering
Respiratory Care
Software Engineering Technology
Vascular Technology

Associate Degrees

Associate of Applied Science

Sleep Health:
 Clinical Sleep Health
 Polysomnographic Technology

Associate of Engineering

Computer Engineering Technology
Software Engineering Technology

Minors

Arts, Literature, and Philosophy (ALPS)
Applied Mathematics
Applied Physics
Applied Statistics
Biology
Business
Chemistry
Geographic Information Systems
Human Communication
Information Technology
International Business
Medical Sociology
Psychology
Surveying
Technical Communication

Specializations

Accounting
Entrepreneurship/Small Business
 Management
Marketing
Picture Archiving and Communication
 Systems (PACS)

Certificates

Accounting (*post baccalaureate*)
Applied Behavior Analysis (*Graduate*)
Dispute Resolution
Polysomnographic Technology
Sleep Health

Wilsonville

Master of Science

Manufacturing Engineering Technology
Renewable Energy Engineering

Bachelor of Applied Science

Technology and Management

Bachelor of Science

Clinical Laboratory Science (*joint degree with OHSU*)
Electrical Engineering
 with emphasis in:
 Electrical Power
 Microelectronics
 Optical Engineering
 Renewable Energy
 Robotics, Automation, and Control
 With dual Major in:
 Robotics, Automation, and Control
 Optical Engineering
 Systems Engineering & Technical
 Management
Electronics Engineering Technology
Emergency Medical Services (*joint degree with OHSU*)
Embedded Systems Engineering
 Technology
Geomatics, with options in:
 Geographic Information Systems
 Surveying
Health Informatics
Information Technology
Manufacturing Engineering Technology
Mechanical Engineering Technology
Operations Management
Renewable Energy Engineering
Software Engineering Technology
Associate of Applied Science
 Emergency Medical Technology–
 Paramedic (*joint degree with OHSU*)
Minors
 Applied Mathematics
 Business
 Information Technology
 Psychology
 Surveying
Certificates
 Applied Behavior Analysis (*Graduate*)

Online

Master of Science

Manufacturing Engineering Technology

Bachelor of Applied Science

Technology and Management

Bachelor of Science

Dental Hygiene (*degree completion*)

Diagnostic Medical Sonography (*degree completion*)

Echocardiography (*degree completion*)

Health Care Management with options
in: Clinical and Radiologic Science
Management

Health Informatics

Information Technology

Operations Management

Radiologic Science (*degree completion*)

Respiratory Care (*degree completion*)

Vascular Technology (*degree completion*)

Associate of Applied Science

Sleep Health

Clinical Sleep Health

Polysomnographic Technology

Minors

Psychology

Business

Information Technology

Specialization

Picture Archiving and Communication
Systems (PACS)

Certificates

Clinical Sleep Health

Polysomnographic Technology

Seattle at Boeing

Master of Science

Manufacturing Engineering Technology

Bachelor of Science

Manufacturing Engineering Technology

Mechanical Engineering

Mechanical Engineering Technology

Chemeketa

Community College

Bachelor of Science

Dental Hygiene

La Grande (ODS

College of Dental

Sciences)

Associate of Applied Science

Dental Hygiene

Academic Calendar 2015-16

Fall Term, 2015

MAY 11-21	Registration for Fall Term
SEP 24-25	Registration for those not registered in advance (new freshmen, new transfer students, and new non-admitted students and re-enrolling students)
SEP 25-26	New student orientation
SEP 28	Classes begin
OCT 2	Last day to use Web for Student for all registration changes
OCT 9	Last day to pay fees or register without late charge
OCT 9	Last day to drop without a "W"*
NOV 9-20	Registration for Winter Term
NOV 13	Last day for course withdraw*
NOV 11	Veterans Day holiday
NOV 26 (1:00 p.m.)	Thanksgiving holiday
DEC 4	Last day to completely withdraw from the University
DEC 7-10	Final exams week
DEC 11	Fall Term ends

For information regarding refund dates related to dropped courses please see the Cashier's Calendar at:
<http://www.oit.edu/faculty-staff/business-affairs/accounts-receivable/cashiers-office>

Winter Term, 2016

NOV 9-20, 2015	Registration for Winter Term
JAN 1	New Year's holiday
JAN 4	Registration and orientation for new students
JAN 4	Classes begin
JAN 8	Last day to use Web for Student for all registration changes
JAN 15	Last day to pay fees or register without late charge
JAN 15	Last day to drop without a "W"*
JAN 18	Martin Luther King, Jr. holiday
FEB 15-25	Registration for Spring Term
FEB 19	Last day for course withdraw*
MAR 11	Last day to completely withdraw from the University
MAR 14-17	Final exams week
MAR 18	Winter Term ends

Spring Term, 2016

FEB 15-25	Registration for Spring Term
MAR 28	Registration and orientation for new students
MAR 28	Classes begin
APR 1	Last day to use Web for Student for all registration changes
APR 8	Last day to pay fees or register without late charge
APR 8	Last day to drop without a "W"*
MAY 2	Registration for Summer Term for all students begins
MAY 9-19	Registration for Fall Term
MAY 13	Last day for course withdraw*
MAY 30	Memorial Day holiday
JUN 3	Last day to completely withdraw from the University
JUN 6-9	Final exams week
JUN 10	Spring Term ends
JUN 11	Commencement

Summer Term, 2016 (8-week session)

MAY 2	Registration for all students begins
JUN 20	Classes begin
AUG 12	Summer Term ends
First 4-week Session	
JUN 20	Classes begin
JUL 15	First 4-week Session ends
Second 4-week Session	
JUL 18	Classes begin
AUG 12	Second 4-week Session ends

Admissions and Financial Aid

Office of Admissions

College Union, 1st Floor
800-422-2017 (toll free)
(541) 885-1150
(541) 885-1024 (fax)
oit@oit.edu
www.oit.edu/admissions

The Oregon Tech Admissions Office is located on the first floor of the College Union on the Klamath Falls campus. Open weekdays from 8 a.m. to 5 p.m., its primary functions are to help prospective students investigate and evaluate Oregon Tech, to manage applications for admission and to assist applicants

with the enrollment process. The Admissions Office operates with the cooperation and support of the entire campus community.

Admissions welcomes visiting students and their families to daily tours, and sessions with admissions counselors, coaches, and other staff. Oregon Tech also hosts several Campus Preview events annually. For Campus Preview dates or to register online for a visit or Campus Preview, go to www.oit.edu/visit or call 541-885-1150 or 800-422-2017. To visit Oregon Tech Wilsonville, call 503-821-1250.

Hearing impaired persons may call the TTY number at 541-885-1072.

Admission requirements apply to all applicants of Oregon Tech. All students who wish to enroll in more than eight credits in a term, receive financial aid and/or graduate from Oregon Tech must apply and be accepted for admission. Applications for general admission (excluding programs requiring specialized admission) are processed on the campus in Klamath Falls regardless of the campus location for the student.

Application Deadlines

The priority application deadline for maximum scholarship and financial aid consideration each fall term is March 1. Oregon Tech accepts applications on a rolling basis, but

students must have a complete application on file in Admissions three weeks prior to the first day of classes as follows:

2015-2016	Application Deadlines
Fall Term	September 7, 2015
Winter Term	December 14, 2015
Spring Term	March 7, 2016
Summer Term	May 30, 2016

Applications

Applications for admission are available online at www.oit.edu/apply. A complete application consists of an application for admission, application fee, official transcripts, test scores, and other required documentation depending on the type of applicant (see Admission Eligibility Requirements).

Students who were previously admitted, but never enrolled, and students who want to re-enroll after skipping four or more terms must log back into the online application and click the link entitled “new” which is located under the “Admission Term” heading, then select the appropriate application to update their information. Students who have not yet registered for classes may change their entry term by logging back into the online application and click on the link entitled “new” which is located under the “Admission Term” heading, then select the appropriate application to update their term. Students who want to only update their choice of major or choice

of campus must use the Application Change Form located online at www.oit.edu/applications under “Other Commonly Used Forms.”

Students who wish to enroll as non-degree seeking students in no more than eight credits per term may submit a Non-Admit Application form; however students must be fully admitted to qualify for financial aid. These forms are available online at www.oit.edu/applications.

International students must complete the International Student Application. Students seeking enrollment through an approved exchange program must complete the International Exchange Application. Both are available online at www.oit.edu/international.

The MS-Manufacturing Technology, MS-Renewable Energy Engineering, and the following majors require a secondary application process after students are granted

general admission and after students meet the eligibility requirements of the program. Each program has its own deadlines, admission requirements and processes which are outlined in the departmental pages of this catalog.

Clinical Laboratory Science (OHSU/Wilsonville)
Diagnostic Medical Sonography
Dental Hygiene (Klamath Falls, La Grande, Salem)
Echocardiography
Nuclear Medicine Technology
Nursing (with OHSU/Klamath Falls)
Paramedic/EMT (OHSU/Wilsonville)
Radiologic Science
Respiratory Care
Vascular Technology

Application Procedures

Every applicant must complete the following steps:

1. Complete the appropriate *Application for Admission* (www.oit.edu/applications).
2. Submit the \$50 non-refundable application fee. (Applicants to online programs submit an additional \$50 non-refundable Online Program Fee). Checks or money orders should be made payable to Oregon Tech. Students who qualify may opt to defer the application fee until enrollment in classes. *OUS Application Fee Deferral Forms* are available at www.oit.edu/applications.
3. Applicants who have earned fewer than 36 college credits must have official SAT I or ACT scores sent to Oregon Tech. Some applicants who graduated from high school three or more years ago may be exempted from this requirement by permission of the Admissions Director.
4. Have official transcripts from all postsecondary institutions that you attended, or received credit from, sent directly to the Oregon Tech Admissions Office. Any offer of admission is contingent upon the submission of satisfactory final transcripts prior to enrollment at Oregon Tech.
5. Have official high school transcripts or GED test results sent directly to the Oregon Tech Admissions Office. High School records are not required from applicants who graduated prior to 1997 and who have earned at least 36 college credits. Applicants who are currently enrolled in high school may be admitted on the basis of six or more semesters of high school work provided that they will have met the 15 subject requirements at the time of high school graduation. In any case, each student's final official high school transcript must be provided upon graduation to complete the admission process.
6. Have official Advanced Placement (AP) or International Baccalaureate (IB) score reports sent to the Oregon Tech Admissions Office, if applicable.

When applying to an online program, submit an Eligibility Verification Form (<http://bit.ly/1a3EOud>). This will help ensure you meet any additional requirements of your desired program. To see eligibility requirements, visit www.oit.edu/online/degrees, and select your desired program.

Some programs at Oregon Tech do not have sufficient space to enroll all qualified applicants who seek admission. In these cases, Oregon Tech reserves the right to offer admission to the most qualified applicants, on a first-come, first-served basis or through a combination of the two strategies.

Upon admission and prior to registration, a completed health form showing evidence of adequate immunizations must be on file with Oregon Tech's Student Health Center. For further information, see the Student Health Center section of this catalog. Students are not required to submit these forms if taking fewer than six credits per term.

If a student fails to submit the required documents in complete and satisfactory order, admission and registration may be cancelled. All records become the property of Oregon Tech.

Social Security Number Disclosure and Consent Statement

Students are requested to provide, **voluntarily**, a Social Security Number (SSN) to assist Oregon Tech in developing, validating or administering predictive tests and assessments; administering student aid programs; improving instruction; internal identification of students; student parking; collection of student debts; or comparing student educational experiences with subsequent workforce experiences. By providing your Social Security Number, students consent to the uses identified above. This request is made pursuant to ORS 351.070 and 351.085. Provision of a Social Security Number and consent to its use is not required and, if a student chooses so, will not be denied any right, benefit or privilege provided by Applicants may enter a series of zeros (000-00-0000) on their admission application in place of their actual SSN, but should be aware that by not providing their SSN they will not be eligible to receive federal student aid or university scholarships.

Additionally, applicants should be aware that Oregon Tech is required to obtain a Social

Security Number in order to file certain returns with the Internal Revenue Service (IRS) for the applicant to receive a 1098T and to furnish a statement to you. The returns that Oregon Tech must file contain information about qualified tuition and related expenses. Privacy Act Notice: Section 6109 of the Internal Revenue Code requires students to give a correct SSN to persons who must file information returns with the IRS to report certain information. The IRS uses the SSN for identification purposes and to help verify the accuracy of tax returns. For more information, refer to IRS code 6050S.

Admission Requirements

Freshman Admission

Academic performance is not the sole criterion for admission. Oregon Tech may evaluate a person's behavior and background

to determine their ability to maintain the standards of academic and professional conduct expected at the university. An evaluation may take into consideration current behavior

and performance as well as past experiences and actions. Simply qualifying for admission does not guarantee admission.

For freshman admission, students must meet entrance requirements adopted by the State Board of Higher Education in Oregon. Applicants who are enrolled in or who have graduated from regionally accredited high schools must:

1. Submit an official high school transcript. An unweighted cumulative high school grade point average of 3.00 is required for admission. Applicants with a GPA between 2.50 and 2.99 may qualify for admission provided they submit adequate SAT Reasoning Exam scores or ACT scores.
2. Submit results from either the SAT Reasoning Exam, SAT I or ACT
 - a. Applicants with an unweighted cumulative high school grade point average of 3.00 or better must take the SAT or ACT and have official scores submitted to Oregon Tech, but there is no minimum SAT or ACT score.
 - b. Applicants with an unweighted GPA of 2.75 to 2.99 must submit combined SAT Reasoning Exam scores of 800 or better on the Critical Reading (formerly called Verbal) and Math tests with a score of at least 400 on the Math portion of the SAT. Those submitting ACT results must have an ACT Math score of at least 17 and a Composite score of at least 17.
 - c. Applicants with an unweighted GPA of 2.50 to 2.74 must submit combined SAT Reasoning Exam scores of 1000 or better on the Critical Reading (formerly called Verbal) and Math tests with a score of at least 500 on the Math portion of the SAT. Those submitting ACT results must have an ACT Math score of at least 21 and a Composite score of at least 21.
 - d. Applicants who have graduated from a standard high school three or more years prior to the term they wish to be admitted and enter the university are not required to submit SAT or ACT aptitude test scores. However, if an applicant wishes to be considered for university scholarships, they must submit aptitude test scores.
3. Applicants must satisfactorily (grade of C- or above) complete at least 15 units (one year is equal to one unit) of college preparatory work in the following areas, unless they graduated from high school prior to spring 1985.
 - a. English (4 units). Shall include the study of the English language, literature, speaking and listening, and writing, with emphasis on and frequent practice in writing expository prose during all four years.
 - b. Mathematics (3 units). Shall include first-year algebra and two additional years of college preparatory mathematics selected from geometry (deductive or descriptive); advanced topics in algebra (through Algebra II), trigonometry, analytical geometry, finite mathematics, advanced applications, calculus, and probability and statistics, or courses that integrate topics from two or more of these areas. One unit is strongly recommended in the senior year. (Algebra and geometry taken prior to 9th grade will be accepted.)
 - c. Science (3 units). Shall include at least one year each in two fields of inquiry based college preparatory science such as biology, chemistry, physics, or earth and physical science. Science courses that are "inquiry based" provide students the opportunity to apply scientific reasoning and critical thinking to support conclusions or explanations with evidence from their investigations. It is strongly recommended that one year be taken as a laboratory science.
 - d. Social Studies (3 units). Shall include analysis of societal issues and events. It is strongly recommended that study includes knowledge and use of geographic information, patterns of United States history, patterns of human history, structures and systems of US Government, and analysis of economic systems.
 - e. Second Language (2 units). Shall include two years of the same high school-level second language, or a C- or better in the third year of a high school-level language, or two terms of a college-level second language with a grade of C- or better, or satisfactory performance on an approved assessment of second language proficiency. Demonstrated proficiency in an American Indian language can meet all or part of the second language requirement, as certified by the governing body of any federally recognized tribe. American Sign Language meets the second language requirement. The second language requirement only applies to applicants graduating from high school in 1997 or later. If admitted as an exception, students failing to meet this requirement must complete two terms of the same college-level second language with a C- or better before earning a degree from Oregon Tech.

Applicants who are unable to meet the 15 subject requirements may be eligible for admission by earning a minimum score of 470 or above (940 total) on each of two College Board SAT Subject Tests (in Math level I or IIC and another test of the student's choice). Students who do not take a SAT Subject test in a second language must

prove language proficiency through another approved process.

Applicants who have not graduated from high school and who are applying on the basis of GED scores must submit test results showing a minimum of 170 on each subject area and 680 overall. A special admission

option will be offered to test takers who scored no lower than 150 on the Reasoning Through Language Arts Test, no lower than 150 on the Social Studies Test, no lower than 160 on the Science Test, and no lower than 170 on the Mathematics Reasoning Test.

GED tests taken prior to 2015 must show a

minimum composite score of 580 (58 on GED exams administered prior to 2002) with a minimum score of 410 on each GED subtest (41 on subtests administered prior to 2002). GED applicants must meet the Foreign Language requirement. Applicants whose pre-2015 GED scores fall below these standards may qualify on the basis of a combination of GED and SAT Reasoning or ACT exam results:

Applicants with GED composite scores of 550 to 570 (55 to 57 on tests administered before 2002) need to submit combined SAT Reasoning Exam scores of 800 or better on the Critical Reading (formerly called Verbal) and Math tests with a score of at least 400 on the Math portion of the SAT. Those submitting ACT results must have an ACT Math score of at least 17 and a Composite score of at least 17.

Applicants with GED composite scores of 500 to 540 (50 to 54 on tests administered before 2002) need to submit combined SAT Reasoning Exam scores of 1000 or better on the Critical Reading (formerly called Verbal) and Math tests with a score of at least 500 on the Math portion of the SAT. Those submitting ACT results must have an ACT Math score of at least 21 and a Composite score of at least 21.

Public high school students must graduate from a standard or regionally accredited high school. Private high school students must graduate from regionally accredited high schools. Home-schooled students and graduates of unaccredited or non-standard high schools, as well as applicants who fail to meet the 15 subject requirements, may be admitted by submitting SAT Reasoning Exam score of 1000 on the Math and Critical Reasoning sections combined or an ACT composite score of 21 or better and a minimum score of 470 or above (940 total) on each of two College Board SAT Subject Tests (Math level I or IIC and another test of the student's choice, in a subject other than math). An examination in a second language is strongly recommended to qualify the applicant for admission by meeting the language proficiency requirements. Students who do not take an SAT Subject test in a second language must prove language proficiency through another approved process.

Transfer Admission

A transfer student is one who has previously earned credits at another regionally accredited institution of higher education. A student must have earned at least 36 college-level credit hours (24 semester credits) to be admitted on the basis of his/her college record alone.

- Transfer applicants must have a cumulative 2.25 GPA or better in college level classes unless they hold an Oregon Transfer Module (OTM) or an associate or bachelor's degree, in which case, a cumulative GPA of 2.0 is required.
- In order to be admitted to Oregon Tech, transfer applicants must demonstrate proficiency in English and Math by completing the equivalent of Math 95 (Intermediate Algebra) or higher and WRI 115 (Introduction to Writing) or higher with grades of "C-" or better.
- Transfer applicants must have complet-

ed two terms of a college-level second language with a grade of C- or better, or two years of the same high school-level second language with grades of C- or better, or satisfactory performance on an approved second language assessment of proficiency. Demonstrated proficiency in an American Indian language can meet all or part of the second language requirement, as certified by the governing body of any federally recognized tribe. American Sign Language meets the second language requirement. The second language requirement applies to transfer applicants graduating from high school in 1997 or after.

- Applicants who do not have an Associate's or a Bachelor's degree must have at least 36 college-level credits. If more than 10 percent of an applicant's credits are in Physical Education, credits beyond the 10 percent threshold will not be counted toward meeting GPA requirements.
- Applicants must be eligible to re-enroll in the previous institution attended.

Official transcripts from all postsecondary institutions must be submitted for consideration. Applicants who graduated from high school after 1997 must also submit official high school transcripts, unless they have completed two terms of college-level study in a second language.

Official transcripts from all postsecondary institutions must be submitted for consideration. Applicants who graduated from high school after 1997 must also submit official high school transcripts, unless they have completed two terms of college-level study in a second language.

Applicants who have earned fewer than 36 quarter or fewer than 24 semester hours of college-level work must also provide high school transcripts or GED scores. They must also provide SAT I or ACT scores. In some

cases, these applicants must submit SAT/ACT scores. Admission will be based on both high school and transfer GPA and subject requirements. Students who have completed fewer than 12 transferable quarter credits (8 semester) must meet freshman admission requirements.

A *Transfer Evaluation Report* acknowledging the courses accepted by the university will be sent after admission status has been confirmed. Acceptance of vocational/technical courses may be granted after registration if the student's administering department finds that vocational/technical courses have satisfied certain bachelor's degree requirements. In all cases, course and/or department prerequisites will be enforced.

Transfer Articulation Agreements

Oregon Tech is dedicated to enhancing partnerships with regional community colleges. One important way of doing this is by forming articulation agreements. An articulation agreement is an officially approved agreement that matches coursework between schools. These agreements are designed to help students make a seamless transition when transferring to Oregon Tech. Articulation agreements give students a clear understanding of what courses will transfer to Oregon Tech and satisfy requirements for their major while minimizing overlap or repeat of courses. Some agreements accept an associate's degree in its entirety while other agreements outline specific courses to take as a student plans for transfer. Students should inform the Admissions Office and their academic department advisor when they are utilizing an articulation agreement.

A list of articulation agreements can be found online at www.oit.edu/articulations; students may search by Oregon Tech major or by transfer institution. Questions regarding these agreements may be directed to the

students' academic department or the Office of Academic Agreements.

Non-Admit Students

A non-admit is a student who wishes to enroll in no more than eight credits per term at Oregon Tech, is not seeking a degree from Oregon Tech and has never been fully admitted to Oregon Tech in the past. A non-admit is not eligible for financial aid. Out-of-state residents are subject to non-resident tuition and fees upon enrolling in more than 6 credits. A tuition and fee schedule can be viewed online (www.oit.edu/college-costs/tuition-fees). College-level classes taken while in non-admit status may be used toward Oregon Tech graduation requirements upon completion of the full admission process or may be transferred to other institutions. Enrollment as a non-admit student does not guarantee future admission to Oregon Tech. To enroll at Oregon Tech as a non-admit, submit the Non-Admit Application Form (www.oit.edu/applications) to the Admissions Office, at least one week prior to enrollment. Oregon Tech reserves the right to deny enrollment to those who seek non-admit status.

Admission to Programs Having Clinical or Practicum Requirements

It is important that prospective students understand that admission to those programs that have clinical or practicum requirements:

1. Is selective;
2. Will be granted after consideration of an applicant's ability to assume professional responsibility for clients, patients or students served by the program; and may be denied to any student with a record of past criminal behavior or psychiatric illness, which bears upon the student's ability to fulfill clinical or practicum responsibilities.

Students seeking admission to online degree completion programs in Radiologic Science, Vascular Technology, Echocardiography, Diagnostic Medical Sonography, or Respiratory Care, must meet all regular admission requirements and be registered professionals working in their chosen field. This will ensure access to clinical sites as required in these programs. For more information, contact the Online Education Office.

Western Undergraduate Exchange

Students enrolled in some of Oregon Tech's majors are eligible for the Western Undergraduate Exchange (WUE) program. WUE is a tuition-reduction program sponsored by Western Interstate Commission for Higher Education (WICHE) that can save students from the Western United States thousands of tuition dollars each year. Students from Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, North Dakota, South Dakota, Utah, Washington, Wyoming, and Commonwealth of the Northern Mariana Islands are eligible. Students from these states who apply for WUE-eligible majors

pay just 150 percent of the in-state tuition. No request is required to receive WUE. Students from WUE states who enter WUE-eligible programs will automatically be reviewed for WUE rates upon admission to Oregon Tech.



Eligible Programs

All majors in the College of Health, Arts and Sciences except;

- Clinical Laboratory Science and pre-Clinical Laboratory Science
- Dental Hygiene and pre-Dental Hygiene
- Medical Imaging Technology and pre-Medical Imaging Technology
- Nursing after acceptance by Oregon Health Sciences University
- Emergency Medical Services, Pre-Paramedic, Paramedic, EMS Management

All majors in the College of Engineering, Technology and Management.

WUE is not offered for the Oregon Tech Online Education programs. WUE students are ineligible for the Presidential Academic Scholarship, although WUE offers the greater savings for non-resident students.

WUE Requirements

To maintain eligibility you must:

- Remain continuously enrolled throughout fall, winter, and spring of the academic year. Summer enrollment at Oregon Tech is not required to maintain eligibility.
- Enroll in at least 12 credits per term and maintain Satisfactory Academic Standing. Students who are simultaneously admitted to Oregon Tech and a community college to allow dual enrollment must take at least 9 credits per term from Oregon Tech with a combined total of 12 credits per term. GPA and completed credits are monitored each academic year.
- Students wishing to 'stop-out' of enrollment for a term must submit a written request to the Office of the Registrar before the start of that term. Requests are granted at the discretion of the university.
- Be seeking your first bachelor's degree

International Student Admission

Oregon Tech welcomes international students as applicants and as vital members of its campus community. In applying for admission, send the following to the Admissions Office:

1. An *International Student Application for Admission* accompanied by a \$50 (U.S.) non-refundable fee.
2. Official transcripts, in English or with an accompanying official translation, of all high school and post-high school institutions attended.
3. Official test scores on the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System exam (IELTS). A minimum score of 520 paper-based TOEFL, 190 computer-based TOEFL, 68 Internet-based TOEFL or 6 IELTS is required for consideration.
4. A completed *Statement of Financial Responsibility* form, indicating that you have the necessary financial resources in U.S. dollars to support yourself while enrolled.
5. A letter, if appropriate, from parents and/or sponsors indicating the amount of financial support they will provide in U.S. dollars.
6. Documentation showing that you, your parents and/or your sponsors have adequate financial resources to meet your expenses while enrolled at Oregon Tech. Examples include official bank statements, tax forms and letters of employment showing annual earnings.
7. An official credential evaluation from an Oregon Tech-approved credential service for all coursework completed at a post-secondary institution outside the United States. Examples include the Association of Collegiate Registrars and Admissions Officers (<http://www.aacrao.org/international/foreignEdCred.cfm>) and World Education Services (www.wes.org).

A completed health history and immunization form must be submitted. In addition to the health requirements that need to be fulfilled before registration (refer to Integrated Student Health Center section of this catalog for health history and immunization requirements); international students must have at least one documented MMR vaccine on file at the Integrated Student Health Center prior to the student attending any classes (per OAR 333-050-0130). Also, students from countries identified as high risk for tuberculosis (most countries in Latin America and the Caribbean, Africa, Asia, Eastern Europe and Russia) are required to complete a TB screening upon entrance to Oregon Tech. This may include a TB skin test and/or a chest x-ray. This can be done at the Integrated Student Health Center if records are not available.

Exchange Student Admission

Oregon Tech welcomes exchange students through multiple exchange partnership agreements. Students at partner institutions work with an advisor at their “home” campus to meet the requirements of Oregon Tech’s international exchange application process. It is recommended that exchange students begin the exchange application process at least nine months prior to the planned date of entry. This allows ample time for submission of documents that the U.S. Bureau of Citizenship and Immigration Services requires Oregon Tech to collect before we can issue the I-20 form that is used to secure an F-1 visa.

Admission Exceptions

The Admissions Committee and Director of Admissions retain the right to make exceptions to the specified requirements for Admission or add stipulations to certain offers of admission. For additional information, contact the Director of Admissions.

Registration

Registration Events for new students occur prior to the start of each term. All students new to the Klamath Falls campus must participate in a Klamath Falls Registration program and all students new to the Wilsonville campus must participate in Wilsonville’s Orientation & Registration program. In addition to placement testing and meeting with advisors to plan an academic schedule, students have the opportunity during Registration to register for classes, set up Oregon Tech computer and email accounts, receive a university ID card and learn more about making a successful transition to Oregon Tech. Students are encouraged to attend an early Registration event rather than waiting to register at the beginning of a term. Visit www.oit.edu/newwings or contact the Admissions Office at (541) 885-1150 or oit@oit.edu for more information.

Placement Testing

Oregon Tech’s Student Success Center (SSC) administers all placement testing for Oregon Tech students. Student admission records are examined to determine placement requirements. Students transferring in math credit for calculus or beyond, or who have transferred in math credits to fulfill all of the math requirements for their major, are exempt from the math placement requirement. Transfer students with more than 36 transferrable college credits are exempt from the reading placement requirement. Students transferring in college-level writing are exempt from the writing placement requirement. Entering students in health programs requiring Human Anatomy and Physiology with transferable college credit for this course are exempt from the entry assessment for the Human Anatomy and Physiology course sequence. Placement tests are available prior to the term of entry and in conjunction with new student registration. Visit www.oit.edu/newwings or contact (541) 885-1791 or testing@oit.edu for more information.

Financial Aid Programs and Application Process

College Union, 1st Floor
(541) 885-1280
dollars@oit.edu
www.oit.edu/faid

The Financial Aid Office is committed to providing high-quality service to all Oregon

Tech students, their families and the community. Our office strives to provide information on a complex topic that enables students to make decisions regarding their educational funding.

The information contained in this catalog is

general in nature and is not meant to serve as notification of students’ rights and responsibilities as financial aid recipients. Oregon Tech’s Financial Aid *Award Guide* serves that purpose. The Award Guide is available on our website at www.oit.edu/faid. Additional questions regarding the application process should

be directed to the Financial Aid Office.

All students applying for federal financial aid must complete the *Free Application for Federal Student Aid* (FAFSA) available at www.fafsa.gov. A federally approved needs-analysis methodology is applied consistently to information provided by all applicants.

Application Procedures/Priority Deadlines

All students applying for federal and state aid must complete the *Free Application for Federal Student Aid* (FAFSA) and list Oregon Tech's school code (003211). We encourage you to file as soon after January 1st as possible to be considered for your maximum eligibility. Some funds are very limited and are expended early.

Once the FAFSA information is received and reviewed by the Financial Aid Office, new students will receive a letter instructing them on how to log into "Web for Student" to view their award letter and the federally mandated shopping sheet online. Students may accept their aid online and request changes. Returning students will receive an email to their Oregon Tech email account when their award letter is ready to view online. *After accepting aid students must log back in to web for student and answer the Title IV authorization questions (24 hours later).* The Financial Aid Award Guide is located on our website at www.oit.edu/faid. It is important that students read the guide and follow the instructions on the letter they are sent.

Any updates/changes to award letters will result in an email to the student's Oregon Tech email account. If additional information is requested, such as tax transcripts or worksheets, students should return the documents as soon as possible to receive an *Offer of Financial Aid*. The award letter will list all types of aid for which the student is eligible. The *Award Guide* is a detailed booklet explaining programs, disbursement procedures and student rights and responsibilities, as well as cost estimates and other miscellaneous information. It is the student's responsibility as a financial aid recipient to become familiar with the contents of the *Award Guide* and contact the Financial Aid Office if additional questions or concerns arise. Additionally, students should check their **Oregon Tech email accounts** for announcements and notifications from Financial Aid.

The *FAFSA must be filed for each year a*

The philosophy behind financial aid is that parents and students have the primary financial responsibility for funding the student's education.

If there are unusual financial circumstances that are not accurately reflected on the FAFSA, the student should contact the Fi-

student wishes to be considered for financial aid eligibility.

Types of Aid

All federal and state programs are need-based with the exception of the Unsubsidized Stafford Loan and the Parent Loan for Undergraduate Students (PLUS). Students receiving federal aid are allowed to receive at maximum, the cost of attendance as determined by the Financial Aid Office through all aid programs, including outside benefits such as third-party payments. Individual financial-aid packages will vary based on determined cost of attendance, expected family contributions and outside resources.

Federal Pell Grants

The estimated maximum annual Pell Grant for **2015-16 is expected to be \$5,775**. Students may receive Pell Grants for less than full time, but the grant will be prorated accordingly. Pell Grant eligibility is limited to those students who have not yet obtained a bachelor's degree. All students will be considered for Pell Grant eligibility if they file a FAFSA. Awards are granted based on the federally calculated expected family contribution (EFC).

Oregon Opportunity Grant

The annual Oregon Opportunity Grant award for 2015-16 is \$2,000. This grant program provides funding to Oregon residents in undergraduate programs attending Oregon schools. The Oregon Opportunity Grant is awarded by Oregon Student Access Commission. Students' not enrolled full time (at least 12 credits) may be eligible for a prorated part-time award if attending half time. By filing a FAFSA, students are applying for this grant. Funds are available on a first come, first-served basis and are limited. A student can receive an Oregon Opportunity Grant for a maximum of 12 terms. More information is available at www.oregonstudentaid.gov.

ncial Aid Office. Under certain conditions, professional judgment may be used and aid eligibility recalculated. The Financial Aid Office will always take the student's best interest into consideration while, at the same time, upholding federal regulations.

Federal Supplemental Educational Opportunity Grants (SEOG)

SEOG funds are very limited at Oregon Tech. Although priority for SEOG funds is given to full-time students, Oregon Tech may, on a case-by-case basis, award SEOG funds to students enrolled at least half time. The typical award is \$300 for an academic year. Only students who have not yet completed a bachelor's degree and are eligible to receive a Pell Grant will be considered for this grant.

Federal Perkins Loan

The Federal Perkins Loan Program has no origination or guarantee fees, a nine-month grace period after a student ceases to be enrolled at least half time before repayment begins and an interest rate of five percent that begins at repayment. Awards at Oregon Tech range from \$1,000 to \$2,000 per year and are based on need. Priority is given to students who are attending full time, but may also be awarded on a case-by-case basis to students attending part time. If your Perkins loan is not disbursed in fall term you will be ineligible for the remainder of 15-16.

Federal Work-Study Program

The Federal Work-Study Program allows students to earn money by working part time on campus or at an off-campus community service site. Information regarding available jobs and application procedures are located in the Career Services Office and on the Oregon Tech Web site. Awards are usually \$1,500 per year, which can be earned at any time during the academic year provided the student is enrolled at least half time.

Direct Lending

Federal Stafford Loans (subsidized and unsubsidized) are available to most students through the federal government Direct Loan Program. Loan amounts vary based on student need and grade level in a declared major at Oregon Tech. A fee for guarantee and origination will be taken at the time of disbursement. It is currently 1.073%

and subject to change. Contact the Oregon Tech Financial Aid Office for current interest rates. The difference between a subsidized and an unsubsidized loan is that the federal government pays the interest on subsidized loans while the student is in school. Students who wish to borrow through the unsubsidized

loan program should remember that interest is accruing on the loan. Interest payments can be made while in school and during the grace period, but are not required. Any interest that has accrued at the time of repayment will be capitalized. Students must complete entrance counseling and fill out a promissory note

before funds will be disbursed. To complete these items go to www.studentloans.gov.

Matthews Loan, Matthews Supplemental Loan and Oregon Tech Long Term Loan

The Matthews Loan, Matthews Supplemental Loan and Oregon Tech Long Term Loan are loans offered by Oregon Institute of Technology. These loans have a five percent interest rate, no origination fee, and repayment begins nine months after students cease to be enrolled at least half-time.

Students must complete a promissory note to receive the funds.

Federal Parent Loans for Undergraduate Students (PLUS)

Parents of dependent students can apply for funds through Parent Loans for undergraduate students. These loans are available for up to the cost of attendance minus other financial aid and resources each year. Interest begins to accrue immediately. A 4.292 % origination and guarantee fee will be taken at the time of each disbursement. Loan repayment begins 60 days after the final disbursement of the academic year. If you're a parent PLUS borrower, you can defer repayment of Direct PLUS Loans first disbursed on or after July 1, 2008, while the student for whom you obtained the loan is enrolled at least half time, and for an additional 6 months after the student graduates or drops below half-time enrollment (half-time enrollment status is determined by your child's school). You must separately request each deferment period.

Presidential Scholarships

First-time freshman applicants and transfers will receive consideration for Presidential Scholarships by applying and being accepted for admission by March 1st for the following fall term and meeting the minimum scholarship requirements. These scholarships are for fulltime students only and may be renewed for up to four years. Award levels vary depending on each recipient's academic record. For more information, go to www.oit.edu/scholarships.

Klamath County Scholarship

The Klamath County Scholarship is automatically awarded to any applicant living in Klamath County who will attend Oregon

Estimated Budgets for 2015-16 (as of March, 2015)

Standard Budget for Fall, Winter, Spring for Full-Time Students

Resident	On Campus	Off Campus	With Parent
Tuition	\$7323.75	\$7323.75	\$7323.75
Fees	\$1,515	\$1,515	\$1,515
Room and Board	\$9,032	\$7,857	\$2,466
Books and Supplies	\$1,100	\$1,100	\$1,100
Miscellaneous	\$3,853	\$3,853	\$3,853
Total	\$22,823.75	\$21,648.50	\$16,257.75

Non-Resident	On Campus	Off Campus
Tuition	\$23,310.90	\$23,310.90
Fees	\$1,515	\$1,515
Room and Board	\$9,032	\$7,857
Books and Supplies	\$1,100	\$1,100
Miscellaneous	\$3,853	\$3,853
Total	\$38,810.90	\$37,635.90

WUE	On Campus	Off Campus
Tuition	\$10,985.85	\$10,985.85
Fees	\$1,515	\$1,515
Room and Board	\$9,032	\$7,857
Books and Supplies	\$1,100	\$1,100
Miscellaneous	\$3,853	\$3,853
Total	\$26,485.85	\$25,310.85

As of this printing, the tuition and fees for Oregon Tech were not finalized. The proposed rates are as follows for the 2015-16 academic year.

As of this printing, the tuition and fees for Oregon Tech were not finalized. The proposed rates are as follows for the 2014-15 academic year.

- Tuition is based on 15 credits, 2015-16 carrying load.
- Fees based on full time enrollment.
- Budget is based on \$429 per month rent, \$274 per month food, and \$170 per month utilities for off-campus students.
- Miscellaneous expenses include medical supplies, entertainment, personal care products, housekeeping supplies, travel, and transportation.
- CLS/PAR, RCP and Dental Hygiene/La Grande have a different budget. Please consult the Oregon University fee book.
- A one-time matriculation fee is assessed for first-term students.
- MIT externs have a different budget which includes increased costs for major medical insurance, internet, and additional credits.
- A single parent may double the budgeted housing figures with documentation.
- Students enrolled in health profession majors have higher fees. Students may request actual fees to be added to budgets by the Financial Aid Office.

Budget increase for computer is \$1,000 maximum with documentation. Please visit www.ous.edu/factreport/tuition for the most current information.

Tech starting fall term after graduation from high school and who is able to meet the Presidential Scholarship criteria. Students must apply for admission, meet all admission requirements and be accepted for admission by March 1st for enrollment fall term. Recipients must be new full-time undergraduate students at Oregon Tech. This scholarship is valued at \$1000 and is NOT renewable.

Oregon Tech Foundation Scholarships

More than 200 new and returning students annually receive funding from scholarships administered by the Oregon Tech Foundation. Alumni, businesses, industry, and friends of Oregon Tech generously fund these awards. To receive consideration, students must be currently enrolled at Oregon Tech, or accepted for admission for the following fall term. Application forms and deadlines are available on the Oregon Tech Web site at www.oit.edu/otfscholars. The online scholarship application process is seamless for students and automatically generates a list of scholarships the student is eligible to apply for. The winter application process opens in early December and has a deadline of March 1.

Leadership and Diversity Scholarships (LAD)

To be considered for the LAD Scholarship, students must submit the scholarship application (available from the Financial Aid Office and online at www.oit.edu/scholarships). Students also should provide at least one letter of recommendation from a teacher, counselor, clergy or other appropriate reference. Candidates must be current Oregon Tech students or have been accepted for admission for the following fall term and submit all scholarship materials by April 1.

Residency

In Oregon, as in all other states, tuition at publicly supported four-year universities is higher for nonresident students than for resident students.

Reciprocity Agreements

Students from some Northern California counties may be eligible to attend Oregon Tech under reciprocity agreements with College of the Siskiyou, College of the Redwoods, and Shasta College. Reciprocity

Scholarship materials should be directed to the Financial Aid Office. For more information, call (541)885-1280.

Estimated Financial-Aid Budgets for 2014-15 Academic Year

Financial-aid budgets can include amounts for tuition and fees, books and supplies, room and board and miscellaneous expenses. Please remember that these are **estimated average costs for students**, and student spending habits will vary. On a very limited, case-by-case basis, the Financial Aid Office may be able to adjust a student's budget as permitted by federal regulations.

Students With Disabilities

Under certain circumstances, a student's aid package may be adjusted to reflect additional expenses. Please contact the Financial Aid Office if you would like additional information or to schedule an appointment.

Consortium Agreement Information

In some cases Oregon Tech's Financial Aid Office will process a paper consortium agreement with another school in order to allow a student taking courses at another institution to receive aid from one school for all eligible classes. The school must be one with which Oregon Tech does not have a dual admission agreement. The institution that will be awarding the degree and awarding financial aid is defined as the "home institution"; the "host institution" is defined as the institution from which the student is taking additional courses.

When Oregon Tech is serving as the "home institution," the following criteria must be

met to have classes at a "host institution" apply toward financial aid:

1. The student must be fully admitted to one of Oregon Tech's degree-granting programs and eligible for financial aid.
2. The student must be enrolled at least half-time (6 credits) at Oregon Tech
3. The classes taken at the host institution must be 100-level or higher.
4. The classes at the host institution must apply toward the student's Oregon Tech degree.
5. The classes taken at the host institution must not be offered by Oregon Tech during the term of enrollment.

It is the student's responsibility to ensure that both the "host" and the "home" institutions complete the appropriate consortium agreement. Consortium-agreement forms are available at www.oit.edu/faith under "forms." Students must provide Oregon Tech's Financial Aid Office with a final grade report from the "host institution" within 30 days of completing the course.

Dual Admitted Students

Oregon Tech has formal dual admit partnerships with multiple community colleges throughout the state. Please go online www.oit.edu/prospective-students/academic-agreements/dual-enrollment to view them.

Students who are dually admitted may be able to combine credits at both schools for full time enrollment. If Oregon Tech is the home school (giving aid) **the student must be enrolled in six credits at Oregon Tech.** Enrollment and grade information will be transmitted electronically. Credits at the host school need to be applicable to the Oregon Tech degree.

www.oit.edu/registrar for the latest version of the residency policy.

The rules used in determining residency seek to ensure that only bona fide Oregon residents are assessed the resident fee. Please see

first at the community college, the student's major, and how many reciprocity permits the college issues.

can allow selected students to attend Oregon Tech at in-state tuition rates. Each participating college has certain restrictions, which may include the county of the student's residence, required enrollment for a period of time

Tuition and Fees

Snell 101
(541) 885-1235

Fees and deposits in all Oregon state institutions of higher education are charged according to a uniform plan, varying on different campuses according to differences in conditions or nature of coursework offered. The State Board of Higher Education reserves the right to make changes in fee schedules without notice.

Below is a partial list of the estimated fees paid by students regularly enrolled for undergraduate and graduate study. Payment of full-time fees entitles students to use the library. Students may receive medical attention from the Student Health Center, use the fitness center (Tech Fit Center) and other student services. No reduction in fees is made for students who do not wish to access these services.

The estimated fee schedule for the 2015-16 academic years is provided for planning purposes only. Fees are subject to change. The current fee schedule is available from the Business Office, Registrar's Office or on the University's website.

Special Fees

All special fees are subject to change without notice.

Application Fee (Not refundable)—\$50

Must accompany admission application.

Matriculation Fee (Not refundable)— \$300 Undergraduate \$150 Graduate

A one-time fee assessed to all new Oregon Tech students.

PDF Transcript—\$15

Petition to Graduate Fee—\$56

Late Fee Payment—\$99

Students paying fees after scheduled payment dates of any term can be charged a late charge of \$99.

Late Fee to Add, Drop or Withdraw—\$20

Return-of-Check Fee—\$25

If institutional charges are met by a check which is returned because of any irregularity for which the student is responsible, a fine will be charged. The late-payment fee will be added to the returned-check charge where the returned check was used to pay tuition and fees.

Special Examination Fee, per credit—\$50

Examination for credit.

Lifetime Transcripts—\$40

A one-time fee assessed to all new and transfer students for a lifetime transcript request. Official Transcripts are issued at no charge. PDF Transcript - \$15.

Allied Health Curriculum Tuition

Tuition is assessed an additional 15 percent for courses specific to the Allied Health curriculums.

Engineering and Technology Differential Tuition

Tuition is assessed an additional 15 percent for students enrolled in Engineering and Technology programs.

Special Course Fees, per course

Special fees, in addition to regular tuition, are assigned for some courses. These fees are noted in the *Schedule of Classes* for each term.

Room and Board Costs

The 2015-16 estimated annual room-and-board costs range from \$8,265 to \$10,012, depending on room type and amount of food purchased. Room-and-board charges are assessed by term. Fees are due in accordance with the same fee payment schedule as exists for tuition. Generally, payments are due during the first week of the term.

Senior Citizen Instruction Fee

Per-credit hour: no charge.

Senior citizens are persons age 65 or older. Such persons are authorized to attend classes on a space-available basis. Charges for special materials, if any, are additional. Incidental fee privileges are not provided.

The senior-citizen privilege is extended to persons auditing classes (not seeking credit or working toward a degree).

Tuition and Fee Refunds

Students who withdraw from the university and who have complied with the regulations governing academic withdrawals may be entitled to certain refunds of fees assessed, depending on the time of withdrawal. The refund schedule has been established by the State Board of Higher Education and is on file in the Business Office. Included with the refund schedule is the mandated order in which financial aid must be returned to the appropriate programs for students on financial aid. All refunds are subject to the following regulations:

1. Any claim for refund must be made in writing before the close of the term in which the claim originated.
2. An official notice of withdrawal must be completed and necessary clearance signatures filed with the Registrar's Office.
3. Refunds in all cases are calculated from the date of receipt of the application for refund or date of withdrawal, and not from the date when the student ceased attending classes, except in unusual cases when formal

withdrawal has been delayed through cause beyond the student's control.

Parking Fees

All student, staff and faculty vehicles must be registered with the Traffic Commission and operated in compliance with *Regulations Governing Traffic Control*. At the time of vehicle registration, a parking fee will be assessed in accordance with a schedule approved by the State Board of Higher Education and filed with the Secretary of State. Parking permits may be purchased online via web-for-student. Vehicles must be registered by the first day after classes begin. Parking Fees for 2015-16 are:

Students	Faculty/Staff	Permits
\$102/year	\$161/year	Add'l vehicle \$10
\$51/term	\$80/term	one-term and full-year permits

Library Fines and Charges

The following regulations govern library fines and charges:

- Books**—A fine of 25 cents per day is charged for each item overdue other than reserve books. No charges are made for the first three days late, but a charge of \$1 is assessed on the fourth day, plus 25 cents per day thereafter (maximum, \$10 each item). Separate charges apply to books borrowed from other libraries.
- Periodicals**—Magazines and newspapers have a \$1-per-day charge for each overdue item up to the maximum overdue fine.
- Reserved books**—The following fines will be charged for violation of rules governing reserve books and other restricted materials: For overdue items, 25 cents for the first hour and 25 cents for each succeeding hour, or portion thereof, until the material is returned or reported lost. In case of flagrant rule violation, a charge of \$1 per hour may be assessed, but in no case will a fine of more than \$10 be assessed.
- Recalls**—Materials needed for use in the library are subject to recall at any time. A maximum fine of \$1 per day may be imposed for failure to return promptly.
- Billing**—Borrowers failing to return materials within 40 days of the due date will be charged the replacement cost of the items plus the amount of fine (maximum fine—\$10 each item) incurred up to the time the item is reported missing. In addition, the borrower will be assessed a service charge of \$10.
- Refunds**—When a lost item for which the borrower has been billed is returned before replacement has been ordered, a refund not exceeding the replacement cost may be made at the discretion of the librarian. In cases where replacement has been ordered, no refunds to the borrower will be made.

**38 U.S.C. 3679(c). Veterans Access, Choice, and Accountability Act of 2014
Official School Catalog Addendum**

I certify the current policy is true and correct:

The following individuals shall be charged the in-state rate, or otherwise considered a resident, for tuition and fees purposes:

- A Veteran using educational assistance under either chapter 30 (Montgomery G.I. Bill Active Duty Program) or chapter 33 (Post-9/11 G.I. Bill), of title 38, United States Code, who lives in the State of Oregon while attending a school located in the State of Oregon (regardless of his/her formal State of residence) and enrolls in the school within twelve years of discharge or release from a period of active duty service of 90 days or more.
- Anyone using transferred Post-9/11 GI Bill benefits (38 U.S.C. § 3319) who lives in the State of Oregon while attending a school located in the State of Oregon (regardless of his/her formal State of residence) and enrolls in the school within three years of the transferor's discharge or release from a period of active duty service of 90 days or more.
- Anyone using benefits under the Marine Gunnery Sergeant John David Fry Scholarship (38 U.S.C. § 3311(b)(9)) who lives in the State of Oregon while attending a school located in the State of Oregon (regardless of his/her formal State of residence) and enrolls in the school within three years of the Service member's death in the line of duty following a period of active duty service of 90 days or more.
- Anyone described above while he or she remains continuously enrolled (other than during regularly scheduled breaks between courses, semesters, or terms) at the same school. The person so described must have enrolled in the school prior to the expiration of the three year period following discharge, release, or death described above and must be using educational benefits under either chapter 30 or chapter 33, of title 38, United States Code.

Signature: _____

Title: _____

Signature of individual authorized to make official revisions to the catalog

Institution: _____



Academic Policies and Procedures

Procedures and Regulations

Student Responsibility

Students are responsible for knowing and understanding Oregon Institute of Technology's requirements relating to registration, academic standards, student activities and student organizations. A partial view of academic regulations is included in the class schedule introduction pages on Oregon Tech's Web site and distributed to new students during their first registration at Oregon Tech. Students are encouraged to meet regularly with their departmental advisors and to contact the Registrar's Office with questions about academic procedures, policies or regulations.

Academic Advising

Students are assigned faculty advisors from their academic programs. Advisors maintain a file on students' progress and help them plan course loads. If a student should change programs, a new advisor will be assigned. Degree-seeking students are required to meet with their advisors prior to registration.

Student Classification

In the Oregon University System students are classified according to the number of college-credit hours earned as follows: 0-44, freshman; 45-89, sophomore; 90-134 junior; 135 and above, senior. Transfer credits are included in determining classification.

Quarter System

Oregon Institute of Technology operates on an academic year consisting of three quarters (or terms) of approximately 10 weeks each and a summer session of eight weeks.

Academic Progress and Petitions Committee

Administration of the regulations governing academic requirements is vested in the Academic Progress and Petitions Committee. This committee also has authority to assess probation or to suspend any student from the university when it appears that the student's work is at such a level that the student cannot benefit by continued attendance. The university requires that students make substantial progress toward meeting graduation requirements, including maintaining a minimum 2.0 GPA. Any cumulative GPA below 2.0

is considered unsatisfactory and will bring the student's record under review. Courses transferred in from other institutions are not included in institutional cumulative GPA.

The Academic Progress and Petitions Committee also serves as an advisory group to the Registrar's Office regarding academic appeals. For information regarding appeals to this committee, students may contact the Registrar's Office.

Admissions with Special Conditions

If a student is admitted with one or more stipulations and fails to meet any of the prescribed condition(s), that student may be referred to the Academic Progress & Petitions (AP&P) Committee for possible academic disciplinary action, up to and including probation and suspension from the university. The request for review by AP&P can be made by any member of the Admission Committee.

Academic Warning

An academic warning is a caution to the student that there is a lack of satisfactory academic progress. Students, including first term freshmen, who do not achieve a 2.0 in any given term will receive an Academic Warning. Students who have no earned credits, withdrawals (i.e., all Fs, withdrawals (W) and/or incompletes (I)), for two consecutive terms will also receive an Academic Warning.

Academic Probation

Students who have attempted two or more terms at Oregon Tech and have an Oregon Tech cumulative GPA below 2.0 will be placed on Academic Probation. Students who have no earned credits, (i.e. all Fs, withdrawals (W) and/or incompletes (I)), for three or more consecutive terms will also be placed on Academic Probation. Students placed on probation will receive notification that they are on Academic Probation as well as instructions on how to proceed. Once placed on probation, students are advised to limit their course load to 13 credits. Courses transferred in from other institutions are not included in institutional cumulative GPA.

Academic Suspension

Students on academic probation for one term who do not meet the 2.0 cumulative GPA requirement in the successive term of enrollment will be placed on Academic Suspension for at least one term. To reenroll, a student must complete the prescribed procedures and appeal to the Academic Progress and Petitions Committee for reinstatement. Students should contact the Registrar's Office for reenrollment information. Students who have been suspended are denied all privileges of the institution.

Veteran students receiving benefits will lose all benefits until academic standing is improved to good standing.

Note: When a student is placed on academic warning, probation or suspension both the student and their advisor will be notified.

Summer Term

Anyone may enroll in summer term. Formal admission to the university is not necessary and there are no GPA or high school diploma requirements. High school students who want to take college courses are invited to attend. Potential students who have not met the college entrance requirements may take appropriate courses during the summer to correct these deficiencies. Students may register from early May through the first day of summer school. Tuition is on a per-credit basis.

The eight-week term begins in mid-June and ends in mid-August. Four-week sessions begin in mid-June and mid-July. Classes meet Monday through Thursday and are scheduled either during day or evening hours. Many summer classes are offered online via Oregon Tech Online.

A separate summer term class schedule is available on the web in April. This schedule provides a listing of courses, fees, registration and housing information.

Advanced Standing

Credit for Prior Learning

Credit for prior learning by a student admitted to Oregon Tech may be granted through a number of independent processes. These include: A) Transfer Credit; B) Military Credit; C) College Level Examination Programs (CLEP) and Advanced Placement credit (AP); D) Credit for National Registry or Licensure Exams; E) Credit by Examination; and F) Credit for Prior Experiential Learning. A number of these categories are for credit that is awarded for educational accomplishments attained outside of accredited post-secondary institutions.

These procedures describe the process used to grant the student appropriate academic credit by each of these methods as follows.

A. Transfer Credit

Oregon Tech makes every effort to give maximum consideration to the transfer work presented by enrolling students. To ensure that the student has the requisite knowledge, Oregon Tech follows these policies in determining credit:

Accreditation Status of Institution

The institution where the transfer credit was earned must be accredited by an accrediting body recognized by the Council for Higher Education (CHEA).

Students transferring work from an institution that is not accredited by a CHEA-recognized accrediting body may receive transfer credit by 1) demonstrating prior experiential learning with a portfolio, 2) applying for credit after demonstrating competencies in advanced coursework in the same subject area or 3) challenging courses by exam.

International Institutions

Students seeking transfer credit from international institutions must provide Oregon Tech with a credential evaluation from an Oregon Tech-approved credential evaluation service. Credential evaluation information may be obtained from the Office of Admissions. The credential evaluation must include course titles, credits and grades. Students must also provide course descriptions in English from the international institution. Any associated costs are the responsibility of the student.

Official Transcripts

Prior to the formal awarding of transfer credit, the transfer student must provide an official transcript of coursework completed at all other higher education institutions. Failure to list all colleges attended on the Application for Admission may result in denial of admission or transfer credit.

Admitted transfer students must submit official transcripts at least one term prior to enrollment to ensure timely evaluation of transfer credits.

Any student receiving GI Bill education benefits while attending Oregon Tech is required to obtain transcripts from all previously attended schools and submit them to the school for review of prior credit.

Determination of Transfer Credit

The Oregon Tech Registrar's Office determines the transfer equivalency of general-education courses using articulation agreements, course descriptions, course outlines, and course syllabi. The student's major department determines the transfer equivalency for technical or major courses using similar resources.

Articulation Agreements

Oregon Institute of Technology is dedicated to enhancing partnerships with regional community colleges. One important way of doing this is by forming articulation agreements. An articulation agreement is an officially approved agreement that matches coursework between schools. These agreements are designed to help students make a seamless transition when transferring to Oregon Tech. Articulation agreements give students a clear understanding of what courses will transfer to Oregon Tech and satisfy requirements for their major with the least overlap or repeat of courses. Some agreements accept an associate degree in its entirety while other agreements outline specific courses to take as a student plans for transfer. Students should inform the Admissions Office and their academic department advisor when they are utilizing an articulation agreement.

A list of articulation agreements can be found online at www.oit.edu/articulations; students may search by Oregon Tech major

or by transfer institution. Questions regarding these agreements may be directed to the students' academic department or the Office of Academic Agreements.

Applicability of Transfer Credit

Oregon Tech provides a complete, written transfer evaluation upon the admission of the student, prior to the planned term of enrollment. The evaluation delineates the transfer credit on a course-by-course basis and specifies direct course equivalencies, courses which may be used towards general-education requirements, elective credits and courses which do not receive credit.

At the time of admission, Oregon Tech's written transfer evaluation may include elective credits that do not apply towards a specific degree. These credits will be recorded as transfer credit for registration purposes, allowing the student an earlier registration appointment based on total earned credit hours.

Some transfer work, which may not be directly equivalent to Oregon Tech courses, may be appropriately substituted to meet Oregon Tech requirements. Students may seek course substitution approval by completing the Course Substitution form and obtaining the signature of the advisor, department chair and University Registrar.

Credit for Alternative-Delivery Courses

Courses taken by alternative delivery from other accredited institutions will be evaluated as transfer credit.

Minimum Grade Standards

Oregon Tech considers for transfer those courses that carry a grade of D or better from an accredited institution. However, many Oregon Tech departments require C or better course grades for prerequisite and graduation purposes. Oregon Tech does not normally transfer math courses with a "D" grade.

Pre-College Level Transfer Credit

Oregon Tech students who plan to enroll at other institutions during the summer or to complete coursework for the degree in absentia are encouraged to obtain written pre-

approval of transfer credit to ensure transfer equivalency for degree purposes.

Pre-Approval of Transfer Credit

Oregon Tech students who plan to enroll at other institutions during the summer or to complete coursework for the degree in absentia are encouraged to obtain written pre-approval of transfer credit to ensure transfer equivalency for degree purposes.

B. Military Credit

Oregon Tech will grant credit for military courses and experiences based on American Council of Education (ACE) guidelines (found in the Guide to the Evaluation of Educational Experience in the Armed Forces) and faculty recommendations. Credit is awarded in accordance with transfer credit policies at Oregon Tech and the Oregon University System. Students may request evaluation of military credit by furnishing an official AARTS or SMART transcript.

C. College-Level Examination Programs and Advanced Placement: College Level Examination Program (CLEP)

Oregon Tech will award credit for several college-level examination programs. These examinations must be completed with a satisfactory score and an original copy of test results must be forwarded to the Registrar's Office from the testing service. In order to receive such credit, the student must be admitted to an Oregon Tech degree program and registered for classes during the term in which the request is made. Oregon Tech awards credit for College-Level Examination Program (CLEP) subject examinations, but not for CLEP general examinations. Information on CLEP course equivalencies and minimum scores may be obtained from the Oregon Tech Registrar's Office.

Advanced Placement (AP)

Students who complete college-level work in high school under the Advanced Placement (AP) program must achieve a minimum score of three to be granted credit on their Oregon Tech transcript. AP course equivalencies may be obtained from the Office of Admissions or Registrar's Office.

A maximum of 25 percent of the credits used toward the degree may be CLEP and AP.

International Baccalaureate

Oregon Tech evaluates IB test scores much in the same way it evaluates AP scores. Students must have official test scores sent to the Office of Admissions. Oregon Tech may award credit to students who receive a 5 or higher on any Higher Level IB examination. No credit is awarded for Subsidiary Level exams. For more information, please contact the Registrar's Office at (541) 885-1300.

D. Credit for National Registry or Licensure Exams

Oregon Tech will award a pre-approved block of credit to fully admitted and enrolled students who have passed a national registry or licensure exam in majors offered by the institution. This award of credit is based on the academic department's annual review of the national exam questions in comparison to the curriculum taught on campus. Full information is maintained in the Registrar's Office and via Oregon Tech Online, which coordinates online degree-completion programs offered by Oregon Tech.

Credit by Examination and Credit for Prior Experiential Learning

Oregon Tech awards credit for educational accomplishments attained outside of accredited postsecondary institutions.

E. Credit by Examination

Students currently enrolled at Oregon Tech may request credit for a course by special examination. This process is called a course challenge and the provisions are:

1. Credit by examination (course challenge) is available to students who are fully admitted in degree-granting programs.
2. Students may not challenge a course which they have previously taken for credit and received a grade other than an audit, nor may they challenge the same course more than once. If students register for a course they wish to challenge, they must drop and challenge the course before the last day to drop

without a "W".

3. No more than 25 percent of the credits submitted for graduation may be credit by examination.
4. Credit by examination counts toward graduation residency requirements. For a bachelor's degree, students must complete 45 credits at Oregon Tech with the last 15 to be taken on campus. For the associate degree, students must complete 30 credits with the last 15 to be taken on campus.
5. Examinations receive either a "P" (pass) or "F" (fail). A pass suggests the student has mastered the material comparable to a grade of "C" or better in the course being challenged. The University Registrar records "P" grades on the student transcript, but does not count the P in grade point average calculations. The University Registrar does not record "F" grades.
6. Students must pay a non-refundable per-credit fee, as published by the Office of Business Affairs, prior to the examination.
7. Departments are responsible for preparing an appropriate examination, evaluating the student's response and submitting results to the Registrar's Office. Departments reserve the right to declare any course offering as non-challengeable.

Further procedures and general guidelines for course challenges may be obtained from the Registrar's Office.

F. Credit for Prior Experiential Learning

Oregon Institute of Technology recognizes that students learn outside the classroom through experiences on the job, vocational education, professional development courses, workshops, and independent study. Oregon Tech may grant credit for experiential learning when it is judged to be equivalent to college-level courses in the Oregon Tech curriculum. This process is only appropriate for students who wish to demonstrate learning for more than one required course. Typically, credit for experiential learning will replace a series of major specific courses.

Level of Credit

Oregon Tech grants credit for prior experiential learning at the undergraduate level only. Credit will be awarded only for documented prior learning that has a balance, appropriate to the subject, between theory and practical application, and not just for prior experience. Credit should be appropriate to the academic context in which it is accepted.

Eligibility Requirements

The student must be fully admitted and enrolled at Oregon Tech. Credit will not be granted until the student has successfully completed the procedure outlined. Credit for prior experiential learning will not be granted if the student has already received credit for the same course. No more than 25 percent of the credits needed for a degree or certificate may be from credit for prior experiential learning. Credit may only be granted for courses offered by Oregon Tech and the university reserves the right to declare any course offering as inappropriate for prior experiential learning credit.

Awarding of Credit

Completion of the institution's review process does not guarantee a student will receive credit for prior experiential learning. If the student successfully demonstrates evidence of college-level learning, credit will be identified on the student's transcript as credit for prior learning. This credit will not be graded or counted in the student's grade point average. Students wishing to appeal the award of credit should appeal to the Provost, whose decision is final.

Tuition and Fees

Fees charged for portfolio assessment are based on the services performed. The application fee for a specified course is published by the Office of Business Affairs. This non-refundable fee must be paid prior to submitting the portfolio for assessment. Proof of payment must accompany the student's Credit for Prior Experiential Learning Application.

Transfer of Prior Experiential Learning Credit

Oregon Tech accepts credit for prior learning from other institutions, provided that the transfer institution awards such credit on the basis of standards similar to those outlined by the Northwest Association of Colleges and Universities (NWCCU).

Faculty Evaluator Qualifications

Credit is awarded based on the recommendation of teaching faculty who are qualified in the subject area, who have adequate training in portfolio evaluation and who are on regular appointment with the university on a continuing basis.

Procedure

Students seeking credit for prior experiential learning should first confer with their advisor to help assess if their experience and learning are appropriate for this process. If it is determined that experiential learning assessment is appropriate, the student should contact the University Registrar.

The University Registrar will determine whether the student has met the eligibility requirements outlined in this procedure. If so, the University Registrar and the Department Chair will sign the student's Credit for Prior Experiential Learning Application. The student must then complete a prior experiential learning documentation course. This course may be utilized for curricular requirements by the major department if appropriate.

Upon completion of the documentation course, the student will submit his/her Credit for Prior Experiential Learning Application and completed portfolio to the appropriate faculty evaluator as determined by the department chair. The faculty member will review the portfolio and if necessary will interview the student. Review of the portfolio will ensure that the learning experience demonstrates the theories, competencies, and outcomes of the academic subject matter. When appropriate, the faculty member may choose to consult with others who have expertise in the subject matter before making a decision as to whether or not to grant credit. The final decision is recorded on the student's Credit for Prior Experiential Learning Application and will be forwarded to the University Registrar. The Credit for Prior Experiential Learning Application will be included in the student's permanent academic record. The portfolio will be retained in accordance with Oregon Tech's archive guidelines.

Catalog of Graduation

The student must meet all degree requirements from one Oregon Tech catalog. The catalog may be chosen from the year the student is first admitted and enrolled at Oregon Tech or from any subsequent year. However, at the time of graduation, all students, including transfer students, must use a catalog that is not more than seven years old.

Transfer students may select their catalog of graduation prior to full admission to Oregon Tech by obtaining written approval from their Oregon Tech major department and the University Registrar. The agreed-upon catalog will be the one a student uses when he/she transfers to Oregon Tech. Students must enroll at Oregon Tech within two years of this approval.

Departments periodically review their curriculum for technical currency. As a result, significant program changes may occur. Courses previously required in the curriculum may no longer be offered. The major department will provide a transition plan for students to fulfill degree requirements.

Programs discontinued by the university may have specific entrance and graduation limits that override this catalog-of-graduation policy.

Baccalaureate Upper-Division Credit Requirement

Baccalaureate students must complete a minimum of 60 credits of upper-division work before a degree will be awarded. Upper-division work is defined as 300- and 400-level classes at a bachelor's-degree-granting institution.

Grading System

Student academic achievement is evaluated and reported in accordance with a system of letter grades assigned at the end of each course. These grades become part of the student's transcript, a permanent academic record. A summary statement of a student's total academic record is expressed as a cumulative grade point average (GPA).

Grading Policy

Oregon Tech uses a 4.0 grading scale to evaluate student performance. Upon completion of a course or upon termination of attendance in the course, a student's performance will be graded by the instructor and reported to the University Registrar as follows:

Letter Grade	Meaning	Points Per Credit Hour	Used to Calculate GPA
A	Exceptional	4	Yes
B	Superior	3	Yes
C	Average	2	Yes
D	Inferior	1	Yes
F	Failed	0	Yes
I	Incomplete	0	No
IP	In Progress	0	No
N	Audit	0	No
NP	No Pass: <i>Equated to a "D" or "F"</i>	0	No
P	Pass: <i>Equated to a "C" or better</i>	0	No
W	Withdrawn	0	No
Z	No Grade Assigned	0	No

Grade Change Policy

All grades except for 'I' and 'IP' are final when filed by the instructor during grade processing each term. Thereafter, a grade change may be made only in the case of clerical, procedural or calculation error. No grade other than 'I' or 'IP', once reported, may be revised by re-testing or by completing additional work. Any grade change by the instructor of record must take place within one year subsequent to the term in which the grade was reported. Any grade change by the instructor of record must take place within one year subsequent to the term in which the grade was reported. Any grade change that is to be filed later than one year must be approved by the appropriate College Dean and the Registrar.

Non-Standard Grading

Courses may be graded on the pass (P)/no pass

(NP) basis at the discretion of the department and the University Registrar. Courses may include, but are not limited to seminars, externships, co-ops, independent study, certificate classes, and physical education.

Class Drop/Withdrawal Policy

A student may drop/withdraw from a course through Friday of the seventh week of the term. Although teaching faculty may drop a student during the first two weeks of the term, according to the Faculty Initiated Withdrawal Policy, they are not required to do so. Students will be notified of instructor-initiated drops in writing.

Faculty-Initiated Withdrawal Policy

Teaching faculty can drop a student during the first two weeks of the term from a class if the student has not attended by the second regularly scheduled meeting of that class. The student will be notified of the withdrawal in writing by the Registrar's Office.

Student Initiated Drops/Withdrawals

1. During the first 10 days of the term, a student may drop one or more courses with no record. However, if a student withdraws from all courses, the student's transcript will note "Complete Withdrawal."
2. After the first 10 days of the term, a student who withdraws from one or more

courses will receive a "W" for those courses. Students may withdraw from individual courses through Friday of the seventh week of the term.

3. After Friday of the seventh week, students will receive a letter grade ("A", "B", "C", "D", "F", "P", "NP", "I" or "IP") from the instructor.
4. Complete withdrawals from the university may be processed through Friday of the week prior to final-exam week. Depending on the time of the term, a complete withdrawal will result in a notation of a "complete withdrawal" or "Ws" on the student's transcript.
5. Students requesting to withdraw from a course(s) after the published withdrawal dates that have medical documentation supporting the withdraw should contact the Dean of Student's Office.

NOTE: The deadlines for dropping/withdrawing from a course are listed in the Academic Calendar.

Incompletes

When the quality of a student's work is satisfactory, but some essential requirement of the course has not been completed for reasons acceptable to the instructor, a grade of Incomplete (I) may be assigned and additional time granted for completion. The instructor is responsible for submitting an "I" grade and completing the Request for Incomplete form and submitting it to the Registrar's Office.

Grade Point Average

A student's GPA is computed by assigning a numerical point value to each grade: "A," 4 points per credit; "B," 3 points per credit; "C," 2 points per credit; "D," 1 point per credit; "F," 0 points per credit. GPA is the quotient obtained by dividing total grade points by total hours attempted. Grades of "I", "P", "NP", "W" and "N" are disregarded in calculating GPA; however, a "P" is equivalent to a "C" or better. For example:

Class #	Title	Credits	Grade	Point Value for Credits	Earned Grade
WRI 121	English Composition	3	B	3	9
ECO 201	Economics	3	C	2	6
MATH 111	College Algebra	4	A	4	16
CHE 101	Elementary Chemistry	3	B	3	9
CHE 104	Elementary Chemistry Lab	1	B	3	3
HED 250	Contemporary Health Issues	2	A	4	8
PHED 190	Racquetball	1	B	3	3
				Total	54

GPA = Sum of earned grade points = $\frac{54}{17}$ = 3.18
Credits attempted 17

An “I” grade must be removed by the end of the next term (summer session not included). An “I” may only be extended under the most extenuating circumstances and then only for one additional term. If an “I” is not removed within the allotted time, the “I” then reverts to the alternate grade assigned by the instructor on the incomplete form.

Incompletes received in the anticipated term of graduation must be finished and the grades recorded in the Registrar’s Office within three weeks after the end of the final term. Otherwise, the diploma will be delayed until the term during which all degree requirements are met.

In Progress (IP) Grade

The ‘In Progress’ grade is used for classes with coursework that continues past the end of the term in which the student is registered. Examples include externship, co-op, clinical and project classes. The ‘IP’ grade may be retained over multiple terms. ‘IP’ grades that are not changed during the allotted time revert to a grade of ‘F’ for undergraduate and graduate courses.

‘IP’ grades given at the undergraduate level will be retained for a maximum of four terms. The ‘IP’ grade for a specific graduate level course is maintained by the Registrar’s Office for a maximum of five years. Each year the student should file a progress report with the Graduate Council signed by the student and the student advisor. After five years, the student can appeal to the Graduate Council to request a grade change beyond this five-year limit. The Graduate Council has the authority to approve or deny the student’s petition.

No Grade Assigned (Z) Grade

The ‘No Grade Assigned’ grade is a grade assigned by the Registrar’s Office when no grade is reported by the instructor. A ‘Z’ grade should be changed by the instructor as soon as possible. If a ‘Z’ is not removed by the completion of the following term, the ‘Z’ reverts to a grade of ‘F’.

Repeat Policy

The following restrictions apply for course-repeat situations:

1. Students may attempt the same course (for a “W” or a letter grade) a total of four times.
2. Each withdrawal (“W”) is considered an attempt. Withdrawals, however, are not included in GPA calculations.

3. The new grade earned will replace the previous grade(s) when computing GPA. Only the first two earned grades will be excluded for GPA calculations. The last grade earned will be used on the petition to graduate.
4. All grades and credits remain on the student’s official transcript.

NOTE: Students should consult with their financial aid counselor to determine financial eligibility for repeat courses.

Auditing Policy

A student has the option to enroll in a class for informational purposes only. This enrollment is classified as an audit and is regulated by the following procedures:

1. Audit classes are charged at regular tuition rates as printed in the class schedule.
2. The only grade an audit class may be granted is “N” (audit). The “N” grade is disregarded in the GPA and is not valid toward graduation requirements.
3. Class attendance shall be in accordance with the instructor’s attendance policy for all students in the class.
4. Instructors having audit students have no obligation to grade or record the audit student’s work.
5. An audit option may be requested during the registration period. Changes “to” or “from” the audit option may be requested no later than the 10th academic day of the term.
6. Students auditing a course may, at a later term:
 - a. Register for the same course for credit.
 - b. Challenge the course by examination.

Excessive Course Load

Admitted students are allowed to register for 21 credit hours (including audits) during an academic term without special permission. Fifteen credits are the maximum for summer session. Students wishing to register for an overload must have a 3.0 cumulative GPA and receive special approval from the advisor and the University Registrar. Appeals may be considered for special circumstances. The class schedule will provide associated tuition costs each term.

Non-admitted students are restricted to eight credits per term, with the exception of summer, where 15 credit hours are the maximum.

Substitution Within the Curriculum

Students desiring to depart from the curriculum prescribed in the catalog should contact their departmental advisor to begin the process. It is the responsibility of the student to file a petition with the Registrar’s Office for such changes. Substitution forms must be approved and filed prior to or with the petition for graduation in order to assure acceptability toward meeting graduation requirements.

Dead Week Policy

Dead Week (the period of Monday morning prior to finals week until the Monday morning of finals week) is the last week of regularly scheduled activities for the term. As such, Dead Week includes routine activities (e.g., lectures, discussions, laboratories, quizzes, assignments, appropriate course reviews, etc.).

1. Final examinations, when utilized, must be given at the scheduled time during finals week.
2. No student activities or athletic events will be scheduled during Dead Week.
3. Projects and/or examinations due Dead Week may not exceed 20 percent of the final course grade without giving students at least three weeks prior notice.

The appropriate vice president must approve any exceptions to this policy.

Final Exams

All teaching faculty will meet their classes during finals week at the final-examination time designated in the official class schedule issued at the beginning of each term.

1. No student activities or athletic events will be scheduled during finals week.
2. Methods of evaluation are at the discretion of the instructor. They should be specified in the course syllabus and distributed to students the first week of class.
3. Faculty who use a final examination will administer that exam at the time designated in the official class schedule. Finals times are designed not to conflict.

Individual students may request exceptions to this policy. These must be approved in advance by the instructor.

Course instructors may request exceptions to this policy. The exception must be approved by the dean of the school and students should be given at least three weeks prior notice of the change.

Academic Forgiveness

The Academic Forgiveness policy allows undergraduates with an unsatisfactory GPA to drop a maximum of three consecutive terms of work from consideration in their GPA. Academic forgiveness applies to terms only. Students are not allowed to select courses within terms for forgiveness.

Academic forgiveness is granted on a case-by-case basis by the Academic Progress and Petitions Committee. It is an extreme measure; it may be granted only once and only when a student provides clear and convincing evidence of a renewed commitment to advancing his or her education. Once forgiveness is granted, it may not be revoked. Forgiveness can be applied only to credits earned at Oregon Tech.

If the petition is approved, the student's transcript will have a notation stating, "Academic Forgiveness Granted" above each term in which forgiveness was granted. Forgiven courses and grades are no longer calculated in the GPA and do not apply toward graduation. However, a record of all coursework will remain on the transcript.

Eligibility

To apply for consideration for academic forgiveness a student must:

1. Have earned less than a 1.0 term GPA for the term(s) being considered for forgiveness. The term(s) for which forgiveness is being requested must have been taken at least seven years prior to the request;
2. Have had at least a two-year lapse in enrollment at Oregon Tech;
3. Be currently enrolled at Oregon Tech;
4. Have completed a minimum of 30 graded credits at Oregon Tech with minimum cumulative GPA of 3.0 or

better since resuming studies at Oregon Tech;

5. Apply for forgiveness with the Academic Progress and Petitions Committee before degree completion.

Procedure

To apply for academic forgiveness, a student must submit a formal letter of request to the University Registrar, which must include:

1. Specific term(s) (maximum of three consecutive) for which forgiveness is being requested;
2. Statement of academic goals and a term-by-term plan for degree completion signed by the student's academic advisor;
3. Rationale for the request.

The University Registrar will forward the application to the Academic Progress and Petitions Committee for review and will notify the student of the Committee's decision.

Graduation

Application for Graduation

Students must file an *Application to Graduate* at least two terms prior to the term of graduation. These forms are available online at www.oit.edu/registrar, at the Registrar's Office, in the Wilsonville Programs offices and in academic departments. They are submitted to the Registrar's Office for evaluation.

Oregon Tech Wilsonville students must schedule a graduation degree-check appointment with their major's program director at least two terms prior to graduation. The final graduation check is completed by the Registrar's Office at the Klamath Falls campus.

Sealing of a Degree

All grade changes, removals of incompletes, and transfer work necessary for completion of degree requirements must be on file in the Office of the Registrar by the Friday following the end of the term of graduation. Academic records are sealed ninety days after the conferral of a degree: no changes to the record will be made following that date.

Grade Point Requirement

Oregon Tech requires a minimum cumulative GPA of 2.0 for graduation.

Graduation Residency Requirements

All degrees require students to take a minimum number of Oregon Tech courses. For an associate degree, a minimum of 30 term-credit hours must be taken from Oregon Tech. For a bachelor's, a minimum of 45 term-credit hours must be taken from Oregon Tech. Credits earned through Oregon Tech course challenge or the Oregon Tech Credit-for-Prior-Learning program are considered resident credits toward graduation requirements. All other credits granted by examination (CLEP or AP) or other methods are non-resident credits. Students desiring to complete course requirements for graduation from Oregon Tech at another college or university must receive prior approval from the Registrar's Office.

Catalog of Graduation

Students must meet all degree requirements from one Oregon Tech catalog. The catalog may be chosen from the year the student is first admitted and enrolled or from any subsequent year. However, at the time of graduation, all students, including transfer students, must use a catalog that is no more than seven years old.

Transfer students may select their catalog of graduation prior to full admission to Oregon Tech by obtaining written approval from their Oregon Tech major department and the University Registrar. The agreed upon catalog will be the one a student uses when he/she transfers to Oregon Tech. Students must enroll at Oregon Tech within two years of this approval.

Departments periodically review their curriculum for technical currency. As a result, significant program changes may occur. Courses previously required in the curriculum can no longer be offered. The major department will provide a transition plan for students to fulfill degree requirements.

Programs discontinued by the university may have specific entrance and graduation limits that override the catalog of graduation.

Baccalaureate Upper-Division Credit Requirement

Baccalaureate students must complete a minimum of 60 credits of upper-division work before a degree will be awarded. Upper-division work is defined as 300- and 400-level classes at a bachelor's-degree-granting institution.

Multiple Majors

An undergraduate student may earn multiple majors if all the degree requirements for each major are met. All successfully completed majors will be listed on both the transcript and diploma.

Concurrent Degrees

Students may be granted a second bachelor's degree provided they meet the requirements for both degrees and complete an additional 36 credits beyond the requirements of the first degree. 45 credits are required if the first degree was not granted by Oregon Tech and students must meet the general-education requirements as outlined in their catalog of graduation. If the first bachelor's degree was granted by Oregon Tech, the general education requirements are waived for the second degree.

Curricular Requirements

Curricular requirements are determined by, and vary with, the departments involved. Major requirements are published in this catalog.

Minors

A minor consists of a minimum of 18 credits in a subject field outside the student's major. The total credits required for a minor depend on the academic discipline, the prerequisites of the required courses and the student's starting level in the discipline. Requirements for approved minors are listed by department in this catalog. Minors will only be granted at the time students receive their baccalaureate degrees. Application for a minor must be submitted to the University Registrar with the student's petition to graduate.

Course Substitutions

Students may seek course substitution approval by completing the *Course Substitution form* and obtaining the signature of the advisor, department chair and University Registrar. Course substitutions for general-education requirements must satisfy the same category of general education requirement. For example, a humanities course specified by the major department may be substituted for another humanities course, subject to the above approvals.

Graduation in Absentia

Students wishing to complete the Oregon Tech degree by attending another college and

transferring work after the minimum residency credits have been met (30 for associate and 45 for bachelor's degree) must complete a *Petition to Graduate* and have the final transferring classes approved for their degree by the transcript evaluator in the Oregon Tech Registrar's Office. This should be done prior to leaving Oregon Tech and beginning at the other college.

Commencement

Oregon Tech's graduation ceremony is held in June each year at which time degrees are granted to all who have satisfactorily completed all major and university general education requirements during the preceding spring term. Summer, Fall and Winter term graduates who have already received diplomas may also participate in Commencement.

Students who demonstrate the ability to graduate in the following summer term may also participate in Commencement ceremonies. However, summer graduates will not receive academic honors or diplomas at the spring commencement.

Diplomas

Oregon Tech awards diplomas at Commencement based on preliminary grades and preliminary degree checks for Spring-Term graduates. Students who receive a diploma at Commencement, but do not subsequently complete degree requirements, will be notified after the final degree check. The student will be asked to return the diploma. The university will place a hold on the student's registration privileges and transcript if the diploma is not returned.

Those students with estimated failing or incomplete grades will receive a letter, rather than a diploma, inside the diploma cover. After completion of all degree requirements, these students will receive their diplomas in the mail. Diplomas will also be held until all fees and charges due Oregon Tech have been paid and exit interviews have been completed for Federal, Perkins and institutional loans.

Academic Honors

At each Commencement, Oregon Tech recognizes academically outstanding students who will receive their bachelor's degree with academic honors. This honor is based on all Oregon Tech courses. *To be eligible for honors a student must complete a minimum of 75 Oregon Tech GPA hours/credits.*

Academic honors are based on the following criteria:

Cum Laude

Graduation with honors
3.50-3.74 GPA

Magna Cum Laude

Graduation with high honors
3.75-3.89 GPA

Summa Cum Laude

Graduation with highest honors
3.90-4.00 GPA.

Note: Students who do not have 75 Oregon Tech credits and who are graduating from a Degree Completion program must complete a minimum of 45 graded Oregon Tech credits to be eligible for honors. For Degree Completion students, who fall into this category, honors are based on all Oregon Tech courses and transfer courses used for the degree.

Honors recognized at the graduation ceremony do not include grades from the term immediately preceding Commencement. After final grades are posted, the honors standing of some students may change. These students will be notified. A student's final honors standing will be posted on the official transcript.

Only past and spring honors are recognized at commencement, both in the program and with honor cords. Summer graduates will have honors listed on their diploma and official transcripts upon completion.

Academic Term Honors

President's List (Applicable to full-time undergraduate students only)
Each term, students with a GPA of 3.70 or better are included on the President's List.

Dean's List (Applicable to full-time undergraduate students only)
Each term, students with a GPA of 3.30-3.69 are included on the Dean's List.

Honors

Special Recognition

Each spring a number of Oregon Tech graduates will be selected for membership in national honor societies. Honor society members can be identified by a distinctive honor cord worn over the shoulder at Commencement.

Alpha Chi, which selects members from baccalaureate programs, identifies its honor society graduates with a white cord. Tau Alpha Pi, which selects members from the sophomore, junior and senior classes of engineer-

ing-technology majors, identifies its graduates with a crimson cord. Lambda Phi Eta selects from juniors and seniors in Communication Studies. Members are identified by a gold cord. Lambda Nu selects from juniors

and seniors in Medical Imaging. Members are identified by a cord that is green, gold and maroon. Sigma Theta Tau, who wear gold and maroon cords, includes Nursing students in the top third of the class.

Baccalaureate General Education Requirements

General Education Requirements

Oregon Tech's General Education requirements provide breadth and depth to the Oregon Tech educational experience. The requirements are designed to help students widen perspectives, explore relationships between subjects and develop critical and analytical thinking skills in areas integrated with a student's major. General education provides the core of an undergraduate university education. These courses help students make progress toward becoming educated persons and provide a foundation for lifelong learning.

Through general education at Oregon Tech, students study broad topics, principles, theories and disciplines. The courses are organized within the curriculum in such a manner that students will acquire knowledge, abilities and appreciation as integrated elements of the educational experience. In addition, general education courses teach students to communicate clearly, think critically and globally, define and solve problems within and across disciplines, calculate logically and apply scientific reasoning. No matter what their major, students will benefit from studying areas of knowledge that help them become competent, well-rounded professionals as well as well-educated human beings and citizens.

The General Education Advisory Council and Oregon Tech's faculty review the general education curriculum regularly. Oregon Tech's goal for General Education is to help students become literate, informed, critical participants in a diverse and rapidly changing global society.

All students must complete the university general education requirements as listed in the curriculum map for the major and in this catalog. If a student holds a baccalaureate degree or higher from a recognized, accredited institution, as determined by Oregon Tech, the Oregon Tech general education requirements for the Oregon Tech baccalaureate may be waived subject to departmental program requirements.

Transfer students entering Oregon Tech who have earned either an Associate of Arts Oregon Transfer degree (AAOT) or an Associate of Science in Business degree (ASOTB) from an Oregon community college will be considered as having met Oregon Tech's lower-division general education requirements.

** Remedial or developmental courses, including MATH 100 and WRI 115, cannot be used for graduation.*

Communication

SPE 111 Public Speaking
WRI 121 English Composition
WRI 122 Argumentative Writing
Plus 9 credits from the following list: COM 205, COM 225, COM 320, COM 347, COM 401, COM 402, SPE314, SPE 321, WRI 123, WRI 214, WRI 227, WRI 327, WRI 328, WRI 350, WRI 410.

Humanities

9 credits selected by student or specified by a major department from the following: ART—Art; HUM—Humanities; LIT—Literature; MUS—Music; PHIL—Philosophy; Languages (second year). Other transfer courses, defined as “humanities” by the Registrar's Office, may be used in this category. No more than three credits of activity or performance-based courses may be used in this category.

Social Science

12 credits selected by student or specified by major department from the following: ANTH—Anthropology; ECO—Economics; GEOG—Geography; HIST—History; PSCI—Political Science; PSY—Psychology; SOC—Sociology. Other transfer courses, defined as “social science” by the Registrar's Office, may be used in this category.

* ANTH 101 may not be used to satisfy both Social Science and Science credits.

* GEOG 105 and GEOG 115 may not be used to satisfy Social Science credits.

Technology

Specific requirements for demonstrating

computer proficiency may be established by the academic department.

Science/Mathematics

One, four credit college-level mathematics course for which at least intermediate algebra is the course prerequisite.

Plus 12 credits selected by student or specified by major department from biological sciences (BIO, CHE), mathematics (MATH), statistics (STAT 412, 413, 415, or 431), physical sciences (PHY), physical geography (GEOG 105 or GEOG 115) geology (GEOL) or physical anthropology (ANTH 101). Other transfer courses, defined as “Science/Mathematics” by the Registrar's Office, may be used in this category. At least four credits must be completed from a laboratory-based science course in BIO, CHE, GEOG, GEOL or PHY.

Baccalaureate Upper-Division Requirement

Baccalaureate students must complete a minimum of 60 credits of upper-division work before a degree will be awarded. Upper-division work is defined as 300- and 400-level classes at a bachelor's-degree-granting institution.

Bachelor of Science Degree

The Bachelor of Science degree requires the student to opt between completion of 36 credits in mathematics and science or 45 credits in mathematics, science and social science. Students placed at a higher beginning level of mathematics than is published in the curriculum of their major may choose to substitute those mathematics credits surpassed by their accelerated level of placement with electives from any department to attain the required number of general education credits required by the university for graduation.

Intercultural Studies

Students are encouraged to select at least one class from the following lists of intercultural courses. These courses also satisfy general education requirements.

Humanities: LIT 266 Native American Literature and Film; LIT 235 American Multicultural Literature, LIT 381 Contemporary World Literature; HUM 147 Western Culture in the Classical Age, HUM148 Western Culture in the Medieval Age, HUM 149 Western Culture in the Modern Age

Social Science: ANTH 103 Introduction to Cultural Anthropology, GEOG 106 Cultural Geography I, GEOG 107 Cultural Geography II, GEOG 108 Cultural Geography III, HIST 392 Modern Asia.

Deficient Foreign Language (DFL)

Students who graduated from high school in 1997 or after, who did not complete two years of the same foreign language in high school with a C- or better, must complete two terms of the same college-level foreign or second language with a C- or better in order to receive an Oregon Tech degree.

University Departments and Programs

Clinical Laboratory Science Program

Dawn Taylor, *Department Chair*

Cara Calvo, *CLS Program Director*

Assistant Professors: C. Calvo, T. Mundy, D. Taylor, T. Wolfe

Associate Professor: A. Furman

Adjunct Faculty: The program utilizes faculty physicians and faculty medical laboratory professionals at Oregon Health & Science University (OHSU) and community medical, research, and public health laboratories.

Early Admission CLS Program (EACLSP) Advisors: Cara Calvo and Deb Disko (Wilsonville), Rosalind McClure (Klamath Falls)

Degree Offered

Bachelor of Science in Clinical Laboratory Science (joint degree between Oregon Tech and OHSU)

Oregon Tech, in partnership with OHSU, offers a course of study leading to a Bachelor of Science in Clinical Laboratory Science degree. Students take coursework that combines a rigorous competency-based science curriculum with community-sponsored clinical training. Graduates are prepared to enter the medical laboratory science profession and to pursue career opportunities in various laboratory settings including medical, research, and public health. Students who successfully complete the degree program are eligible to take the *Medical Laboratory Scientist (MLS)* national board certification examination offered by the *American Society for Clinical Pathology (ASCP)*.

Accreditation

The Clinical Laboratory Science professional program is accredited by the *National Accrediting Agency for Clinical Laboratory Science (NAACLS)*, 5600 North River Road, Suite 720, Rosemont, Illinois 60018-5119. (773) 714-8880

Mission Statement

The mission of the Oregon Tech • OHSU Clinical Laboratory Science Program is to educate, train, and graduate professionally competent and ethical individuals, committed to life-long learning, and who are prepared to meet current and future workplace challenges in medical laboratory science.

Program of Study

During the first three years or *pre-professional phase* of study, students complete a minimum of 103-quarter hours that includes (a) 55-quarter hours of general education coursework, including two college-level math courses, one of which must be statistics; (b) 24-quarter hours of biology requisites that must include one microbiology course and one immunology course; and (c) 24-quarter hours of chemistry cognates. Additionally, to receive an Oregon Tech degree, students who graduated from high school in or after 1997 but who did not complete two years of a foreign language in high school with a C- or better must complete two terms of college-level second language coursework.

Through an application process students are selected to enter the fourth year of study or *the professional program*. **NOTE:** Oregon Tech *Early Admission CLS Program (EACLSP)* students who complete EACLSP requirements are automatically admitted to the CLS professional program. *For more information on the Early Admission CLS Program, contact the Department of CLS program office at (503) 821-1146 or EACLSP advisor Rosalind McClure on the Klamath Falls campus at (541)-885-1525.*

The CLS professional program is admission-restricted and 15 months (5 consecutive terms) long, beginning in September of the academic year in which a student is admitted and ending in December of the following year. Admitted students spend four quarters completing clinical laboratory science-specific coursework on the Oregon Tech Wilsonville campus. Upon successful completion of the on-campus work, students are assigned to one or more program-affiliated laboratories to complete an extended fifth term (16 weeks) of clinical training. During clinical training, students spend 40 hours per week applying knowledge and skills to perform a wide variety of testing in a contemporary, accredited medical laboratory and to further develop discipline-specific competency under supervision of clinical instructors. Currently, the Department of CLS maintains affiliations with accredited laboratories in Oregon, Washington, Idaho and Nevada.

Students admitted to the CLS professional program are guaranteed placement for their clinical training subject to the following policies and procedures:

1. Due to the variable availability of training sites year to year and the nature of contractual agreements with affiliated training sites, student placement at a specific site may not be possible. Therefore, placement of students for clinical training is determined by the program in consultation with clinical affiliate training sites.
2. Before beginning clinical training, students must comply with all training site and Oregon standardized administrative requirements including but not limited to immunizations, screening (e.g., background check, drug screen, etc.), trainings (e.g., safety, CPR, etc.), and proof of health insurance coverage valid for the entire clinical training period.
3. All academic and non-academic requirements must be met to the satisfaction of program faculty before a student is permitted to start clinical training.
4. Students are solely responsible for transportation and housing needs associated with their clinical training placement.

Professional Program Application and Admission Requirements

The professional program admits one cohort of students a year. Except for *EACLSP students*, all prospective students should submit completed applications from September 1st to December 31st of the preceding year for which an applicant seeks admission. Students can download application instructions and the application forms from URL <http://www.oit.edu/wilsonville/academics/degrees/clinical-laboratory-science/how-to-apply>. **Importantly, transfer and post-baccalaureate students must also submit a separate application for admission to Oregon Tech.** Prospective students may apply online at URL <http://www.oit.edu/wilsonville/admissions>. When asked, applicants should select "**Pre CLS**" as their major. Applications received by the CLS Department will not be considered if an Oregon Tech admissions application is not on file with the Oregon Tech Admissions' office. **NOTE: Admission to Oregon Tech does not mean that an applicant has been admitted to the CLS professional program.**

Admission to the professional program is criterion-based, competitive, and decided by the program admissions committee. Admission selection is based upon scholarship, personal qualifications, recommendations from three references, and interview results. Selected candidates are interviewed in February and applicants selected for admission are notified in writing by the Program Director during March. To be eligible for admission, candidates for the CLS professional program must meet the following minimum eligibility requirements:

- Those applicants who have earned a Baccalaureate degree must have completed a minimum of 103 transferable quarter credit hours to include:
 - Mathematics:** one college-level math course. Minimum requirements are met by MATH 111 College Algebra. **Additional required math course:** statistics;
 - Biology:** 24-quarter credit hours that must include one course in immunology and a course in microbiology. The microbiology coursework must include a laboratory component either integral to the course or taken separately; courses must be at the 200-level or above and not survey type. **Additional highly recommended courses:** general biology, genetics, anatomy and physiology, cellular or molecular biology;
 - Chemistry:** 24-quarter credit hours of chemistry; courses must be at the 200 level or above and not survey type. **Highly recommended courses:** general chemistry, organic chemistry, biochemistry, and quantitative analysis; and
 - Either two years of high school foreign language or two terms of college-level foreign language.
- Those applicants who have not earned a Baccalaureate degree must have completed a minimum of 103 transferable quarter hours to include the prerequisites listed in 1 above and:
 - 18-quarter credit hours of Communication course work including specified course work in writing and speech (see Baccalaureate General Education Requirements described elsewhere in this catalog);
 - 9-quarter credit hours of Human-

ities course work in topical areas such as Art, Art History or Appreciation, Music, Music History or Appreciation, English (excluding writing and speech), Linguistics, and Philosophy (no more than three credits of activity of performance-based courses may be used in this category); and

- 12-quarter credit hours of Social Science course work in topical areas such as Anthropology, Economics, Geography, History, Political Science, Psychology, and Sociology.

Prerequisite course work does not need to be completed to apply, but official transcript(s) documenting completion of all outstanding prerequisite coursework with grades of 'C' or better must be on file with the CLS Department office before any offer of admission is finalized. The Oregon Tech Registrar's office will review each applicant's transcripts to confirm that the requirements are met. Applicants who have met **admission requirements** seven or more years prior to application to the CLS Program must complete additional academic work to qualify. This may be accomplished by:

- Completing a course in chemistry and a course in biology with a grade of C or better; courses must be at the 200-level or above and not survey type; or
- Receiving credit by examination in biochemistry and in microbiology; or
- Achieving a CLEP score at or above the 50th percentile on both the biology and chemistry examinations.

Applicants seeking transfer credit from international institutions must provide a credential evaluation from an Oregon Tech-approved credential evaluation service and must meet requirements as described in two above. Contact the Oregon Tech Office of Admissions on-line at <http://www.oit.edu/admissions/international-students> or by telephone 503.821.1250 or 1.800.422.2017 for additional information.

- All applicants must have a minimum GPA of 2.5 to apply.

Oregon Tech Freshman Advantage: The Early Admission CLS Program

Oregon Tech students who have completed their freshman year in good academic stand-

ing may apply to the *Early Admission Clinical Laboratory Science Program* (EACLSP).

NOTE: Students with fewer than 60 credits of pre-professional CLS program coursework to complete are not eligible for the Early Admission CLS Program.

EACLSP students who meet the following minimum eligibility requirements are automatically admitted to the CLS professional program:

- At the time of application to the EACLSP, a student must be enrolled at either the Klamath Falls or Wilsonville Oregon Tech campus with at least sophomore standing; and
- A EACLSP-track student must carry a minimum of 12-credits at Oregon Tech per term; and
- Complete all pre-professional CLS program coursework with grades of "C" or better; and
- Earn a minimum GPA of 3.00 in each term; and
- Maintain a cumulative GPA of at least 3.25 in each term; and
- Adhere to the Student Life Policies and Regulations and the Oregon Tech Academic Regulations - see the *Oregon Tech General Catalog* and *Oregon Tech Student Handbook*;
- Job-shadow a minimum of 10 hours in an approved medical laboratory setting;
- Attend one 'meet-the-faculty' event on the Wilsonville campus while in the EACLSP;
- Complete CLS 100 Introduction to Clinical Laboratory Science with a grade of "B" or better; and
- Pass a criminal background check.

Essential Requirements

In accordance with its accreditation standards, the CLS program has established essential requirements. To be admitted and maintain enrollment, participate in, and successfully complete the CLS professional program, a student must meet these non-academic standards of performance:

- Students must demonstrate the ability to acquire and to communicate information. Specifically, a program student must be able to:
 - Read for comprehension and follow verbal and written instructions to demonstrate mastery of information

- presented in coursework, including relevant content in basic science and clinical courses, at a level deemed appropriate by the faculty.
2. Effectively communicate in written and spoken English in order to transmit information to faculty, staff, peers, and members of the healthcare team.
 3. Make a correct judgment in seeking supervisory help and consultation in a timely manner.
 4. Competently utilize technology to research, investigate, acquire and present information obtained by observation and experimentation.
 5. Use strategies that minimize miscommunication.
 6. At all times and in all circumstances, follow established procedures to safeguard protected patient information communicated by non-electronic and electronic means.
- B. Students must demonstrate sufficient motor and sensory function to execute movements required to carry out work assignments in all phases of diagnostic testing, including preanalytical, analytical, and postanalytical. Specifically, a program student must be able to:
1. Distinguish the physical and/or chemical attributes, including color, shape, and size, of objects both macroscopically and microscopically.
 2. Demonstrate sufficient dexterity to safely manipulate specimens, laboratory utensils, tools, equipment and instrumentation including computer touch-screens, keyboards and handheld calculators, necessary to obtain and report complete and accurate diagnostic test results.
 3. Demonstrate adequate mobility to attend to duties in the various locations of the medical laboratory work environment.
 4. Use sensory skills to acquire and apply information presented by various means and media, including demonstrations.
 5. Perform sustained, often repetitive physical activity that may require sitting, standing and/or walking for prolonged periods of time.
 6. Accurately read, record, and when necessary, respond to numbers, letters and symbols displayed in print whether transmitted through non-electronic, electronic or other technological media.
7. Demonstrate proficiency performing a wide range of tests in areas of the contemporary medical laboratory including but not limited to hematology, clinical chemistry, immunohematology, and microbiology, molecular and other emerging diagnostic venues.
- C. Students must project an image of professionalism through behavior, speech, and grooming. Each student is to possess requisite knowledge and skill and safely perform a wide variety of test procedures with precision and accuracy. Specifically, a program student must be able to:
1. Follow established laboratory safety protocols when working with various sample types including blood, urine, and other body fluids and tissues, and with microbial organisms that may be infectious, and hazardous chemicals.
 2. Work accurately and safely under stress and time constraints, and make subjective evaluations and decisions when mistakes may have a negative and/or high impact on patient care.
 3. Adapt to changing environments, maintain a professional demeanor and concentration in distracting situations.
 4. Demonstrate attributes that include integrity, responsibility, and tolerance.
 5. Speak, act and perform all work in an ethical manner.
 6. Show respect for self and others.
 7. Work independently as well as cooperatively with others, performing professional obligations in a timely, responsible manner.
 8. Prioritize tasks and accept responsibility for work performed independently and as a team member.
 9. Assess his or her performance, willingly accept criticism, and actively seek ways to improve.

Graduation Requirements

BS CLS degree students must complete 200 quarter credits hours, maintain a minimum GPA of 2.00, and earn a grade of "C" or better in all professional program courses (CLS) as prescribed by the curriculum outline.

Bachelor of Science in Clinical Laboratory Science

Curriculum

All senior level courses require admission to the Clinical Laboratory Science Program or instructor consent. Required courses and recommended terms during which they should be taken:

Pre-Clinical Laboratory Science (121 credits)

Freshman Year	Fall
200-level General Biology I	4
200-level General Chemistry I	4
MATH 111 College Algebra	4
WRI 121 English Composition	3
Total	15

Freshman Year	Winter
BIO 200 Medical Terminology	2
200-level General Biology II	4
200-level General Chemistry II	4
WRI 122 Argumentative Writing	3
Total	13

Freshman Year	Spring
CLS 100 Introduction to Clinical Laboratory Science	2
200-level General Biology III	4
200-level General Chemistry III	4
SPE 111 Public Speaking	3
Total	13

Sophomore Year	Fall
BIO 231 Human Anatomy & Physiology I	4
Organic Chemistry I 200-level or above	4
SPE 321 Small Group and Team Communication	3
Humanities Elective	3
Total	14

Sophomore Year	Winter
BIO 232 Human Anatomy & Physiology II	4
Organic Chemistry II 200-level or above	4
WRI 227 Technical Report Writing	3
Social Science Elective	3
Total	14

Sophomore Year	Spring
BIO 233 Human Anatomy & Physiology III	4
Organic Chemistry III 200-level or above	4
MATH 361 Statistical Methods I	4
WRI 327 Advanced Technical Writing	3
Total	15

Junior Year	Fall
BIO 345 Medical Microbiology	5
CLS 432 Foundations of CLS I**	4
Social Science Elective	3
Total	12

Junior Year	Winter
BIO 341 Medical Genetics	3
BUS/MGT Elective***	3
PHIL 331 Ethics in the Professions	3
Social Science Elective	3
Total	12

Junior Year	Spring
BIO 436 Immunology	4
BUS/MGT Elective***	3
Humanities Elective	3
Social Science Elective	3
Total	13

** May substitute a 4 credit 200 or 300-level biology or chemistry course; if substituted, CLS 432 must be taken in the professional year as shown on the professional program curriculum map.

*** Select from the following:

BUS 215 Principles of Management	or
BUS 313 Health Care Systems and Policy	
BUS 316 Total Quality in Health Care	
BUS 317 Health Care Management	
MGT 421 Quality Management	
MGT 461 Lean/Six Sigma Management I	
MGT 462 Six Sigma Management II	

Professional Courses (79-83)

Senior Year	Fall
CLS 415 Clinical Chemistry I	6
CLS 420 Clinical Immunology	5
CLS 432 Foundations of CLS I*	4
CLS 464 Medical Mycology & Virology	2
CLS 474 Medical Parasitology	2
Total	15/19

Senior Year	Winter
CLS 416 Clinical Chemistry II	6
CLS 442 Hematology I	6
CLS 444 Clinical Microbiology I	6
CLS 462 Foundations of CLS II	2
Total	20

Senior Year	Spring
CLS 422 Molecular Diagnosis Methods	3
CLS 443 Immunohematology I	4
CLS 445 Microbiology II	4
CLS 452 Hematology II	5
Total	16

Senior Year	Summer
CLS 417 Clinical Chemistry III	2
CLS 424 Hemostasis	3
CLS 449 Principles of Urinalysis	3
CLS 453 Immunohematology II	2
CLS 457 Advanced Chemistry/ Immunology Concepts	2
Total	12

Senior Year	Fall
CLS 463 Foundations of CLS III	1
CLS 470 Chemistry and Immunology Externship	4
CLS 471 Hematology Externship	4
CLS 472 Microbiology Externship	4
CLS 473 Immunohematology Externship	3
Total	16

*May be taken in junior year

Total Credits Required for B.S. Clinical Laboratory Science: 200

Emergency Medical Services Department

Department Chair: Jamie Kennel

Program Director Paramedic Program: Jamie Kennel

Medical Director: Todd Ellingson

Assistant Professor: H. Jarrard, J. Kennel

Instructors: K. Darling, C. Hamper, S. Schmidt, A. Wagner

Degrees Offered

Associate of Applied Science (AAS) in Paramedic (joint degree through Oregon Tech and OHSU).

Bachelor of Science (BS) of Emergency Medical Services Management (joint degree through Oregon Tech and OHSU).

Career Opportunities

The EMS department provides a full spectrum of pre-hospital training programs and degrees, jointly offered by OHSU and Oregon Tech, starting from your very first EMS or general education course all the way through to completing your bachelor's degree, all created with collaboration from local and national industry leaders including:

- Emergency Medical Technician (EMT) Training and Certification
- Paramedic Training (AAS degree & Nationally Accredited)
- Critical Care Paramedic Training
- Community Care Paramedic / Mobile Integrated Healthcare Training
- EMS Management (Bachelor's degree)

Depending on your career aspirations, graduates find career employment in a variety of settings including ambulance transport agencies, fire and rescue agencies, air-medical transport agencies, medical support for industrial sites, tactical-medical teams, hospitals, and international aid missions, to name just a few.

The EMT and Paramedic program prepares students for entry positions in the pre-hospital medicine profession. Upon successful completion of the program, graduates are eligible to sit for the National Registry examination, which can lead to both national and state certifications.

Accreditation

While all programs at the university are accredited by the Northwest Commission on Colleges and Universities (NWCCU), where it is available and adds value to our students, our EMS programs offer additional programmatic accreditation. The Paramedic program is nationally accredited by The Commission on Accreditation of Allied Health Education Programs (www.caahep.org) upon the recommendation of the Committee on Accreditation of Educational Programs for the Emergency Medical Services Professions (CoAEMSP).

Admission Requirements

All courses offered by the EMS department require only general Oregon Tech admission with one exception: the second year of the Paramedic degree. Due to the large number of applications and relatively limited number of student positions, the second year of the paramedic degree is a competitive application process requiring a separate admissions step, further described on the Oregon Tech website (www.oit.edu/paramedic).

Whether you're an incoming freshman or preparing to transfer into one of our programs, students have been most successful when they focus and excel in the following three areas:

- Strong academic performance overall with an emphasis on science coursework performance
- Experience in providing pre-hospital care (e.g. volunteer, intern, BLS transports, etc.) ideally with hands-on direct patient care
- Strong customer service experience with the public

All prospective students are encouraged to meet with the EMS department Program Coordinator to review transcripts and develop a customized plan to get started.

Curriculum

The following are required courses and recommended terms for students wishing to meet the AAS and BS degree requirements. All courses listed on the curriculum map in the catalogue year a student begins a program must be fulfilled for graduation eligibility.

Associate of Applied Science in Emergency Medical Technology- Paramedic Curriculum

Required courses and recommended terms during which they should be taken:

<u>Freshman Year</u>		<u>Fall</u>
BIO 200	Medical Terminology	2
BIO 231	Human Anatomy and Physiology I	4
EMS 151	Emergency Medical Technician I	6
HED 260	Diet & Exercise for Lifetime Fitness	2
Total		14

<u>Freshman Year</u>		<u>Winter</u>
BIO 232	Human Anatomy and Physiology II	4
EMS 152	Emergency Medical Technician II	6
SPE 111	Public Speaking	3
WRI 121	English Composition	3
Total		16

<u>Freshman Year</u>		<u>Spring</u>
BIO 233	Human Anatomy and Physiology III	4
EMS 115	Introduction to EMS	3
MATH 100	Intermediate Algebra	4
	Social Science Elective	3
Total		14

Paramedic Professional Courses (Additional Application Required)

<u>Sophomore Year</u>		<u>Fall</u>
CHE 210	Clinical Pharmacology	3
EMS 218	Trauma Emergencies	3
EMS 231	Medical Emergencies I	4
EMS 235	Basic Electrocardiography	3
EMS 241	Paramedic C.R.M. I	3
EMS 271	Paramedic Skills Laboratory I	3
Total		19

<u>Sophomore Year</u>		<u>Winter</u>
EMS 211	Prehospital Emergency Pharmacology	3
EMS 232	Medical Emergencies II	3
EMS 236	Advanced Electrocardiography	3
EMS 242	Paramedic CRM II	1
EMS 272	Paramedic Skills Laboratory II	2
EMS 283	Group 1** Clinical Practicum I	6
EMS 283	Group 2** Clinical Practicum II	6
Total		18

<u>Sophomore Year</u>		<u>Spring</u>
EMS 233	Medical Emergencies III	3
EMS 243	Paramedic CRM III	1
EMS 273	Paramedic Skills Laboratory III	1
EMS 284	Group 1** Clinical Practicum I	6
EMS 284	Group 2** Clinical Practicum II	6
EMS 291	Field Externship I	5
Total		16

<u>Sophomore Year</u>		<u>Summer</u>
EMS 292	Field Externship Practicum II	12
Total		12

Total Credit Hours for A.A.S. Degree in EMT-Paramedic:

Technical Credits Total	65
Degree Credits Total	109

Bachelor of Science in Emergency Medical Services Management Curriculum

Required courses and recommended terms during which they should be taken:

<u>Freshman Year</u>		<u>Fall</u>
BIO 200	Medical Terminology	2
BIO 231	Human Anatomy and Physiology I	4
EMS 151	Emergency Medical Technician I	6
MATH 111	College Algebra	4
Total		16

<u>Freshman Year</u>		<u>Winter</u>
BIO 232	Human Anatomy and Physiology II	4
EMS 152	Emergency Medical Technician II	6
SPE 111	Public Speaking	3
WRI 121	English Composition	3
Total		16

<u>Freshman Year</u>		<u>Spring</u>
BIO 233	Human Anatomy and Physiology III	4
EMS 115	Introduction to EMS	3
PSY 201	Psychology	3
WRI 122	Argumentative Writing	3
	Humanities Elective	3
Total		16

Paramedic Professional Courses (Additional Application Required)

<u>Sophomore Year</u>		<u>Fall</u>
CHE 210	Clinical Pharmacology	3
EMS 218	Trauma Emergencies	3
EMS 231	Medical Emergencies I	4
EMS 235	Basic EKG	3
EMS 241	Paramedic C.R.M. I	3
EMS 271	Paramedic Skills Laboratory I	3
Total		19

<u>Sophomore Year</u>		<u>Winter</u>
EMS 211	Prehospital Pharm.	3
EMS 232	Medical Emergencies II	3
EMS 236	Advanced Electrocardiography	3
EMS 242	Paramedic C.R.M. II	1
EMS 272	Paramedic Skills Laboratory II	2
EMS 283	*Group I: Clinical Practicum I (or)	6
EMS 284	*Group 2: Clinical Practicum II	
Total		18

<u>Sophomore Year</u>		<u>Spring</u>
EMS 233	Medical Emergencies III	3
EMS 273	Paramedic Skills Laboratory III	1
EMS 243	Paramedic C.R.M. III	1
EMS 283	*Group 2: Clinical Practicum I (or)	6
EMS 284	*Group 1: Clinical Practicum II	
EMS 291	Field Externship I	4
Total		15

<u>Sophomore Year</u>		<u>Summer</u>
EMS 292	Field Externship	12
Total		12

<u>Junior Year</u>		<u>Fall</u>
BUS 317	Health Care Management	3
BUS 337	Principles of Health Care Marketing	3
ECO 201	Principles of Economics, Micro	3
WRI 227	Technical Writing	3
Total		12

<u>Junior Year</u>		<u>Winter</u>
BUS 313	Health Care Systems and Policy	3
ECO 202	Principles of Economics, Macro	3
EMS 331	Critical Care Transport I	4
EMS 381	Critical Care Clinical Practicum I	1
Total		11

<u>Junior Year</u>		<u>Spring</u>
EMS 332	Critical Care Transport II	3
EMS 382	Critical Care Practicum II	3
HUM	300 or 400 Elective	3
PSY 347	Organizational Behavior	3
SPE 321	Small Group & Team Communication	3
Total		15

<u>Senior Year</u>		<u>Fall</u>
BUS 349	Human Resource Management	3
MATH 361	Statistical Methods I	4
PHIL 331	Ethics in the Professions	3
WRI 327	Advanced Technical Writing	3
Total		13

<u>Senior Year</u>		<u>Winter</u>
BUS 316	Total Quality in Health Care	3
EMS 496	EMS Capstone Project I	3
EMS 456	Research Methods in EMS	2
MATH 362	Statistical Methods II	4
	Math, Science, or Social Science Elective (upper division)	3
Total		15

<u>Senior Year</u>		<u>Spring</u>
BUS 467	Service Management	3
EMS 497	EMS Capstone Project II	3
EMS 444	EMS Systems, Leadership and Management	3
	Math, Science, or Social Science Elective (upper division)	4
Total		13

Total Credits Required for B.S. in Emergency Medical Services Management Critical Care Track: 190

Bachelor of Science in Emergency Medical Services Management – Community Care Track

Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
BIO 200	Medical Terminology	2
BIO 231	Human Anatomy and Physiology I	4
EMS 151	Emergency Medical Technician I	6
MATH 111	College Algebra	4
Total		16

Freshman Year		Winter
BIO 232	Human Anatomy and Physiology II	4
EMS 152	Emergency Medical Technician II	6
SPE 111	Public Speaking	3
WRI 121	English Composition	3
Total		16

Freshman Year		Spring
BIO 233	Human Anatomy and Physiology III	4
EMS 115	Introduction to EMS	3
PSY 201	Psychology	3
WRI 122	Argumentative Writing	3
	Humanities Elective	3
Total		16

Paramedic Professional Courses (Additional Application Required)

Sophomore Year		Fall
CHE 210	Clinical Pharmacology	3
EMS 218	Trauma Emergencies	3
EMS 231	Medical Emergencies I	4
EMS 235	Basic EKG	3
EMS 241	Paramedic C.R.M. I	3
EMS 271	Paramedic Skills Laboratory I	3
Total		19

Sophomore Year		Winter
EMS 211	Prehospital Pharm.	3
EMS 232	Medical Emergencies II	3
EMS 236	Advanced Electrocardiography	3
EMS 242	Paramedic C.R.M. II	1
EMS 272	Paramedic Skills Laboratory II	2
EMS 283	*Group I: Clinical Practicum I (or)	6
EMS 284	*Group 2: Clinical Practicum II	
Total		18

Sophomore Year		Spring
EMS 233	Medical Emergencies III	3
EMS 273	Paramedic Skills Laboratory III	1
EMS 243	Paramedic C.R.M. III	1
EMS 283	*Group 2: Clinical Practicum I (or)	6
EMS 284	*Group 1: Clinical Practicum II	
EMS 291	Field Externship I	4
Total		15

Sophomore Year		Summer
EMS 292	Field Externship	12
Total		12

Junior Year		Fall
BUS 317	Health Care Management	3
BUS 337	Principles of Health Care Marketing	3
EMS 321	Community Paramedic I	4
EMS 341	Community Paramedic Clinical I	2
Total		12

Junior Year		Winter
BUS 313	Health Care Systems and Policy	3
ECO 202	Principles of Economics, Macro	3
EMS 322	Community Paramedic II	4
EMS 342	Community Paramedic Clinical II	2
Total		12

Junior Year		Spring
EMS 332	Critical Care Transport II	3
EMS 382	Critical Care Practicum II	3
HUM	300 or 400 Elective	3
PSY 347	Organizational Behavior	3
SPE 321	Small Group & Team Communication	3
Total		15

Senior Year		Fall
BUS 349	Human Resource Management	3
MATH 361	Statistical Methods I	4
PHIL 331	Ethics in the Professions	3
WRI 327	Advanced Technical Writing	3
Total		13

Senior Year		Winter
BUS 316	Total Quality in Health Care	3
EMS 496	EMS Capstone Project I	3
EMS 456	Research Methods in EMS	2
MATH 362	Statistical Methods II	4
	Math, Science, or Social Science Elective (upper division)	3
Total		15

Senior Year		Spring
BUS 467	Service Management	3
EMS 497	EMS Capstone Project II	3
EMS 444	EMS Systems, Leadership and Management	3
	Math, Science, or Social Science Elective (upper division)	4
Total		13

Total Credits Required for B.S. in Emergency Medical Services Management Community Care Track: 191

Civil Engineering

Sean St. Clair, *Department Chair*

Roger Lindgren, *Program Director, Master of Science in Civil Engineering*

David Thaumert, *Curriculum Coordinator*

Professors: R. Lindgren, S. St. Clair

Associate Professors: C. Riley, D. Thaumert

Assistant Professors: M. Sleep

Civil engineers design infrastructure—transportation networks, bridges, buildings, dams, communities, and water and waste management systems—for the enhancement of human welfare and protection of our environment. Oregon Tech's freshman-to-master's Civil Engineering degree program, the first such program in the Pacific Northwest, equips students to meet industry needs identified by the American Society of Civil Engineers (ASCE). This unique pairing of degrees prepares future professionals for licensure requirements proposed in the ASCE Policy Statement 465.

Career Opportunities

Upon completing the core curriculum, civil engineering students have a solid foundation in structural, transportation, water resources/environmental, and geotechnical engineering. In their fourth and fifth years of study, students can then target specific careers within the broad field of civil engineering. Graduates have career opportunities with consulting firms, government agencies, heavy construction and industry.

Geotechnical engineering involves the design and construction of projects built on and of the earth. These projects include foundations for structures, earth embankments of soil and rock, dams, levees, and tunnels. In addition geotechnical engineers predict reactions of the earth due to changes imposed by other engineered systems.

Structural engineering involves the planning, analysis and design of buildings and other structures using the principal construction materials of wood, steel, concrete and masonry. Graduates are familiar with current codes and standards, and are aware of trends in high-performance structures.

Transportation engineering is concerned with the planning, design, construction, operation, performance, evaluation and rehabilitation of

transportation systems and facilities, such as streets, highways, railroads, mass transit, and air transportation systems.

Water resources and environmental engineering address the spectrum of water from supply to transport to use to discharge, and are at the junction of efforts to provide sustainable human and natural environments, in compliance with regulatory mandates. Graduates have opportunities in planning, design, and operation of hydraulic and water resource projects, floodplain management, or resource management issues.

Civil engineering graduates may consider a concurrent degree in environmental sciences to expand career opportunities with a broad spectrum of government agencies, consulting firms, and industry.

Degrees Offered

Bachelor of Science & Master of Science in Civil Engineering (co-terminal degrees)
Master of Science in Civil Engineering
Bachelor of Science in Civil Engineering

Mission Statement

The mission of the Oregon Tech Civil Engineering program is to prepare students for professional practice. To be prepared to practice as professionals, engineers must be able to act responsibly and ethically, understand their limits and the limits of the tools they use, communicate effectively, work well in teams, and, amid the changing landscape of the field of civil engineering, be able to pursue graduate-level education.

Objectives

Civil engineering graduates will be able to:

1. Practice as a professional civil engineer.
2. Pursue advanced education in civil engineering or related fields.
3. Act as responsible, effective and ethical citizens.
4. Understand and effectively communicate the realistic constraints of civil engineering.
5. Perform effectively in a multi-disciplinary environment.

Students enjoy a close relationship with full-time faculty with advanced engineering degrees who are also licensed professionals with many years of practical experience. Course offerings promote education in theory

relevant to our civil engineering technical areas, engineering design and principles of sustainable development. These concepts are emphasized and integrated throughout the curriculum in a sequential manner.

Early in the curriculum, elements of the creative design process are introduced as students complete first-year design projects. While most freshman and sophomore courses are intended to provide a solid background in mathematics, communications, basic sciences, and engineering mechanics, certain courses provide additional concepts and methodologies supporting more advanced topics in engineering and professional practice.

At the junior level, students develop a broad civil engineering base. Junior courses include core topics in structural, transportation, water resources and geotechnical engineering.

In the fourth year, students are required to complete an intensive engineering design project. This effort is focused on a professional-quality civil engineering design and includes essential elements of technical communications and group dynamics. The design project also involves realistic constraints including cost and sustainability considerations, socioeconomic concerns, aesthetic choices and ethical deliberations. Fourth-year students prepare for the Fundamentals of Engineering (FE) examination as a first step toward licensure as professional engineers. In this year, co-terminal (BS/MS) degree-seeking students also begin their selected program of graduate-level coursework leading to selection of their graduate project.

Finally, in the fifth year, co-terminal students complete coursework and individual graduate projects leading to the co-terminal bachelor's and master's degrees.

To ensure graduates can become responsible, effective citizens and begin building a foundation for lifelong learning, students are required to satisfy Oregon Tech general education requirements in communication, humanities, social sciences, and science/mathematics.

Student Preparation

Students interested in the field of civil engineering should emphasize mathematics and

science in high school. Two years of algebra and one year each of geometry, trigonometry, chemistry and physics are preferred. Additional courses in mathematics and computer-aided drafting are desirable.

Accreditation

The Civil Engineering Program is accredited by the Engineering Accreditation Commission (EAC) of ABET, Inc., 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone: (410) 347-7700. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

Graduation Requirements

All courses listed in the curriculum for the current catalog year must be completed to be eligible for graduation, unless a student has already completed the requirements for a category that has changed. When changes are made to the curriculum, students who entered the program under a previous catalog will work with their academic advisors to transition to meet the requirements of the current catalog.

For the co-terminal bachelor's and master's degrees in Civil Engineering, a minimum of 225 credits must be completed. Students must maintain a 3.0 GPA for progression to the fourth and fifth years of study. In addition, a final grade of "C" or better must be earned in all math and science courses and those with CE or CIV, ENGR, and GME prefixes, as well as all courses listed as prerequisites for these courses. At least 45 credits of graduate work must be completed.

For the bachelor's degree in Civil Engineering, a minimum of 180 credits must be completed and students must maintain a 2.0 GPA to be eligible for graduation. In addition, a final grade of "C" or better must be earned in all math and science courses and those with CE or CIV, ENGR, and GME prefixes as well as all listed prerequisites for these courses.

The Master of Science in Civil Engineering requires completing 45 credits of graduate work with a final grade of "C" or better in all graduate courses.

Bachelor of Science in Civil Engineering Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall	Junior Year		Fall
CHE 221	General Chemistry I	5	CE 311	Intro to Geotechnical Engineering	5
ENGR 101	Introduction to Engineering I	2	CE 331	Structural Analysis	4
SPE 111	Public Speaking	3	ENGR 318	Engineering Mechanics: Fluids	4
WRI 121	English Composition	3	MATH 361	Statistical Methods I	4
	Humanities Elective*	3	Total		17
Total		16			
Freshman Year		Winter	Junior Year		Winter
CHE 222	General Chemistry II	5	ANTH/HIST 335	Social Science Elective	3
ENGR 102	Introduction to Engineering II	2	CE 341	Elementary Structural Design	5
WRI 122	Argumentative Writing	3	CE 351	Intro to Transportation Engineering	4
	Humanities Elective*	3	CE 371	Closed Conduit System	4
	Social Science Elective	3	Total		16
Total		16			
Freshman Year		Spring	Junior Year		Spring
CE 203	Engineering Graphics	3	CE 312	Earth Pressures & Foundations	3
GEO 201	Physical Geology	4	CE 354	Traffic Engineering	3
MATH 251	Differential Calculus	4	CE 374	Hydrology	4
	Humanities Elective*	3	MATH 321	Applied Differential Equations I	4
Total		14	Total		14
Sophomore Year		Fall	Senior Year		Fall
CE 212	Civil Engineering Materials	4	CE 401/		
GME 161	Plane Surveying I	4	COM 401	Civil Engineering Project I	5
MATH 252	Integral Calculus	4	CE 405	Sustainability & Infrastructure	3
PHY 221	General Physics with Calculus	4	CE 442/444	(Intermediate Structures Course)	4
Total		16	CE 4XX	Civil Engineering Elective	3
			Total		15
Sophomore Year		Winter	Senior Year		Winter
CE 205	Computational Methods	2	CE 402/		
ENGR 211	Engineering Mechanics: Statics	4	COM 402	Civil Engineering Project II	7
MATH 254N	Vector Calculus I	4	CE 4XX	Civil Engineering Elective	3
PHY 222	General Physics with Calculus	4	CE 4XX	Civil Engineering Elective	3
Total		14	Total		13
Sophomore Year		Spring	Senior Year		Spring
CE 208	Principles of Professional Practice	4	ANTH 452	Globalization (SS)	3
ENGR 213	Engineering Mechanics: Strength of Materials	4	CE 4XX	Civil Engineering Elective	3
GIS 134	Geographic Information systems	3	CE 4XX	Civil Engineering Elective	3
WRI 227	Technical Report Writing	3		Math/Science Elective	3
Total		14		Social Science Elective	3
			Total		15

* Humanities courses may not be skill or performance based. One Humanities course must study literature (typically LIT prefix). Civil electives must total to at least 15 credits (of which at least 9 credits must be CE 400 or 500 level electives).

Total Credits Required for B.S. in Civil Engineering: 180

Concurrent Degree in Environmental Sciences

Civil Engineering students have the opportunity to earn concurrent degrees in Civil Engineering and Environmental Sciences. The additional degree requires 45 credits in Environmental Sciences courses, which can be taken concurrent to Civil Engineering courses or as an add-on year. The dual degree in Environmental Sciences places engineering projects in the context of environmental impacts and environmental regulations, and greatly increases job opportunities for Oregon Tech Civil Engineering graduates. The purpose of the concurrent programs is to challenge motivated students to become even better prepared for the engineering and environmental job markets. To obtain both degrees, students must complete the following listed courses along with the courses required for the Bachelor of Science in Civil Engineering.

BIO 111	Introduction to Environmental Sciences	4
BIO 211	Principles of Biology	4
BIO 212	Principles of Biology	4
BIO 213	Principles of Biology	4
BIO 225	Riparian Assessment Methods	1
BIO 327	General Ecology	
or		
BIO 337	Aquatic Ecology	4
BIO 434	Data Analysis Methods	
or		
MATH 362	Statistical Methods II	4
BIO 484	Sustainable Human Ecology	4
CHE 223	General Chemistry III*	5
CHE 331	Organic Chemistry I	4
ENV 314	Environmental Management and Restoration	3
GEOG 105	Physical Geography *	3
GIS 134	Geographic Information Systems Chemistry Technical Emphasis Elective**	3

* CHE 223 and GEOG 105 should be taken as Civil Engineering Math/Science Electives.

** This technical emphasis elective must have a CHE prefix; different courses are offered every year.

Total Additional Credits Needed: 53

Bachelor of Science/ Master of Science in Civil Engineering Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
CHE 221	General Chemistry I	5
ENGR 101	Introduction to Engineering I	2
SPE 111	Public Speaking	3
WRI 121	English Composition Humanities Elective*	3
Total		16

Freshman Year		Winter
CHE 222	General Chemistry II	5
ENGR 102	Introduction to Engineering II	2
WRI 122	Argumentative Writing Humanities Elective*	3
	Social Science Elective	3
Total		16

Freshman Year		Spring
CE 203	Engineering Graphics	3
GEOG 201	Physical Geology	4
MATH 251	Differential Calculus Humanities Elective*	3
Total		14

Sophomore Year		Fall
CE 212	Civil Engineering Materials	4
GME 161	Plane Surveying I	4
MATH 252	Integral Calculus	4
PHY 221	General Physics with Calculus	4
Total		16

Sophomore Year		Winter
CE 205	Computational Methods	2
ENGR 211	Engineering Mechanics: Statics	4
MATH 254N	Vector Calculus I	4
PHY 222	General Physics with Calculus	4
Total		14

Sophomore Year		Spring
CE 208	Principles of Professional Practice	4
ENGR 213	Engineering Mechanics: Strength of Materials	4
GIS 134	Geographic Information systems	3
WRI 227	Technical Report Writing	3
Total		14

Junior Year		Fall
CE 311	Intro to Geotechnical Engineering	5
CE 331	Structural Analysis	4
ENGR 318	Engineering Mechanics: Fluids	4
MATH 361	Statistical Methods I	4
Total		17

Junior Year		Winter
ANTH/HIST 335	Social Science Elective	3
CE 341	Elementary Structural Design	5
CE 351	Intro to Transportation Engineering	4
CE 371	Closed Conduit System	4
Total		16

Junior Year		Spring
CE 312	Earth Pressures & Foundations	3
CE 354	Traffic Engineering	3
CE 374	Hydrology	4
MATH 321	Applied Differential Equations I	4
Total		14

Fourth Year		
CE 401/		
COM 401	Civil Engineering Project I	5
CE 402/		
COM 402	Civil Engineering Project II	7
CE 405	Sustainability & Infrastructure	3
CE 442	Advanced Reinforced Concrete Design	4
Or		
CE 444	Intermediate Steel Design	
	Technical Electives**	3
	Technical Electives >500**	15
CE 501	Graduate Seminar	1
MATH 4XX	Math/Science Elective	3
WRI 521	Writing at the Graduate Level	3
Year Total		44

Fifth Year		
ANTH 452	Globalization	3
CE 590	Graduate Project	3-9
	Technical Electives**	12
	Technical Electives >500**	17-23
	Social Science Elective	3
Year Total		44

Total Credits Required for BS/MSCE: 225

* Humanities courses may not be skill or performance based. One Humanities course must study literature (typically LIT prefix).

** Technical Electives are generally 400- and 500-level CE courses. A maximum of 9 non-CE technical elective credits (specified below) may be applied to the co-terminal BSCE/MSCE degree.

**Allowed Non-CE Technical
Electives**

ENV 435 Atmospheric Physics 4

GME 351 Construction and Engineering
Surveying 3

or

GME 372 Subdivision Planning and Platting

GME 425 Remote Sensing 4

MATH 341 Linear Algebra 4

MATH 425 Vector Analysis 3

MATH 451 Numerical Methods I 4

MATH 465 Mathematical Statistics 4

Communication Department

Matt Schnackenberg, *Department Chair*

Professors: K. Brown, M. Dyrud, L. Young

Associate Professors: D. Peterson, M. Schnackenberg

Assistant Professors: A. Fultz, V. Koehn, R. Schwartz, M. Search, C. Strynyk, C. Vukovich

Degree Offered

Bachelor of Science in Communication Studies

The Bachelor of Science in Communication Studies allow students flexibility in designing a program that fits their life and career goals. Students choose core courses and Electives from areas such as technical, organizational, and interpersonal communication. In addition, students build a career foundation by completing a *focused sequence of Electives*.

Minors Offered

Human Communication
Technical Communication

Certificate Offered

Dispute Resolution

Career Opportunities

The Communication Studies Program prepares students for careers in areas such as technical communication, organizational communication, new communication technologies, education, human resources, project management, public relations, sales, and mediation.

General Education Courses

To ensure that Oregon Tech's graduates are skilled communicators, the Communication Department provides writing, speech, and communication courses to satisfy general education requirements. Students in other majors should consult the general education and degree requirements in their major departments.

Student Preparation

All students who plan to study at Oregon Tech should enroll in writing and speech classes during their high school years to better benefit from the university's communication courses. Students applying to the Communication Studies Program should have

especially strong reading and writing skills. It is important to have a well-rounded college preparation background, including courses in math, sciences, and general education.

Degree Requirements

The Bachelor of Science in Communication Studies requires 184 credits. All major courses, general education communication courses, and focused sequence of electives courses must be completed with a grade of "C" or higher.

Bachelor of Science in Communication Studies Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
COM 104	Introduction to Communication	3
COM 225	Interpersonal Communication	3
MIS 101	Word Processing Software Lab	1
PSY 201	Psychology	3
WRI 121	English Composition	3
	Laboratory Science Elective	4
Total		17

Freshman Year		Winter
COM 105	Introduction to Communication Theory	3
COM 115	Introduction to Mass Communication	3
MIS 102	Spreadsheet Software Lab	1
PSY 202	Psychology	3
SPE 111	Public Speaking	3
WRI 122	Argumentative Writing	3
Total		16

Freshman Year		Spring
ART 207	Graphic Design	3
COM 106	Introduction to Communication Research	3
COM 205	Intercultural Communication	3
COM 109	Technology and Communication	3
MIS 103	Presentations Graphics Software Lab	1
PSY 203	Psychology	3
Total		16

Sophomore Year		Fall
COM 216	Grammar and Punctuation	3
MATH	Any for which MATH 100 pre-req	4
SPE 321	Small Group and Team Communication	3
WRI 227	Technical Report Writing	3
	Social Science Elective	3
Total		16

Sophomore Year		Winter
COM 237	Visual Communication	3
COM 276	Democracy and Media	3
JOUR 211	Publications—Student Newspaper	3
	Focused Sequence Elective (outside 1)**	3
	Social Science Elective	3
Total		15

Sophomore Year **Spring**

COM 248	Digital Media Production	3
COM 255	Communication Ethics	3
	Business Elective	3
	Focused Sequence Elective*	3
	Laboratory Science/Math Elective	4
Total		16

Junior Year **Fall**

COM 301	Rhetorical Theory and Applications	3
COM 325	Gender and Communication	3
COM 326	Communication Research	3
Focused Sequence Elective (outside 2)**		3
	Social Science Elective (UD)	3
Total		15

Junior Year **Winter**

COM 345	Organizational Communication I	3
SPE 314	Argumentation	3
	Social Science Elective (UD)	3
Focused Sequence Elective in major (UD)(2)*		3
Focused Sequence Elective (outside 3)**		3
Total		15

Junior Year **Spring**

COM 347	Negotiation and Conflict	3
COM 358	Communication and the Law	3
Focused Sequence Elective (outside 4)**		3
	Humanities Elective	3
	Writing (UD)	3
Total		15

Senior Year **Fall**

COM 309	Applied Technology	3
COM 420	Extern/Senior Project	4
	Social Science Elective	3
	Humanities Elective (UD)	3
	Elective	3
Total		16

Senior Year **Winter**

COM 420	Extern/Senior Project	4
Focused Sequence Elective in major (UD)(3)*		3
	Social Science Elective (UD)	3
	Social Science Elective	3
Total		13

Senior Year **Spring**

COM 420	Extern/Senior Project	4
COM 424	Capstone Course	3
Focused Sequence Elective in major (UD)(4)*		3
	Laboratory Science/Math Elective	4
Total		14

* A series of four courses chosen from within the major applicable to the student's career aspirations. Three of the four courses should be upper division. Students consult with their advisors when choosing these courses.

**A series of four courses chosen from outside the major applicable to the student's career aspirations. Students consult with their advisors when choosing these courses

Curriculum notes: To earn the Bachelor of Science degree, students must complete 36 credits in mathematics and science or 45 credits in mathematics, science, and social science. Students must also complete 60 credits of upper-division courses.

There is no guarantee of externships for Communication Studies majors. The best externship experiences are often those identified and arranged by students.

Total Required Credits for in B.S. Communication Studies: 184

Human Communication Minor

The Human Communication Minor supplements Oregon Tech technical and applied science degrees and provides advanced training in communication skills. The minor offers courses in the analysis and practice of human communication in a variety of areas including interpersonal, intercultural, health, nonverbal and electronic communication. In addition, the minor allows students to practice conflict resolution, negotiation strategies, ethical communication and rhetorical analysis. Students who have performed well in general education communication courses are encouraged to enroll in this minor. For further information on enrollment, contact a member of the Communication Department or the Communication Department chair. One goal of the Human Communication Minor is to educate students from a variety of majors in the effective practice of human communication skills based on theoretical understandings of communication.

Career Opportunities

The Human Communication minor enhances students' employability and career flexibility. Many employers in many industries seek employees who can work effectively on multi-disciplinary teams, communicate in many (including international) contexts, understand and resolve conflict in the workplace and analyze and create effective messages in a variety of settings.

Requirements of the Human Communication Minor

COM 205 Intercultural Communication
COM 225 Interpersonal Communication
SPE 321 Small Group and Team Communication

In addition, students will select THREE from the following list of courses:

COM 226 Nonverbal Communication
COM 301 Rhetorical Theory and Application
COM 320 Advanced Intercultural Communication
COM 346 Health Communication
COM 347 Negotiation and Conflict Resolution
COM 365 Electronic Communication and Society
PHIL 331 Ethics in the Professions

Technical Communication Minor

The Technical Communication Minor supplements Oregon Tech technical degrees and provides advanced training and experience in communication skills. The minor offers specialized communication courses in such varied areas as proposal and grant writing, documentation development, and technical editing.

Students who have performed above-average work in their lower-division communication courses are encouraged to enroll in the program. For further information on enrollment, contact any Communication Department faculty member.

Career Opportunities

The Technical Communication Minor will enhance students' flexibility as their careers develop. Employers in private industry, governmental agencies, and research facilities seek a unique combination of skills. First, employers know that the major coursework at Oregon Tech prepares students well. Second, the Technical Communication Minor courses build skills in project development, manual writing and editing, computer-aided writing and publishing, oral presentations, and interviewing skills that complement technical education. Even if students choose not to work as technical writers or editors, the Technical Communication Minor may increase job opportunities and professional advancement.

Requirements of the Minor

In addition to the general education requirements in communication, Technical Communication Minor students take four upper-division courses (12 units). Students take two required core courses and choose two Electives from the list below. Students must earn a "C" or better in all courses to complete the minor.

Required Courses

COM 301 Rhetorical Theory and Application
WRI 328 Technical Journalism

Elective Courses

COM 365 Electronic Communication and Society
COM 415 Developing Effective Multimedia-based Presentations
WRI 350 Documentation Development
WRI 410 Proposal and Grant Writing
WRI 415 Technical Editing
WRI 420 Document Design

Dispute Resolution Certificate

The Dispute Resolution Certificate provides students with a thorough foundation of communication courses related to dispute resolution. The program culminates in specialized courses: negotiation, facilitation, and mediation, giving students expertise in the field. A practicum in mediation offers practical experience in community mediation and guarantees competence of students completing the certificate. This certificate provides students with both the theoretical background and the practical experience to effectively resolve conflicts in a variety of contexts.

Prerequisite or Co-requisite Classes

SPE 111	Public Speaking	3
WRI 121	English Composition	3
WRI 122	Argumentative Writing	3

Program Courses

COM 205	Intercultural Communication	3
COM 225	Interpersonal Communication	3
COM 226	Nonverbal Communication	3
COM 345	Organizational Communication I	3
COM 347	Negotiation and Conflict Resolution	3
COM 348	Facilitation	3
COM 425	Mediation	3
COM 426	Mediation Practicum	3
SPE 321	Small Group and Team Communication	3

Computer Systems Engineering Technology Department

Calvin Caldwell, *Department Chair*

Jay Bockelman, *Wilsonville Operations Program Director, Software Engineering Technology and Embedded Systems Engineering Technology.*

Todd Breedlove, *Program Director, Software Engineering Technology*

Doug Lynn, *Program Director, Computer Engineering Technology*

Jim Long, *Program Director, Embedded Systems Engineering Technology*

Sherry Yang, *Curriculum Coordinator, Software Engineering Technology*

Phong Nguyen, *Curriculum Coordinator, Computer Engineering Technology*

Professors: J. Bockelman, T. Breedlove, C. Caldwell, C. Kansaku, J. Long, D. Lynn, S. Yang

Associate Professors: P. Nguyen

Assistant Professors: D. Bishop, P. Howard, K. Pintong, T. Scevers

Degrees Offered

- Bachelor of Science in Computer Engineering Technology
- Bachelor of Science in Software Engineering Technology
- Bachelor of Science in Embedded Systems Engineering Technology
- Associate of Engineering in Computer Engineering Technology
- Associate of Engineering in Software Engineering Technology

Common First-Year Curriculum

The Bachelor of Science in Computer Engineering Technology, Bachelor of Science in Software Engineering Technology, Bachelor of Science in Embedded Systems Engineering Technology, the Associate of Engineering in Computer Engineering Technology and the Associate of Engineering in Software Engineering Technology all share a common first-year curriculum.

Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
CST 116	C++ Programming I	4
CST 162	Digital Logic I	4
MATH 111	College Algebra	4
WRI 121	English Composition	3
Total		15

Freshman Year		Winter
CST 126	C++ Programming II	4
CST 130	Computer Organization	3
MATH 112	Trigonometry	4
SPE 111	Public Speaking	3
WRI 122	Argumentative Writing	3
Total		17

Freshman Year		Spring
CST 120	Embedded C	4
CST 131	Computer Architecture	3
CST 136	Object-Oriented Programming with C++	4
MATH 251	Differential Calculus	4
Total		15

Computer Engineering Technology

Degrees Offered

- Bachelor of Science in Computer Engineering Technology
- Associate of Engineering in Computer Engineering Technology

Bachelor of Science and Associate of Engineering Degrees

All students who complete the curriculum requirements in Computer Engineering Technology will be knowledgeable in the theory and applications of both computer hardware and software.

Required Student Equipment

Successful completion of this degree requires intensive, hands-on use of computers. Therefore, all students are required to own their own computer. To ensure compatibility with campus-wide computers and networks,

students should consult a department faculty member for a specification sheet. Financial aid may be available to help defray the cost of this equipment. Please consult the Financial Aid Office at Oregon Tech.

Career Opportunities

Work in the field of computer engineering technology includes: application specific integrated circuit development, firmware development, embedded systems design, software development, testing and applications of technology.

Computer engineering technology graduates will be involved in development of hardware, software and embedded applications that adapt digital logic and computer systems to solve problems in a wide range of industries from industrial manufacturing to consumer electronics. In addition, they may be involved in product testing and qualification or in ap-

plication engineering, customer support, sales and public relations.

The associate's degree curriculum gives the student a strong foundation in both hardware and software aspects of computing, while also furnishing a solid background in general education subjects including mathematics, physics and communication. The associate degree graduate qualifies as a technician who is productive immediately upon entering the work force. The associate's degree also provides a way for students who obtain degrees in related disciplines to add breadth to their education.

The bachelor's curriculum goes beyond the associate's degree curriculum providing the greater depth and breadth of technical capability necessary for an engineering technologist. The graduate is qualified to assume a responsible position in business or

industry. Graduates may be responsible for the development, use and the maintenance of computing systems, and for the supervision of personnel.

New careers are constantly evolving in both the hardware and software branches of this field. A diversified study allows the graduate to quickly adapt to changing market conditions.

Curriculum Mission and Objectives

The mission of the Computer Engineering Technology (CET) Degree program in the Computer Systems Engineering Technology (CSET) Department at Oregon Institute of Technology is to provide an excellent education incorporating industry-relevant, applied laboratory-based design and analysis to our students. The program is to serve a constituency consisting of its Alumni, employers in the high-technology industry and the members of our IAB. Major components of the CET program's mission in the CSET

Department are to:

- educate computer engineering technology students to meet current and future industrial challenges;
- promote a sense of scholarship, leadership and professional service among our graduates;
- enable students to create, develop, and disseminate knowledge for the applied engineering environment;
- expose students to a cross-disciplinary educational program;
- provide high tech industry employers with graduates in the computer engineering technology profession, a profession which is increasingly being driven by advances in technology.

CET Bachelor of Science Program Educational Objectives

Alumni of the Computer Engineering Technology (CET) Bachelor Degree program may be employed in a wide range of high tech industries from industrial manufacturing to consumer electronics where they will be involved in solving problems through the development of hardware, software and embedded applications. Alumni may be involved in product design, testing and qualification, application engineering, customer support, sales, or public relations.

1. Alumni will demonstrate technical competency through success in computer engineering technology positions and/or pursuit of engineering or engineering technology graduate studies if desired.
2. Alumni will demonstrate competencies in communication and teamwork skills by assuming increasing levels of responsibility and/or leadership or managerial roles.
3. Alumni will develop professionally, pursue continued learning and practice responsibly and ethically.

CET Associate Degree Program Education Objectives

Alumni of the Computer Engineering Technology (CET) Associate Degree program may be employed as technicians or in support roles in a wide range of high tech industries from industrial manufacturing to consumer electronics. Alumni may be involved in product testing and qualification, customer support, sales, or public relations.

1. Alumni will demonstrate technical competence through success in computer engineering technician positions.
2. Alumni will demonstrate competencies in communication and teamwork skills through positive contributions to team based engineering projects.
3. Alumni will develop professionally, pursue continued learning and practice responsibly and ethically.

According to current statistics, one third of students who obtain the CET Associate degree also obtain a bachelor degree in a related discipline, most often a bachelor degree in Software. In this case, the Associate degree adds breadth to their education. Alumni in this category would be expected to perform at a level consistent with the bachelor degree program educational objectives.

Cooperative Field Experience

The cooperative program includes work experience during the junior and senior years. The co-op period is an employment arrangement with an employer in the area of the student's major field with normal salary and academic credit. These arrangements are made on an individual basis and the student is under no obligation to accept permanent employment with any previous co-op employer.

A student must have junior standing in Computer Engineering Technology to be considered for this program.

Accreditation

The Computer Engineering Technology Programs are accredited by the Engineering Technology Accreditation Commission (ETAC), Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

Degree Requirements

Associate of engineering technology degree students must complete 94 credit hours as prescribed by the curriculum outline. The Bachelor of Science in Computer Engineering Technology degree requires 94 additional credit hours, for a total of 188 credits, as prescribed by the curriculum outline.

Bachelor of Science in Computer Engineering Technology

Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
CST 116	C++ Programming I	4
CST 162	Digital Logic I	4
MATH 111	College Algebra	4
WRI 121	English Composition	3
Total		15

Freshman Year		Winter
CST 126	C++ Programming II	4
CST 130	Computer Organization	3
MATH 112	Trigonometry	4
SPE 111	Public Speaking	3
WRI 122	Argumentative Writing	3
Total		17

Freshman Year		Spring
CST 120	Embedded C	4
CST 131	Computer Architecture	3
CST 136	Object-Oriented Programming with C++	4
MATH 251	Differential Calculus	4
Total		15

Sophomore Year		Fall
CST 133	Digital Logic II	4
CST 134	Instrumentation	1
CST 250	Computer Assembly Language	4
MATH 252	Integral Calculus	4
WRI 227	Technical Report Writing	3
Total		16

Sophomore Year		Winter
CST 204	Introduction to Microcontrollers	4
CST 231	Digital Systems Design I	4
EE 221	Circuits I	4
MATH 254N	Vector Calculus I	4
Total		16

Sophomore Year		Spring
CST 240	UNIX	4
EET 237	AC Circuits, Filters and Signals	3
EET 238	AC Circuits, Filters and Signals Laboratory	1
SPE 321	Small Group and Team Communication	3
	Advanced Math Elective**	4
Total		15

Junior Year		Fall
CST 337	Embedded System Architecture	5
CST 315	Embedded Sensor Interfacing and I/O	4
CST 371	Embedded Systems Development I	4
PHY 221	General Physics with Calculus	4
Total		17

Junior Year		Winter
CST 331	Microprocessor Peripheral Interfacing	5
CST 372	Embedded Systems Development II	3
PHY 222	General Physics with Calculus	4
	Social Science Elective	3
Total		15

Junior Year		Spring
CST 351	Digital Systems Design II	3
CST 373	Embedded Systems Development III	2
PHY 223	General Physics with Calculus	4
WRI 327	Advanced Technical Writing	3
	Humanities Elective	3
Total		15

Senior Year		Fall
BUS 304	Engineering Management	3
CST 344	Intermediate Computer Architecture	3
CST 441	Logic Synthesis with VHDL+	3
PHIL 331	Ethics in the Professions	3
	Technical Elective*	3
Total		15

Senior Year		Winter
CST 418	Data Communications and Networks	3
CST 442	Advanced Computer Architecture	3
CST 451	ASIC Design using FPGAs+	4
MGT 345	Engineering Economy	3
	Social Science Elective	3
Total		16

Senior Year		Spring
ANTH 452	Globalization	3
CST 461	Advanced Topics in VLSI Design+	3
CST 464	RISC-Based Microprocessor Systems	4
	Humanities Elective	3
	Social Science Elective	3
Total		16

* See your advisor for acceptable technical electives.

** Electives: MATH 253N, MATH 465, MATH 341 or MATH 321.

+ OR Senior Project: CST 334(1), CST 412(3), CST 422(3), CST 432(2)

Total Credits Required for B.S. in Computer Engineering Technology: 188

Associate of Engineering in Computer Engineering Technology

Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
CST 116	C++ Programming I	4
CST 162	Digital Logic I	4
MATH 111	College Algebra	4
WRI 121	English Composition	3
Total		15

Freshman Year		Winter
CST 126	C++ Programming II	4
CST 130	Computer Organization	3
MATH 112	Trigonometry	4
SPE 111	Public Speaking	3
WRI 122	Argumentative Writing	3
Total		17

Freshman Year		Spring
CST 120	Embedded C	4
CST 131	Computer Architecture	3
CST 136	Object-Oriented Programming with C++	4
MATH 251	Differential Calculus	4
Total		15

Sophomore Year		Fall
CST 133	Digital Logic II	4
CST 134	Instrumentation	1
CST 250	Computer Assembly Language	4
MATH 252	Integral Calculus	4
WRI 227	Technical Report Writing	3
Total		16

Sophomore Year		Winter
CST 204	Introduction to Microcontrollers	4
CST 231	Digital Systems Design I	4
EE 221	Circuits I	4
PHY 221	General Physics with Calculus	4
Total		16

Sophomore Year		Spring
CST 240	UNIX	4
EET 237	AC Circuits, Filters and Signals	3
EET 238	AC Circuits, Filters and Signals Laboratory	1
PHY 222	General Physics with Calculus	4
	Humanities or Social Science Elective	3
Total		15

Total Credits Required for Associate of Engineering in Computer Engineering Technology: 94

Concurrent Degree

The CSET Department provides the opportunity for the interested student to earn a bachelor's degree in computer engineering technology and software engineering technology concurrently. Such concurrent degree holders are highly sought after in industry since they know and understand both the hardware and software aspects of computers. The purpose of the concurrent CET/SET Degree Program is to challenge the brightest and most motivated students to become even better prepared for the job market, extending their time in college by an additional year. To obtain both degrees, students must complete the following listed courses along with the courses required for the Bachelor of Science degree in Computer Engineering Technology with the exception of WRI 327, the CST elective and the MATH elective.

CST 136	Object-Oriented Programming with C++	4
CST 211	Data Structures	4
CST 229	Introduction to Grammars	4
CST 236	Software Systems Testing	4
CST 238	Graphical User Interface Programming	4
CST 276	Software Design Patterns	4
CST 320	Compiler Methods	4
CST 324	Database Systems and Design	4
CST 334	Project Proposal	1
CST 352	Operating Systems	4
CST 412	Senior Development Project	3
CST 422	Senior Development Project	3
CST 432	Senior Development Project	2
CST 415	Computer Networks	4
	CST Technical Electives*	9
	MATH Elective**	3/4
MATH 465	Mathematical Statistics	4
WRI 327	Advanced Technical Writing or	
WRI 350	Documentation Development	3

- * One Elective must be a CET hardware technical elective—a Hardware CST 407, or CST 456.
- * One Elective must be a SET software technical elective—CST 346, CST 356, CST 405, a Software CST 407, CST 426, CST 465 or CST 466.
- ** MATH 321, MATH 322, MATH 327, MATH 341, MATH 342, or MATH 451.

Embedded Systems Engineering Technology

Degree Offered

Bachelor of Science in Embedded Systems Engineering Technology

Required Student Equipment

Successful completion of this degree requires intensive, hands-on use of computers. Therefore, all students are required to own their own computer. To ensure compatibility with campus-wide computers and networks, students should consult a department faculty member for a specification sheet. Financial aid may be available to help defray the cost of this equipment. Please consult the Financial Aid Office at Oregon Tech.

Career Opportunities

The Department of Computer Systems Engineering Technology offers a Bachelor of Science degree in Embedded Systems Engineering Technology (ESET) designed to build and enhance student's knowledge and skills in this high demand field. Embedded systems play an important role in society. They are the products that contain computing capabilities which are found throughout a wide spectrum of applications. Examples of embedded systems can be found in areas ranging from the entertainment industry to office systems; health care to telecommunications. Embedded systems encompass such diverse products as interactive multimedia, printers, medical equipment, avionics equipment, kitchen appliances, mobile phones, and automotive

engine management units. Engineering and technological challenges abound in the design and development of such innovative products due to the high level integration of hardware and software. As they become more complex and time to market shrinks there is increasing need for skill and creativity on the part of the Embedded System Engineering Technology graduate.

If you want to:

- develop skills in design and implementation of firmware for embedded systems,
- expand knowledge and apply new ideas in practical design,
- gain hands-on experience in embedded system design,
- bridge the gap between software and hardware design,
- enhance your career opportunities in a variety of high demand areas of industrial applications, then the Embedded Systems Engineering Technology Program is the place for you.

Objective of the Curriculum

The goal of the Embedded Systems Program is to prepare students with the skills demanded by real-world industrial applications. Key to this process is the direct involvement of the embedded systems industries. Specific areas of preparation include:

- Embedded systems design methods—methods and techniques specific to the

creation of an embedded system that integrates both software and hardware to fulfill a set of requirements.

- Software engineering methods—methods specific to development of software for embedded systems, including implementation, maintenance and testing.
- Systems software development—device driver development, multiprocessing control systems, and the software necessary to directly access and manipulate hardware.
- Architectural elements of embedded systems—methods and techniques for designing and implementing hardware components for embedded systems such as application-specific integrated circuits and System-On-a-Chip (SoC) technology.
- Real-time high-reliability and high availability processing—methods and techniques necessary for understanding, evaluating and addressing quality attributes most often associated with embedded systems such as real-time deadlines, high availability, survivability, and safety.
- Data communications—methods and techniques for developing distributed systems within embedded environments that use physical or wireless networking.

Cooperative Field Experience

The cooperative program includes work experience during the junior and senior years. The

co-op period is an employment arrangement with an employer in the area of the student's major field with normal salary and academic credit. These arrangements are made on an individual basis and the student is under no obligation to accept permanent employment with any previous co-op employer.

Degree Requirements

The Bachelor of Science in Embedded Systems Engineering Technology requires 196 credit hours as prescribed by the curriculum outline.

Bachelor of Science in Embedded Systems Engineering Technology

Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall	Junior Year		Fall
CST 116	C++ Programming I	4	CST 315	Embedded Sensor Interfacing and I/O	4
CST 162	Digital Logic I	4	CST 337	Embedded System Architecture	5
MATH 111	College Algebra	4	CST 371	Embedded Systems Development I	4
WRI 121	English Composition	3	PHY 221	General Physics with Calculus	4
Total		15	Total		17
Freshman Year		Winter	Junior Year		Winter
CST 126	C++ Programming II	4	CST 347	Real-Time Embedded Operating Systems	4
CST 130	Computer Organization	3	CST 372	Embedded Systems Development II	3
MATH 112	Trigonometry	4	PHY 222	General Physics with Calculus	4
SPE 111	Public Speaking	3	MATH 465	Mathematical Statistics	4
WRI 122	Argumentative Writing	3	Total		15
Total		17			
Freshman Year		Spring	Junior Year		Spring
CST 120	Embedded C	4	CST 334	Project Proposal	1
CST 131	Computer Architecture	3	CST 373	Embedded Systems Development III	2
CST 136	Object-Oriented Programming with C++	4	CST 417	Embedded Networking	4
MATH 251	Differential Calculus	4	WRI 227	Technical Report Writing Laboratory Science Elective Humanities Elective	3 4 3
Total		15	Total		17
Sophomore Year		Fall	Senior Year		Fall
CST 133	Digital Logic II	4	BUS 304	Engineering Management	3
CST 134	Instrumentation	1	CST 412	Senior Development Project	3
CST 250	Computer Assembly Language	4	CST 455	System on a Chip Design Humanities Elective Social Science Elective	4 3 3
CST 276	Software Design Patterns	4	Total		16
MATH 252	Integral Calculus	4			
Total		17			
Sophomore Year		Winter	Senior Year		Winter
CST 204	Introduction to Microcontrollers	4	CST 422	Senior Development Project	3
CST 231	Digital Systems Design I	4	CST 456	Embedded System Testing	4
EE 221	Circuits I	4	MGT 345	Engineering Economy	3
MATH 254N	Vector Calculus I	4	WRI 350	Documentation Development Social Science Elective	3 3
Total		16	Total		16
Sophomore Year		Spring	Senior Year		Spring
CST 211	Data Structures	4	ANTH 452	Globalization	3
CST 240	UNIX	4	CST 432	Senior Development Project	2
PSY 201	General Psychology	3	CST 466	Embedded System Security Humanities Elective Technical Elective	3 3 3
SPE 321	Small Group and Team Communication	3	Total		14
Total		14			

Total Credits Required for B.S. in Embedded Systems Engineering Technology: 189

Tech Elective: One additional CST upper division course.

Software Engineering Technology

Degrees Offered

- Bachelor of Science in Software Engineering Technology
- Associate of Engineering in Software Engineering Technology

Students who complete the curriculum requirements in Software Engineering Technology will be qualified and knowledgeable in the establishment and use of sound engineering principles (methods) in order to create software of all types that is reliable and works on real machines.

Required Student Equipment

Successful completion of this degree requires intensive, hands-on use of computers. Therefore, all students are required to own a computer. To ensure compatibility with campus-wide computers and networks, students should consult a department faculty member for a specification sheet. Financial aid may be available to help defray the cost of this equipment. Please consult the Financial Aid Office at Oregon Tech.

Career Opportunities

Bachelor of Science in Software Engineering Technology degree graduates find employment as software engineers, systems engineers, systems analysts, programmer/analysts, researchers and assistants, consultants, customer engineers, etc., responsible for the application, design, development, and implementation of software in all areas of industry, government and education.

Software engineering technologists' career paths will be many and varied. They may concentrate on hardware-support activities such as new design/development, testing, customer service and the like. They may concentrate on software specification, design, construction and testing through implementation and maintenance.

Graduates may get involved with administrative or project management by beginning as a member of an applications development team and progressing into management. They may pursue careers in product development, marketing, sales, design, and support. Students completing the requirements for the Associate of Engineering degree should consider themselves as entry-level trainees in the careers mentioned.

High School Preparation

Coursework in computer science, mathematics, and physical science will aid students in their progress in this program.

Bachelor Program Mission

The mission of the Software Engineering Technology (SET) Bachelor's Degree Program within Computer Systems Engineering Technology (CSET) Department at Oregon Institute of Technology is to prepare our students for productive careers in industry and government by providing an excellent education incorporating industry-relevant, applied laboratory-based instruction in both the theory and application of software engineering. The program is to serve a constituency consisting of our alumni, our employers and our Industrial Advisory Board. Major components of the SET Program's mission in the CSET Department are:

- To educate a new generation of Software Engineering Technology students to meet current and future industrial challenges and emerging software trends;
- To promote a sense of scholarship, leadership and professional service among our graduates;
- To enable our students to create, develop, apply and disseminate knowledge within the software development environment;
- To expose our students to cross-disciplinary educational programs;
- To provide government and high tech industry employers with graduates in software engineering and related professions.

Bachelor Program Educational Objectives

The Program Educational Objectives of Oregon Tech's Software Engineering Technology Program are to produce graduates that:

- Use their knowledge of engineering to creatively and innovatively solve difficult computer systems problems;
- Regularly engage in exploring, learning and applying state-of-the-art hardware and software technologies to the solution of computer systems problems;
- Will be an effective software development team member that contributes innovative software design solutions to the resolution of business, scientific or government computer systems problems;

- Will communicate effectively and successfully, both individually and within multi-disciplinary teams.

Associate Program Mission

The mission of the Software Engineering Technology (SET) Associate Degree program within the Computer Systems Engineering Technology (CSET) Department at Oregon Institute of Technology is to prepare our students for entry level careers in the software industry and government by providing applied laboratory based instruction.

The program is to serve a constituency consisting of our alumni, our employers and our Industrial Advisory Board. Major components of the SET program's mission in the CSET Department are:

- To provide a new generation of Software Engineering Technology students with a solid background in computer programming
- To enable our students to create, develop and apply knowledge within a technical software environment
- To provide government and high tech industry employers with entry level graduates in computer programming and related professions.

Associate Program Educational Objectives

The Program Educational Objectives of Oregon Tech's Software Engineering Technology program are to produce graduates that:

- Assist in solving computer systems problems using their knowledge of computer programming
- Regularly engage in learning and applying state-of-the-art hardware and software technologies to the solution of computer systems problems
- Will communicate effectively and successfully in the workplace.

Cooperative Field Experience

The cooperative program includes work experience usually during the junior and senior years. The co-op period would be an employment arrangement with an employer in the area of the student's major field with normal salary and academic credit. These arrangements are made on an individual basis, and the student is under no obligation to accept permanent employment with any previous cooperating employer. A student

must be ready to enter the sophomore year in Software Engineering Technology to be considered for this program

Accreditation

The Software Engineering Technology Programs are accredited by the Engineering Technology Accreditation Commission

(ETAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

Degree Requirements

Associate of Engineering Technology degree students must complete 96 credit hours as prescribed by the curriculum outline. The Bachelor of Science in Software Engineering Technology degree requires 187 credit hours as prescribed by the curriculum outline.

Bachelor of Science in Software Engineering Technology

Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
CST 116	C++ Programming I	4
CST 162	Digital Logic I	4
MATH 111	College Algebra	4
WRI 121	English Composition	3
Total		15

Freshman Year		Winter
CST 126	C++ Programming II	4
CST 130	Computer Organization	3
MATH 112	Trigonometry	4
SPE 111	Public Speaking	3
WRI 122	Argumentative Writing	3
Total		17

Freshman Year		Spring
CST 120	Embedded C	4
CST 131	Computer Architecture	3
CST 136	Object-Oriented Programming with C++	4
MATH 251	Differential Calculus	4
Total		15

Sophomore Year		Fall
CST 250	Computer Assembly Language	4
CST 276	Software Design Patterns	4
MATH 252	Integral Calculus	4
WRI 227	Technical Report Writing	3
Total		15

Sophomore Year		Winter
CST 211	Data Structures	4
CST 240	UNIX	4
MATH 254N	Vector Calculus I	4
PSY 201	General Psychology	3
Total		15

Sophomore Year		Spring
CST 223	Concepts of Programming Languages	3
CST 236	Software Systems Testing	4
CST 238	Graphical User interface programming	4
MATH 327	Discrete Mathematics	4
Total		15

Junior Year		Fall
CST 229	Introduction to Grammars	3
CST 316	Junior Team-Based Project Development I	4
CST 324	Database Systems and Design	4
PHY 221	General Physics with Calculus	4
SPE 321	Small Group and Team Communication	3
Total		18

Junior Year		Winter
CST 320	Compiler Methods	4
CST 326	Junior Team-Based Project Development II	4
PHY 222	General Physics with Calculus	4
WRI 350	Documentation Development	3
Total		15

Junior Year		Spring
CST 334	Project Proposal	1
CST 336	Junior Team-Based Project Development III	4
CST 352	Operating Systems	4
PHY 223	General Physics with Calculus Social Science Elective	4
Total		16

Senior Year		Fall
BUS 304	Engineering Management	3
CST 412	Senior Development Project	3
CST 415	Computer Networks Humanities Elective	4
	Technical Elective*	3
Total		16

Senior Year		Winter
CST 422	Senior Development Project	3
MATH 465	Mathematical Statistics Humanities Elective	4
	Social Science Elective	3
	Technical Elective*	3
Total		16

Senior Year		Spring
ANTH 452	Globalization	3
CST 432	Senior Development Project	2
MGT 345	Engineering Economy Humanities Elective	3
	Technical Elective*	3
Total		14

Total Credits Required for B.S. in Software Engineering Technology: 187

* Three additional CST upper division courses.

One CST upper division elective course may be exchanged for an upper division MATH course.

Associate of Engineering in Software Engineering Technology

Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
CST 116	C++ Programming I	4
CST 162	Digital Logic I	4
MATH 111	College Algebra	4
WRI 121	English Composition	3
Total		15

Freshman Year		Winter
CST 126	C++ Programming II	4
CST 130	Computer Organization	3
MATH 112	Trigonometry	4
SPE 111	Public Speaking	3
WRI 122	Argumentative Writing	3
Total		17

Freshman Year		Spring
CST 120	Embedded C	4
CST 131	Computer Architecture	3
CST 136	Object-Oriented Programming with C++	4
MATH 251	Differential Calculus	4
Total		15

Sophomore Year		Fall
CST 276	Software Design Patterns	4
MATH 252	Integral Calculus	4
PSY 201	General Chemistry	3
WRI 227	Technical Report Writing	3
	Technical Elective*	3
Total		17

Sophomore Year		Winter
CST 211	Data Structures	4
CST 240	UNIX	4
PHY 221	General Physics with Calculus	4
	Humanities Elective	3
Total		15

Sophomore Year		Spring
CST 223	Concepts of Programming Languages	3
CST 236	Software Systems Testing	4
CST 238	Graphical User Interface Programming	4
	Social Science Elective	3
	Elective	3
Total		17

**Total Credits Required for Associate of
Engineering in Software Engineering
Technology: 96**

* See your advisor for acceptable Elective classes.

Dental Hygiene Department

Jill Schultz, *Department Chair*

Professor: J. Schultz

Associate Professor: J. Cope, S. Hopper

Assistant Professors: C. Devens, E. Gordon, V. Points, P. Russell

Instructors: K. Clarke, H. Denton, P. Hendrix, S. Shivji, K. Sroufe

Degrees Offered

Bachelor of Science in Dental Hygiene
Associate of Applied Science in Dental Hygiene

A Bachelor of Science in Dental Hygiene is offered on the Oregon Tech Klamath Falls campus and on the Chemeketa Community College campus in Salem.

An Associate of Applied Science in Dental Hygiene is offered at ODS College of Dental Sciences in La Grande.

Accreditation

The dental hygiene curriculum is accredited with no reporting requirements by the American Dental Association Commission on Dental Accreditation, a specialized accrediting body recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education. The program is recognized by the Oregon Board of Dentistry, Oregon Dental Association and the Oregon Dental Hygienists' Association.

Program Purpose and Mission Statement

The dental hygiene programs prepare students to enter the dental hygiene profession as registered dental hygienists. Graduates are prepared for national and regional examinations and to meet qualifications for licensure. Bachelor degree graduates are prepared for post graduate education in dental hygiene and other related fields of study. The dental hygiene faculty strives to make a difference in students' lives by helping them achieve their goals. An atmosphere of respect within a safe learning environment that encourages critical thinking is valued.

Program Educational Objectives

The dental hygiene graduate will be competent in:

1. Applying ethical, legal and regulatory

concepts in the provision and/or support of oral health care services.

2. Critical thinking and problem solving related to comprehensive care and management of patients.
3. Interpersonal and communication skills to effectively interact with diverse population groups.
4. Assessing, planning, implementing and evaluating community-based oral health programs including health promotion and disease prevention activities.
5. Providing oral health care to individuals at all stages of life and for all periodontal classifications.
6. Self-assessment skills necessary for life-long learning.

Career Opportunities

Dental hygienists are most commonly employed in private dental practices and provide oral health preventive and therapeutic services. Graduates are prepared for licensure as a dental hygienist and with the qualifications to obtain permits and endorsements for expanded practice in such settings as nursing homes, schools, and hospitals. In addition to clinical practice, dental hygienists have careers in the fields of education, research, administration, and public health.

Student Preparation

A science background is beneficial to individuals interested in any health sciences profession. Students considering a career in dental hygiene should take a college-bound course of study in high school that includes algebra, chemistry, and biology or human anatomy and physiology.

Admissions Procedures

Any student who meets the OIT general admissions requirements may enroll in Pre-Dental Hygiene courses (freshman year). A limited number of seats are available in the professional courses (sophomore, junior, and senior years). Students are selected to enter the professional program through an application process.

The application deadline is in April of the calendar year of enrollment. To be eligible for admission into the Dental Hygiene Program the following minimum eligibility requirements must be met:

1. Applicants must have on file with the

Oregon Tech Office of Admissions an official *Application for Admission* to Oregon Tech, accompanied by a \$50 non-refundable fee and official transcripts of each college or university attended. Admission to Oregon Tech is independent of admission to the Dental Hygiene Program. All applicants to Oregon Tech are admitted as pre-dental hygiene majors until accepted into the dental hygiene program.

2. Applicants must have successfully completed or be in progress of completing all freshmen pre-dental hygiene courses. Completion of Introduction to Dental Hygiene (DH 100 on campus or DHE 100 online) is required by the end of spring term. All other prerequisite (freshman) courses must be completed by the end of summer term.
3. Applicants must have a minimum cumulative 2.50 GPA in previous college work.
4. Applicants must submit a *Dental Hygiene Application for Admission*, related forms, including official transcripts, and \$75 non-refundable application fee directly to the Dental Hygiene Department by the established date published on the department website. Detailed information and forms can be found on the Oregon Tech Dental Hygiene Program web page, www.oit.edu/dental-hygiene.

Program Requirements

Dental hygiene students admitted to the Dental Hygiene Program (sophomore, junior, senior years) must purchase instruments and other supplies to be used during clinical practice and pay additional fees associated with dental hygiene courses. A background check and drug test are required prior to final admission into the professional program.

Graduation Requirements

All courses listed in the curriculum for the catalog year a student begins a program must be fulfilled. Total credits required for graduation are: Bachelor of Science degree, 204; Associate of Applied Science, 163. A minimum cumulative grade point average (GPA) of 2.0 is required for graduation. Students must maintain a grade of "C" or better in all courses to continue in the program.

Bachelor of Science in Dental Hygiene Curriculum

The following are required courses and recommended terms for students attending on the Klamath Falls campus. Please visit www.oit.edu/dentalhygiene for transfer information from other Oregon colleges and for recommended course sequencing for those attending on the Chemeketa Community College campus.

Pre-Dental Hygiene

Freshman Year		Fall
BIO 200	Medical Terminology	2
BIO 231	Human Anatomy and Physiology I	4
CHE 101	Introduction to General Chemistry	3
CHE 104	Introduction to General Chemistry Laboratory	1
DH 100	Introduction to Dental Hygiene	2
MATH 100	Intermediate Algebra or higher	4
Total		16

Freshman Year		Winter
BIO 105	Microbiology	4
BIO 232	Human Anatomy and Physiology II	4
CHE 102	Introduction to Organic Chemistry	3
CHE 105	Introduction to Organic Chemistry Laboratory	1
SOC 204	Introduction to Sociology	3
WRI 121	English Composition	3
Total		18

Freshman Year		Spring
BIO 205	Nutrition	3
BIO 233	Human Anatomy and Physiology III	4
CHE 103	Introduction to Biochemistry	3
CHE 106	Introduction to Biochemistry Laboratory	1
SPE 111	Public Speaking	3
WRI 122	Argumentative Writing	3
Total		17

Professional Courses

Sophomore Year		Fall
CHE 360	Clinical Pharmacology for the Health Professions	3
DH 221	Dental Hygiene Clinical Practice and Seminar I	4
DH 225	Head and Neck Anatomy, Histology and Embryology	3
DH 240	Prevention I	3
DH 366	Dental Anatomy	2
Total		15

Sophomore Year		Winter
DH 222	Dental Hygiene Clinical Practice and Seminar II	4
DH 241	Prevention II	3
DH 244	General and Oral Pathology	3
DH 252	Oral Radiology I	3
DH 275	Dental Ethics	2
SPE 321	Small Group and Team Communication	3
Total		18

Sophomore Year		Spring
DH 223	Dental Hygiene Clinical Practice and Seminar III	3
DH 242	Prevention III	3
DH 253	Oral Radiology II	2
DH 254	Introduction to Periodontology	1
DH 267	Emergency Procedures	3
DH 380	Community Dental Health I Social Science Elective	2
		3
Total		17

Junior Year		Fall
BUS 317	Health Care Management	3
DH 321	Dental Hygiene Clinical Practice and Seminar IV	4
DH 340	Prevention IV	3
DH 354	Periodontology	3
DH 381	Community Dental Health II Psychology Elective	2
		3
Total		18

Junior Year		Winter
DH 322	Dental Hygiene Clinical Practice and Seminar V	3
DH 341	Prevention V	3
DH 351	Pain Management I	2
DH 382	Community Dental Health III	2
WRI 227	Technical Report Writing Humanities Elective	3
		3
Total		16

Junior Year		Spring
DH 323	Dental Hygiene Clinical Practice and Seminar VI	5
DH 344	Advanced General and Oral Pathology	3
DH 352	Pain Management II	3
DH 363	Dental Materials	4
DH 370	International Externship (optional)	1
DH 383	Community Dental Health IV	1
Total		16/17

Senior Year		Summer
AHED 450	Instructional Methods	3
BUS 331	Personal Finance	3
DH 371	International Externship (optional)	1
DH 421	Dental Hygiene Clinical Practice and Seminar VII	4
DH 461	Restorative Dentistry I	2
MATH 243	Introductory Statistics	4
Total		16/17

Senior Year		Fall
DH 372	International Externship (optional)	1
DH 422	Dental Hygiene Clinical Practice and Seminar VIII	5
DH 462	Restorative Dentistry II	2
DH 475	DH Research Methods I Communication Elective Humanities Elective	3
		3
Total		16/17

Senior Year		Winter
DH 423	Dental Hygiene Clinical Practice and Seminar IX	5
DH 454	Dental Practice Management	3
DH 463	Restorative Dentistry III	4
DH 476	DH Research Methods II Humanities Elective Psychology Elective	3
		3
Total		21

Total Credits Required for B.S. in Dental Hygiene: 204

Associate of Applied Science in Dental Hygiene

Curriculum

Required courses and recommended terms during which they should be taken:

Pre-Dental Hygiene

Freshman Year		Fall
BIO 200	Medical Terminology	2
BIO 231	Human Anatomy and Physiology I	4
CHE 101	Introduction to General Chemistry	3
CHE 104	Introduction to General Chemistry Laboratory	1
DHE 100	Introduction to Dental Hygiene I	2
MATH 105	Collegiate Mathematics	
or		
MATH 111	College Algebra	4
Total		16

Freshman Year		Winter
BIO 105	Microbiology	4
BIO 232	Human Anatomy and Physiology II	4
CHE 102	Introduction to Organic Chemistry	3
CHE 105	Introduction to Organic Chemistry I	1
SPE 111	Public Speaking	3
WRI 121	English Composition	3
Total		18

Freshman Year		Spring
BIO 205	Nutrition	3
BIO 233	Human Anatomy and Physiology III	4
CHE 103	Introduction to Biochemistry	3
CHE 106	Introduction to Biochemistry Laboratory	1
SOC 204	Introduction to Sociology	3
WRI 122	Argumentative Writing	3
Total		17

Professional Courses

Sophomore Year		Fall
CHE 360	Clinical Pharmacology for the Health Professions	3
DHE 211	Principles of Dental Hygiene I	2
DHE 221	Dental Hygiene Clinical Practice I	3
DHE 252	Oral Radiology I	3
DHE 366	Dental Anatomy	2
SPE 321	Small Group and Team Communication	3
Total		16

Sophomore Year		Winter
DHE 212	Principles of Dental Hygiene II	3
DHE 222	Dental Hygiene Clinical Practice II	4
DHE 225	Head and Neck Anatomy, Histology, and Embryology	3
DHE 244	General and Oral Pathology	3
DHE 253	Oral Radiology II	2
DHE 275	Dental Ethics	2
DHE 282	Medical and Dental Emergency Procedures	3
Total		20

Sophomore Year		Spring
DHE 213	Principles of Dental Hygiene III	3
DHE 223	Dental Hygiene Clinical Practice III	4
DHE 233	Periodontology	3
DHE 261	Dental Health Education	3
DHE 320	Dental Materials	4
DHE 344	Advanced General and Oral Pathology	3
Total		20

Junior Year		Summer
DHE 311	Principles of Dental Hygiene IV	3
DHE 321	Dental Hygiene Clinical Practice IV	4
DHE 333	Periodontal Therapy	3
DHE 351	Dental Analgesia	3
DHE 380	Oral Health Planning and Care I	3
DHE 461	Restorative Dentistry I	2
Total		18

Junior Year		Fall
DHE 312	Principles of Dental Hygiene V	3
DHE 322	Dental Hygiene Clinical Practice V	4
DHE 381	Oral Health Planning and Care II	4
DHE 462	Restorative Dentistry II Psychology Elective	2 3
Total		16

Junior Year		Winter
DHE 313	Principles of Dental Hygiene VI	4
DHE 323	Dental Hygiene Clinical Practice VI	5
DHE 463	Restorative Dentistry III	4
WRI 227	Technical Report Writing Humanities Elective Psychology Elective	3 3 3
Total		22

Total Credits Required for A.A.S. in Dental Hygiene: 163

Bachelor's Degree Completion Outreach Program

This program offers dental hygienists who have earned an associate's degree the opportunity to complete a Bachelor of Science in Dental Hygiene. The degree is offered through Oregon Tech Online.

Dental hygienists who have graduated with an associate's degree from an accredited dental hygiene program may be eligible to apply to the bachelor's degree completion program. Oregon Tech will make every effort to give maximum consideration to the transfer work presented at time of application. Typically, most professional and related science requirements are accepted. Additional coursework may be necessary to meet Oregon Tech general education requirements and a minimum of 45 credit hours must be completed through Oregon Tech to satisfy residency requirements.

Courses Granted for Licensure

DH 100	Introduction to Dental Hygiene	2
DH 221/222/223	Dental Hygiene Clinical Practice and Seminar I, II, and III	11
DH 225	Head and Neck Anatomy, Histology and Embryology	3
DH 240/241/242	Prevention I, II, and III	9
DH 244	General and Oral Pathology	3
DH 252/253	Oral Radiology I and II	5
DH 254	Introduction to Periodontology	1
DH 267	Emergency Procedures	3
DH 275	Dental Ethics	2
DH 321/322/323	Dental Hygiene Clinical Practice and Seminar IV, V, and VI	12
DH 340/341	Prevention IV and V	6
DH 344	Advanced General and Oral Pathology	3
DH 354	Periodontology	3
DH 363	Dental Materials	3
DH 366	Dental Anatomy	2
DH 380/381	Community Dental Health I, II	4
DH 421/422/423	Dental Hygiene Clinical Practice and Seminar VII, VIII, IX	14

Oregon Tech Degree Completion Courses

AHED 450	Instructional Methods	3
BUS 317	Health Care Management	3
BUS 331	Personal Finance	3
DH 351	Pain Management I*	2
DH 352	Pain Management II*	3
DH 401	Overview of Advanced Dental Hygiene	3
DH 453	Current Issues in Dental Hygiene	3
DH 454	Dental Practice Management	3
DH 455	Dental Hygiene Research	3
DH 470	Community Program Planning I	3
DH 471	Community Program Planning II	3
MATH 243	Introductory Statistics	4
SPE 321	Small Group and Team Communication	3
	Communication Elective	3
	Humanities Elective	3
	Humanities Elective	3
	Social Science Elective	3
	Elective approved by advisor	3

Additional required courses (Transfer or Oregon Tech)

BIO 105	Microbiology	4
BIO 200	Medical Terminology	2
BIO 205	Nutrition	3
BIO 231	Anatomy and Physiology I	4
BIO 232	Anatomy and Physiology II	4
BIO 233	Anatomy and Physiology III	4
CHE 101/104	Introduction to General Chemistry / Laboratory	4
CHE 102/105	Introduction to Organic Chemistry / Laboratory	4
CHE 103/106	Introduction to Biochemistry / Laboratory	4
CHE 360	Clinical Pharmacology for the Health Professions	3
MATH 105	Collegiate Mathematics	
or		
MATH 111	College Algebra	4
SOC 204	Introduction to Sociology	3
SPE 111	Public Speaking	3
WRI 121	English Composition	3
WRI 122	Argumentative Writing	3
WRI 123	Research Writing	3
or		
WRI 227	Technical Report Writing	3
	Humanities Elective	3
	Psychology Elective	3
	Psychology Elective	3

* Credits may be granted for additional specialty licensure exams.

Graduation Requirements:

The following requirements must be met to earn a bachelor's degree in dental hygiene from Oregon Institute of Technology:

- Transfer your dental hygiene professional courses.
- Complete general education courses required for a bachelor's degree.
- Complete the bachelor's degree completion courses.
- Complete 60 credits of upper-division (300-400 level) coursework. (You will be awarded some upper-division credit for your transferred professional courses.)
- Complete at least 45 credits from Oregon Tech.
- Maintain a grade "C" or better in all courses.

Electrical Engineering and Renewable Energy Department

Cristina Crespo, *Department Chair*

Mehmet Vurkac, *Program Director, B.S. Electrical Engineering (Klamath Falls)*

Jamie Zipay, *Program Director, B.S. Renewable Energy Engineering (Klamath Falls)*

Aaron Scher, *Program Director, B.S. Electrical Engineering and B.S. Electronics Engineering Technology (Wilsonville)*

Scott Prahl, *Program Director, Optical Engineering (Wilsonville)*

Claudia Torres Garibay, *Program Director, B.S. Renewable Energy Engineering (Wilsonville)*

Hope Corsair, *Program Director, M.S. Renewable Energy Engineering (Wilsonville)*

Professors: M. Aboj, J. Zipay

Associate Professors: C. Crespo, P. Dingman, S. Petrovic, S. Prahl, C. Torres Garibay

Assistant Professors: H. Corsair, A. Douglas, E. Hossain, T. Jiru, E. Klopff, F. Ryttonen, F. Shi, A. Scher, M. Vurkac

Degrees offered

- Bachelor of Science in Electrical Engineering (Klamath Falls and Wilsonville)
- Bachelor of Science in Electronics Engineering Technology (Wilsonville)
- Bachelor of Science in Renewable Energy Engineering (Klamath Falls and Wilsonville)
- Master of Science in Renewable Energy Engineering (Wilsonville)

Dual Majors offered

- Automation, Robotics, and Control Engineering (Wilsonville)
- Optical Engineering (Wilsonville)
- Systems Engineering & Technical Management (Wilsonville)

Electrical Engineering

Degrees Offered

- Bachelor of Science in Electrical Engineering
- Bachelor of Science in Electrical Engineering and Optical Engineering (dual major)
- Bachelor of Science in Electrical Engineering and Systems Engineering & Technical Management (dual major)
- Bachelor of Science in Electrical Engineering and Bachelor of Science in Renewable Energy Engineering (dual degree)
- Bachelor of Science in Electrical Engineering and Master of Science in Renewable Energy Engineering (4+1 co-terminal degree)

Note: The BS Electrical Engineering is offered in both the Klamath Falls and Wilsonville campuses. The different degree options (technical emphases, dual majors, etc.) may vary by campus.

Career Opportunities

The Bachelor of Science in Electrical Engineering (BSEE) at Oregon Tech is designed to prepare professionals to meet the needs of the growing Electrical Engineering industry. Electrical engineering is concerned with the use of electricity to transmit electric power, or to process information. Electrical engineers design, develop, test, and integrate electrical power systems and electrical machines, as well as electronic systems, including portable electronic devices, medical equipment, com-

munication systems, radar and navigation systems, and others.

The program is designed around a set of core courses which provide a classical electrical engineering foundation, and a number of elective courses that allow students some flexibility to specialize in the areas that interest them most, such as electronics, electrical power, optical engineering, renewable energy, etc. Emphasis is placed on practical application of engineering knowledge. The BSEE program at Oregon Tech can accommodate full-time students, transfer students, and working professionals, and provides a solid preparation for industry or graduate school.

Graduates of the Electrical Engineering Program are prepared to fulfill a wide range of functions within industry. Employers of electrical engineering graduates include research and development laboratories, electronic equipment manufacturers, public utilities, colleges and universities, government agencies, medical laboratories and hospitals, electronic equipment distributors, and semiconductor companies, among others.

The program also provides a solid preparation for students intending to continue to graduate school to pursue master's degrees in engineering, engineering management, MBAs, and JDs.

Program Mission and Objectives

The mission of the BS Electrical Engineering program is to provide a comprehensive program of instruction that will enable graduates to obtain the knowledge and skills necessary for immediate employment and continued advancement in the field of electrical engineering.

Graduates of the BSEE program will:

1. Possess a strong technical background as well as analytical, critical-thinking, and problem-solving skills that enable them to excel as professionals contributing to a variety of engineering roles within the various fields of Electrical Engineering and the high-tech industry;
2. Be employed in Electrical Engineering positions including (but not limited to) design engineers, test engineers, characterization engineers, applications engineers, field engineers, hardware engineers, process engineers, control engineers, and power engineers;
3. Be committed to professional development and lifelong learning by engaging in professional or graduate education in order to stay current in their field and achieve continued professional growth;
4. Be working as effective team members possessing excellent oral and written communication skills, and assuming technical and managerial leadership roles throughout their career.

Student Preparation

Students entering the Electrical Engineering program from high school should have a minimum of: 1) Two years of high-school algebra and one year of high-school geometry and trigonometry. 2) Two years of a physical science (physics, chemistry preferred). 3) Three years of English composition. Additional mathematics, science, English, electronics, and computer languages are very helpful.

Students entering the Electrical Engineering program by transfer are requested to contact the department concerning transfer of technical coursework.

Accreditation

The BSEE program is accredited by the Engineering Accreditation Commission (EAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

Degree Requirements

The Bachelor of Science in Electrical Engineering follows a rigorous curriculum, requiring a minimum of 184 credit hours, which takes approximately four years to complete. To be eligible for graduation, students must maintain a 2.0 GPA. In addition, a final grade of "C" or better must be earned in all EE courses that are prerequisites for another EE course.

All courses listed in the curriculum map for the catalog year of graduation must be completed to be eligible for graduation. Any deviations from the courses listed in the curriculum map require approval from the academic advisor, the department chair, and the Registrar's office. Approvals are not official until entered in the official student records. When changes are made to the curriculum, students who entered the program under a previous catalog will work with their academic advisors to transition to meet the requirements of the current catalog.

Technical Emphases

Students in the BSEE program may choose to specialize in a particular area by selecting at least three of their engineering technical elective courses from the appropriate list below. These lists of courses are provided only for guidance. Students are not required to select a technical emphasis, and technical emphases will not appear on the students' transcripts.

Electrical Power

Choose at least three engineering elective courses from the following list:

EE 419	Power Electronics	4
REE 243	Electrical Power	4
REE 253	Electromechanical Energy Conversion	3
REE 345	Wind Power	3
REE 453	Power System Analysis	3
REE 454	Power System Protection and Control	3

Or other approved technical Electives

Microelectronics

Choose at least three engineering elective courses from the following list:

EE 325	Electronics III	5
EE 421	Analog IC Design	5
EE 423	CMOS Digital IC Design	5
EE 432	Advanced Digital System Design w/HDL	4

Or other approved technical Electives

Optical Engineering

Choose at least three engineering elective courses from the following list:

EE 448	Geometric Optics	4
EE 449	Optical Detection & Radiometry	4
EE 450	Physical Optics	4
EE 451	Lasers	4
EE 452	Waveguides & Fiber Optics	4
EE 453	Optical Metrology	4

Or other approved technical electives

Note: Optical Engineering emphasis only available at the Wilsonville campus.

Renewable Energy

Choose at least three engineering elective courses from the following list:

EE 419	Power Electronics	4
REE 243	Electrical Power	4
REE 253	Electromechanical Energy Conversion	3
REE 345	Wind Power	3
REE 346	Biofuels and Biomass	3
REE 412	Photovoltaic systems	3
REE 413	Electric Power Conversion Systems	3
REE 427	Greenhouse Gas Accounting	3

Or other approved technical Electives

Robotics, Automation, and Control

Choose at least three engineering elective courses from the following list:

ENGR 420	Engineering Modeling	4
ENGR 421	Automation Systems	4
ENGR 422	Process Control	4
ENGR 423	Motion Control and Robotics	4
REE 463	Energy Systems Instrumentation	3

Or other approved technical electives

Note: Optical Engineering emphasis only available at the Wilsonville campus.

Bachelor of Science in Electrical Engineering Curriculum Klamath Falls Campus

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
CHE 201	General Chemistry I*	3
CHE 204	General Chemistry I Laboratory*	1
ENGR 101	Introduction to Engineering I	2
MATH 251	Differential Calculus	4
WRI 121	English Composition	3
Total		13

Freshman Year		Winter
CHE 202	General Chemistry II*	3
CHE 205	General Chemistry II Laboratory*	1
ENGR 102	Introduction to Engineering II	2
MATH 252	Integral Calculus	4
PHY 221	General Physics with Calculus	4
WRI 122	Argumentative Writing	3
Total		17

Freshman Year		Spring
EE 131	Digital Electronics I	4
MATH 254N	Vector Calculus I	4
PHY 222	General Physics with Calculus	4
SPE 111	Public Speaking	3
Total		15

Sophomore Year		Fall
EE 133	Digital Electronics II	4
EE 221	Circuits I	4
PHY 223	General Physics with Calculus	4
	Social Science Elective	3
Total		15

Sophomore Year		Winter
CST 116	C++ Programming I	4
EE 223	Circuits II	4
MATH 321	Applied Differential Equations I	4
MATH 341	Linear Algebra I	4
Total		16

Sophomore Year		Spring
EE 225	Circuits III**	4
MATH 253N	Sequences and Series	4
WRI 227	Technical Report Writing	3
	Humanities Elective	3
	Social Science Elective	3
Total		17

Junior Year		Fall
EE 321	Electronics I	5
EE 331	Digital System Design with HDL	4
EE 341	Electricity and Magnetism with Transmission Lines	4
MGT 345	Engineering Economy	3
Total		16

Junior Year		Winter
EE 323	Electronics II	5
EE 333	Microcontroller Engineering	4
EE 343	Solid-State Electronic Devices	3
MATH 465	Mathematical Statistics	4
Total		16

Junior Year		Spring
EE 335	Advanced Microcontroller Engineering	4
EE 355	Control System Design	4
ENGR 267	Engineering Programming	3
	Engineering Elective***	4
Total		15

Senior Year		Fall
EE 430	Linear Systems and Digital Signal Processing	5
ENGR 465	Capstone Project	2
SPE 321	Small Group and Team Communication	3
	Engineering Elective***	4
	Social Science Elective	3
Total		17

Senior Year		Winter
EE 401	Communication Systems	5
ENGR 465	Capstone Project	2
	Engineering Elective***	3
	Humanities Elective	3
	Writing Elective****	3
Total I		16

Senior Year		Spring
ENGR 465	Capstone Project	2
	Engineering Elective***	3
	Humanities Elective	3
	Social Science Elective	3
Total		11

Total Credits Required for B.S. in Electrical Engineering: 184

* CHE 201/4 and CHE 202/5 can be substituted with CHE 221 and CHE 222, respectively. CHE 202/5 can be substituted with an approved 4 credit Math/Science Elective.

** EE 225 can be substituted with EE 320.

*** Any course numbered EE 3XX, EE 4XX, REE 3XX, REE 4XX, or courses included in the list for a specific degree option can be used as an engineering elective (students must satisfy course pre- and co-requisites). Other courses may be used as engineering electives with advisor and department chair approval. Students must complete a minimum of 14 credits of engineering elective coursework.

**** Choose from WRI327, WRI350, and WRI410.

Curriculum – Wilsonville Campus

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
CHE 201	General Chemistry I*	3
CHE 204	General Chemistry I Laboratory*	1
EE 131	Digital Electronics I	4
MATH 251	Differential Calculus	4
WRI 121	English Composition	3
Total		15

Freshman Year		Winter
CHE 202	General Chemistry II*	3
CHE 205	General Chemistry II Laboratory*	1
EE 133	Digital Electronics II	4
MATH 252	Integral Calculus	4
WRI 122	Argumentative Writing	3
	Social Science Elective	3
Total		18

Freshman Year		Spring
MATH 321	Applied differential Equations I	4
MATH 254N	Vector Calculus I	4
MGT 345	Engineering Economy	3
SPE 111	Public Speaking	3
	Humanities Elective	3
Total		17

Sophomore Year		Fall
CST 116	C++ Programming I	4
EE 221	Circuits I	4
PHY 221	General Physics with Calculus	4
WRI 227	Technical Report Writing	3
Total		15

Sophomore Year		Winter
EE 223	Circuits II	4
ENGR 267	Advanced Engineering Programming	3
MATH 341	Linear Algebra I	4
PHY 222	General Physics with Calculus	4
	Humanities Elective	3
Total		18

Sophomore Year		Spring
EE 225	Circuits III**	4
MATH 253N	Sequences and Series	4
PHY 223	General Physics with Calculus	4
	Social Science Elective	3
Total		15

Junior Year		Fall
EE 321	Electronics I	5
EE 333	Microcontroller Engineering	4
EE 341	Electricity and Magnetism with Transmission Lines	4
SPE 321	Small Group and Team Communication	3
Total		16

Junior Year		Winter
EE 323	Electronics II	5
EE 331	Digital System Design with HDL	4
EE 335 A	Advanced Microcontroller Engineering	4
	Social Science Elective	3
Total		16
Junior Year		Spring
EE 343	Solid State Electronic Devices	3
EE 432	Advanced Digital System Design With HDL**	4
	Engineering Elective***	4
	Writing Elective****	3
Total		14
Senior Year		Fall
EE 355	Control System Design	4
ENGR 465	Capstone Project	2
MATH 465	Mathematical Statistics	4
	Engineering Elective***	4
Total		14
Senior Year		Winter
EE 430	Linear Systems and Digital Signal Processing	5
ENGR 465	Capstone Project	2
	Engineering Elective***	3
	Humanities Elective	3
Total 1		13
Senior Year		Spring
EE 401	Communication Systems	5
ENGR 465	Capstone Project	2
	Engineering Elective***	3
	Social Science Elective	3
Total		13

Total Credits Required for B.S. in Electrical Engineering: 184

* CHE 201/4 and CHE 202/5 can be substituted with CHE 221 and CHE 222, respectively. CHE 202/5 can be substituted with an approved 4 credit Math/Science Elective.

** EE 225 can be substituted with EE 320. EE432 can be substituted with an approved technical Elective.

*** Upper division EE or REE courses (except EE311, EE320, and EE347), or courses included in the list for a specific degree option (students must satisfy course pre- and co-requisites). Other courses may be used as engineering Electives with advisor and department chair approval. Students must complete a minimum of 14 credits of engineering Elective coursework.

**** Choose from WRI327, WRI350, and WRI410.

Bachelor of Science in Electrical Engineering (Post-Baccalaureate)

Oregon Tech Bachelor of Science in Electronics Engineering Technology graduates may complete 36 additional credits to receive a Bachelor of Science in Electrical Engineering (post-baccalaureate). Students will receive two diplomas: a BSEET degree (upon completion of the BSEET degree requirements), and a BSEE degree (upon completion of the BSEE degree requirements, which include a minimum of 36 credits from Oregon Tech beyond the BSEET requirements). Students who have completed an ABET accredited BS degree in Electronics Engineering Technology from another university must complete a minimum of 45 Oregon Tech credits to receive the BS in Electrical Engineering from Oregon Tech. Students pursuing this option should contact an academic advisor to draft an academic plan that ensures all BSEE curriculum requirements are met. The following is a list of additional courses that Oregon Tech BSEET graduates are required to complete in order to meet the BSEE degree requirements.

Mathematics and Science

CHE 201	General Chemistry I	3
CHE 204	General Chemistry I Laboratory*	1
CHE 202	General Chemistry II	3
CHE 205	General Chemistry II Laboratory*	1
MATH 253N	Series and Sequences	4
MATH 341	Linear Algebra I	4
MATH 465	Mathematical Statistics	4

Electrical Engineering

EE 341	Electricity and Magnetism with Transmission Lines	4
EE 343	Solid-State Electronic Devices	3
EE 355	Control System Design	4

Engineering Technical Electives

Engineering Elective (EE, REE)**	3
Engineering Elective (EE, REE)**	3

Total if prior BSEET degree awarded by Oregon Tech **36**

Additional credits needed for students who completed a BSEET degree from another institution:

Engineering Elective (EE, REE)**	3
Engineering Elective (EE, REE)**	3
Engineering Elective (EE, REE)**	3

Total **45**

*CHE 201/4 and CHE 202/5 can be substituted with CHE 221 and CHE 222 respectively. CHE 202/5 can be substituted with an approved 4 credit Math/Science Elective.

**Requires approval.

Bachelor of Science in Electrical Engineering with a Dual Major

Students completing the BSEE program have the option of selecting a dual major. The EERE department currently offers a dual major in Optical Engineering, and a dual major in Systems Engineering & Technical Management. Students completing a BSEE degree with a dual major will receive a single BS degree with both majors listed on their diploma and transcript. The degree is issued upon completion of the requirements for each major (some courses may be used to meet the requirements for both majors). The requirements for the dual major in Optical Engineering, as well as the dual major in Systems Engineering & Technical Management are listed under the corresponding sections of the catalog.

Dual Degree in Electrical Engineering and Renewable Energy Engineering

The EERE Department provides the opportunity for interested and motivated students to earn two Bachelor of Science degrees concurrently: a BS in Electrical Engineering & BS in Renewable Energy Engineering. The purpose of this dual degree is to provide the top students with a challenging academic program that will prepare them for career opportunities in the electronics, electrical engineering, power, and energy industries. The students receive a BS degree in a classical engineering discipline (Electrical Engineering), as well as an emerging high growth discipline (Renewable Energy Engineering). This dual degree program takes approximately an additional year beyond the BSEE degree program (or 4.5 years total by taking courses in Summer term). To obtain both degrees (BSEE and BSREE) students must complete all of the courses required for the BSEE degree and the following BSREE courses. Consult with your advisor for details.

CHE 202/205 General Chemistry*	4
CHE 260 Electrochemistry for RE	4
EE 419 Power Electronics*	4
ENGR 211 Engineering Mechanics: Statics	4
ENGR 355 Thermodynamics	3
HIST 356 History of Energy*	3
or	
HIST 357 History of the Electric Grid*	3
MECH 318 Fluid Mechanics	4
MECH 323 Heat Transfer I	3
REE 243 Electrical Power*	4
REE 253 Electromechanical Energy Conversion	3
REE 33X REE Elective	3
REE 3XX REE Elective	3
REE 412 Photovoltaic Systems*	3
REE 413 Electrical Power Conver. Sys.	3
REE 463 Energy System Instrumentation	3
REE 4XX REE Elective	3

*Can be used to meet BSEE degree requirements
Students must complete a minimum of 36 credit hours in addition to the BSEE degree requirements in order to get a second degree.

4+1 BSEE/MSREE

Students may earn both BSEE and MS-REE degrees, awarded simultaneously upon completion of this curriculum. Students enrolled in the BSEE program who have a proven record of academic excellence have the option of completing the MSREE with one additional year of coursework. Students pursuing this option follow the standard BSEE curriculum map during the first three years, start their graduate-level courses in the senior year, and complete the MSREE requirements during their fifth (graduate) year, according to the following guidelines:

To meet BSEE requirements:

- Replace 9 credits of engineering Electives with one graduate-level REE sequence in Electric Power (REE 529, 549, 569) or PV Systems and Processing (REE 525, 545, 565).
- Replace 3 terms of ENGR465 - Capstone Project with 3 terms of Graduate Design Project (REE 599, 599,

599)

- To meet additional MSREE requirements:
- Research Methods and Innovation sequence (REE 511, 512, 513)
- Energy Engineering sequence (REE 515, 516, 517)
- Graduate-level REE specialization sequence (REE 5xx, 5xx, 5xx)
- Graduate-level REE specialization sequence (REE 5yy, 5yy, 5yy)

To be eligible for this option, students must have a cumulative GPA of 3.0, and must contact the MSREE Program Director for admission into the graduate program by the end of Spring term of their junior year. Students will receive both their BSEE and MSREE degrees at the end of their fifth year. REE 599 requirement must be met by a design project supervised and approved by both EE and REE advisors. Students should contact their academic advisors for details.

Electronics Engineering Technology

Degrees Offered

Bachelor of Science in Electronics Engineering Technology (Wilsonville)

Oregon Institute of Technology offers an ABET accredited Bachelor of Science degree in Electronics Engineering Technology (BSEET). The program is conveniently offered at the Oregon Tech Wilsonville campus, as well as the Willow Creek Center, in order to accommodate degree seeking professionals working for high-tech companies in the Portland Westside area. The Willow Creek Center is located in Hillsboro (OR), at the heart of the Portland Westside high-tech industry cluster (Silicon Forest), minutes away from companies such as Intel, Tektronix, MAXIM, Credence, Lattice, Synopsis, Quorvo, and others. Some of the core and technical elective courses for the degree are also available online and at the Oregon Tech-Wilsonville campus.

Career Opportunities

Electronics Engineering Technology is concerned with theory, concepts, and practice of applied electronics engineering. Emphasis is placed on the practical application of engineering knowledge. As a result, the Electronics Engineering Technology graduate possesses a combination of theoretical and

practical understanding and requires minimal on-the-job training.

The BSEET program is designed to prepare graduates to assume engineering and technology positions in the electronics industry. Graduates of the BSEET program fulfill a wide range of functions within industry, typically assuming positions such as component and system design, test engineering, product engineering, field engineering, manufacturing engineering, sales or market engineering, quality control engineering, and other similar roles. The program also provides a solid preparation for students intending to continue to graduate school to pursue master's degrees in engineering, engineering management, and MBAs.

Employers of Electronics Engineering Technology graduates include research and development laboratories, electronic equipment manufacturers, public utilities, colleges and universities, government agencies, medical laboratories and hospitals, electronic equipment distributors, semiconductor companies, and automated electronic controlled processing companies. Recent graduates have been employed at companies such as MAXIM, Tektronix, Quorvo, MSEI/Biotronik, and Intel.

Program Mission and Objectives

The mission of the BSEET Program is to provide a comprehensive program of instruction that will enable graduates to obtain the knowledge and skills necessary for immediate employment and continued advancement in the field of electronics.

Graduates of the BSEET program will:

1. Possess a strong technical background as well as analytical and problem solving skills, and will contribute in a variety of technical roles within the electronics and high-tech industry. Within three years of graduation, BSEET graduates are expected to be employed as test engineers, characterization engineers, applications engineers, field engineers, hardware engineers, process engineers, and similar engineering technology positions within this industry.
2. Be working as effective team members with excellent oral and written communication skills, assuming technical and managerial leadership roles throughout their career.
3. Be committed to professional development and lifelong learning by engaging in professional and/or graduate education in order to stay current in their field and achieve continued professional growth.

Student Preparation

The BSEET degree at Oregon Tech is designed to accommodate working professionals with evening delivery of upper-division and custom bridging courses. It is especially suited for working professionals with an associate degree in Electronics Engineering Technology, Microelectronics Technology, or equivalent coursework. Students entering the BSEET program by transfer are requested to contact the BSEET Program Director concerning transfer of technical coursework. The BSEET program has articulation and transfer agreements with the Electronics, Microelectronics, and Renewable Energy Technology programs at various community colleges in Oregon. Students transferring to Oregon Tech with an AAS degree from these programs will not be required to take any lower-division electronics coursework. It is recommended (but not required) that students who are transferring with an AAS degree have completed Calculus II prior to transferring to the BSEET program at Oregon Tech, since Integral Calculus is a pre-requisite for most upper-division BSEET courses.

We encourage transfer students to start the advising process with Oregon Tech upon completion of the first year of their AAS degree.

Accreditation

The Electronics Engineering Technology program is accredited by the Engineering Technology Accreditation Commission (ETAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

Degree Requirements

The Bachelor of Science in Electronics Engineering Technology follows a rigorous curriculum, requiring a minimum of 188 credit hours, which takes approximately four years to complete. To be eligible for graduation, students must maintain a 2.0 GPA. In addition, a final grade of "C" or better must be earned in all EE and EET courses that are prerequisites for another EE or EET course. All courses listed in the curriculum map for the catalog year of graduation must be completed to be eligible for graduation. Any deviations from the courses listed in the curriculum map require approval from the academic advisor, the department chair, and the Registrar's office. Approvals are not official

until entered in the official student records. When changes are made to the curriculum, students who entered the program under a previous catalog will work with their academic advisors to transition to meet the requirements of the current catalog.

Technical Emphases

Students in the BSEET program may choose to specialize in a particular area by selecting their engineering elective courses from the appropriate list below. These lists of courses are provided only for guidance. Students are not required to select a technical emphasis, and technical emphases will not appear on the students' transcripts.

Electrical Power

Choose technical elective courses from the following list:

EE 419	Power Electronics	4
REE 243	Electrical Power	4
REE 253	Electromechanical Energy Conversion	3
REE 345	Wind Power	3
REE 453	Power System Analysis	3
REE 454	Power System Protection and Control	3

Or approved technical Electives

Microelectronics

Choose technical elective courses from the following list:

EE 341	Electricity & Magnetism with Transmission Lines	4
EE 343	Solid State Electronic Devices	3
EE 421	Analog IC Design	5
EE 423	CMOS Digital IC Design	5

Or approved technical Electives

Optical Engineering

Choose technical elective courses from the following list:

EE 448	Geometric Optics	4
EE 449	Optical Detection & Radiometry	4
EE 450	Physical Optics	4
EE 451	Lasers	4
EE 452	Waveguides & Fiber Optics	4
EE 453	Optical Metrology	4

Or approved technical electives

Note: Optical Engineering emphasis only available at Wilsonville campus.

Renewable Energy

Choose technical elective courses from the following list:

EE 419	Power Electronics	4
REE 243	Electrical Power	4
REE 253	Electromechanical Energy Conversion	3
REE 345	Wind Power	3
REE 346	Biofuels and Biomass	3
REE 412	Photovoltaic systems	3
REE 413	Electric Power Conversion Systems	3
REE 427	Greenhouse Gas Accounting	3

Or advisor approved technical electives

Robotics, Automation, and Control

Choose technical Elective courses from the following list:

EE 355	Control System Design	4
ENGR 420	Engineering Modeling	4
ENGR 421	Automation Systems	4
ENGR 422	Process Control	4
ENGR 423	Motion Control and Robotics	4
REE 463	Energy Systems Instrumentation	3

Or other approved technical electives

Note: Robotics, Automation, and Control emphasis only available at Wilsonville campus.

Bachelor of Science in Electronics Engineering Technology Curriculum

The curriculum map below shows the required courses, recommended sequence, and recommended terms during which they should be taken for students transferring into the program with an accredited AAS degree or equivalent lower division coursework (freshman and sophomore years).

Transfer students and part-time students should contact the BSEET program director to develop a customized curriculum tailored to their individual needs.

Freshman and Sophomore Years

The degree requirements for the first two years can be fulfilled by completing an accredited Associate of Applied Science degree in Electronics Engineering Technology, Microelectronics Engineering Technology, Microelectronics Technology, Electrical Engineering Transfer, Renewable Energy Technology, or equivalent coursework. Oregon Tech has articulation agreements with various community colleges throughout Oregon. Students transferring to Oregon Tech with an AAS degree from these programs will not be required to take any lower-division electronics courses at Oregon Tech. In addition to the electronics courses, students should complete the programming, math and science, communication, and general education courses specified below during the Freshman and Sophomore years while completing their AAS degree in order to be able to complete the upper-division (Junior and Senior) BSEET courses at Oregon Tech in two years. Below is a list of courses to satisfy the requirements for the first two years of the degree. Completion of all these courses is not required to be able to transfer, but it is recommended for 2+2 transferability.

Communication (12 credits)

SPE 111	Public Speaking	3
WRI 121	English Composition	3
WRI 122	Argumentative Writing	3
WRI 227	Technical Report Writing	3

General Education (12 credits)

Humanities Elective	6
Social Science Elective	6

Mathematics and Science (32 credits)

MATH 111	College Algebra	4
MATH 112	Trigonometry	4
MATH 251	Differential Calculus	4
MATH 252	Integral Calculus	4
PHY 221	General Physics with Calculus	4
PHY 222	General Physics with Calculus	4
PHY 223	General Physics with Calculus	4
	Statistics Elective*	4

Electronics (36 credits)

EE 121	Fundamentals of Electric Circuits I	4
EE 123	Fundamentals of Electric Circuits II	4
EE 131	Digital Circuits I	4
EE 133	Digital Circuits II	4
EE 219	Introduction to Semiconductor Devices and Amplifiers	4

Programming (4 credits)

CST 116	C++ Programming I	4
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Upper Division Courses

Sophomore Year		Summer
MATH 254N	Vector Calculus I	4
MATH 321	Applied Differential Equations I	4
Total		8

Junior Year		Fall
EE 320	Advanced Circuit and Systems Analysis	5
EE 321	Electronics I	5
MGT 345	Engineering Economy	3
Total		13

Junior Year		Winter
EE 323	Electronics II	5
EE 331	Digital System Des w/HDL	4
ENGR 267	Engineering Programming	3
Total		12

Junior Year		Spring
EE 325	Electronics III	5
EE 432	Advanced Digital system Design w/HDL	4
	Social Science Elective	3
Total		12

Junior Year		Summer
SPE 321	Small Group and Team Communication	3
	Social Science Elective	3
	Writing Elective**	3
Total		9

Senior Year		Fall
EE 333	Microcontroller Engineering	4
ENGR 465	Capstone Project	2
	Engineering Elective***	3
	Humanities Elective	3
Total		12

Senior Year		Winter
EE 335	Adv. Microcontroller Engineering	4
EE 430	Linear Systems and Digital Signal Processing	5
ENGR 465	Capstone Project	2
	Engineering Elective***	3
Total		14

Senior Year		Spring
EE 401	Communication Systems	5
ENGR 465	Capstone Project	2
	Engineering Elective**	3
	Elective	2
Total		12

* Choose from MATH243, MATH361, and MATH465.

** Lower Division Technical electives include CST126, CST136, and other approved 200-level engineering or engineering technology courses.

*** Choose from WRI327, WRI350, and WRI410.

**** Upper division EE or REE courses (except EE311, EE320, and EE347), or courses included in the list for a specific degree option (students must satisfy course pre- and co-requisites). Other courses may be used as engineering electives with advisor and department chair approval. Students must complete a minimum of 9 credits of engineering elective coursework.

Total credits required for B.S. in Electronics Engineering Technology: 188

Renewable Energy Engineering

Degrees Offered

- Bachelor of Science in Renewable Energy Engineering
- Bachelor of Science in Renewable Energy Engineering and Optical Engineering (dual major)
- Bachelor of Science in Renewable Energy Engineering and Systems Engineering & Technical Management (dual major)
- Bachelor of Science in Renewable Energy Engineering and Bachelor of Science in Electrical Engineering (dual degree)
- Bachelor of Science in Renewable Energy Engineering and Bachelor of Science in Environmental Science (dual degree)
- Bachelor of Science in Renewable Energy Engineering and Master of Science in Renewable Energy Engineering (4+1 co-terminal degree)
- Master of Science in Renewable Energy Engineering

Note: The BS Renewable Energy Engineering is offered in both the Klamath Falls and Wilsonville campuses. The different degree options (technical emphases, dual majors, etc.) may vary by campus. The MS Renewable Energy Engineering is offered at the Wilsonville campus.

Career Opportunities

Program graduates will enter energy careers as power engineers, PV/semiconductor processing engineers, facilities and energy managers, energy system integration engineers, HVAC and M/E/P engineers, design and modeling engineers for net-zero energy buildings, biofuels plant and operations engineers, energy systems control engineers, power electronics engineers, utility program managers, as well as renewable energy planners and policy makers. Graduates of the program will be able to pursue a wide range of career opportunities, not only within the emerging field of renewable energy, but within more traditional areas of energy engineering as well.

Employers of Renewable Energy Engineering graduates include consulting engineering firms, fuel cell manufacturers, power converter manufacturers, public utilities, government agencies, photovoltaic manufacturers, and energy developers. Recent graduates have been employed at companies such as Advanced Energy, Jacobs Engineering, Power Engineers, and Iberdrola Renewables.

Bachelor of Science in Renewable Energy Engineering

The Bachelor of Science in Renewable Energy Engineering (BSREE) prepares students for the challenges of designing, promoting and implementing renewable energy engineering in society's rapidly-changing energy-related industries. Energy, in its many abundant forms, is the driving physical factor upon which industrial societies are founded. As geopolitical, environmental and geological factors act to constrain traditional resources, societies have been forced to re-think and re-develop their energy infrastructures. Renewable energy resources include solar thermal collectors, photovoltaics, ground-source heat pumps, geothermal resources, hydroelectric power, wind power, tidal and wave power, biofuels and fuel cells. Oregon Tech's Bachelor of Science in Renewable Energy Engineering prepares students for success in these rapidly developing fields.

The BSREE program is built upon a solid foundation in physics, chemistry, mathematics and communications. Added to this foundation are courses in electrical and mechanical engineering that establish a firm understanding of the fundamentals of energy. The engineering coursework prepares students for renewable energy-specific courses such as photovoltaics, wind power, biofuels, hydroelectric, fuel cells and solar thermal systems. These courses are then integrated into system-wide senior level courses such as energy system design, energy-efficient building systems, renewable energy transportation systems, energy management and energy systems control.

Program Mission and Objectives

The mission of the Bachelor of Science in Renewable Energy Engineering program is to prepare students for the challenges of designing, promoting and implementing renewable energy solutions within society's rapidly-changing energy-related industry cluster, particularly within Oregon and the Pacific Northwest. Graduates will have a fundamental understanding of energy engineering and a sense of social responsibility for the implementation of sustainable energy solutions.

Graduates from the BSREE program will:

1. Excel as professionals in the various fields of energy engineering.
2. Be known for their commitment to lifelong learning, social responsibility, and professional and ethical responsibilities in implementing sustainable engineering solutions.
3. Excel in critical thinking, problem solving and effective communication.

Student Preparation

High school students should be prepared to start their college academic work with at least college calculus and Freshman English composition. Typically, this means the successful new student has completed:

1. Four years of high school mathematics including algebra I and II, geometry and trigonometry
2. Four years of English composition/writing
3. Four years of science including physics and chemistry

Students entering the program by transfer are requested to contact the program director for evaluation of REE-related transfer courses.

Accreditation

The Renewable Energy Engineering baccalaureate program is accredited by the Engineering Accreditation Commission (EAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

Degree Requirements

The Bachelor of Science in Renewable Energy Engineering follows a rigorous curriculum, requiring a minimum of 184/185 credit hours, which takes approximately four years to complete. To be eligible for graduation, students must maintain a 2.0 GPA. In addition, a final grade of "C" or better must be earned in all courses with MATH, CHE, PHY, EE, ENGR, MECH, and REE prefixes. Students must also earn a grade of "C" or better in all courses listed as prerequisites for these courses.

All courses listed in the curriculum map for the catalog year of graduation must be completed to be eligible for graduation. Any deviations from the courses listed in the curriculum map require approval from the academic advisor, the department chair, and the Registrar's office. Approvals are not official until entered in the official student records. When changes are made to the curriculum, students who entered the program under a previous catalog will work with their academic advisors to transition to meet the requirements of the current catalog.

Bachelor of Science in Renewable Energy Engineering Curriculum – Klamath Falls Campus

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
CHE 201	General Chemistry I*	3
CHE 204	General Chemistry I Laboratory*	1
ENGR 101	Introduction to Engineering I**	2
MATH 251	Differential Calculus	4
WRI 121	English Composition	3
Total		13

Freshman Year		Winter
CHE 202	General Chemistry II*	3
CHE 205	General Chemistry II Laboratory*	1
ENGR 102	Introduction to Engineering II**	2
MATH 252	Integral Calculus	4
WRI 122	Argumentative Writing	3
	Social Science Elective	3
Total		16

Freshman Year		Spring
CHE 260	Electrochemistry for RE	4
ENGR 267	Advanced Eng. Programming	3
MATH 254N	Vector Calculus I	4
SPE 111	Public Speaking	3
WRI 227	Technical Report Writing	3
Total		17

Sophomore Year		Fall
ECO 201	Principles of Economics, Microeconomics	3
Or		
ECO 202	Principles of Economics, Macroeconomics	3
EE 221	Circuits I	4
MATH 321	Applied Differential Equations I	4
PHY 221	General Physics with Calculus	4
Total		15

Sophomore Year		Winter
EE 223	Circuits II	4
ENGR 211	Engineering Mechanics: Statics	4
HIST 356	A History of Energy	3
Or		
HIST 357	History of Electrical Grid	3
PHY 222	General Physics with Calculus	4
Total		15

Sophomore Year		Spring
EE 225	Circuits III	4
MATH 361	Statistical Methods I	4
Or		
MATH 465	Mathematical Statistics	4
PHY 223	General Physics with Calculus	4
REE 243	Electrical Power	4
Total		16

Junior Year		Fall
EE 321	Electronics I	5
MATH 341	Linear Algebra	4
MECH 318	Fluid Mechanics I	4
Or		
ENGR 318	Engineering Mechanics: Fluids	4
REE 253	Electromechanical Energy Conversion	3
Total		16

Junior Year		Winter
REE 337	Materials for RE Applications	3
Or		
EE 343	Solid-State Electronic Devices	4
EE 355	Control Systems Design	4
ENGR 355	Thermodynamics	3
	Writing Elective***	3
	Renewable Energy Engineering Elective	3
Total		16

Junior Year		Spring
EE 419	Power Electronics	4
MECH 323	Heat Transfer I	3
REE 331	Fuel Cells	3
SPE 321	Small Group and Team Communication	3
	Renewable Energy Engineering Elective	3
Total		16

Senior Year		Fall
ENGR 465	Capstone Project	2
REE 4XX	Senior Sequence I	3
REE 412	Photovoltaic Systems	3
	Renewable Energy Engineering Elective	3
	Humanities Elective	3
	Social Science Elective	3
Total		17

Senior Year		Winter
ENGR 465	Capstone Project	2
REE 4XX	Senior Sequence II	3
REE 413	Electric Power Conversion Systems	3
	Renewable Energy Engineering Elective	3
	Humanities Elective	3
Total		14

Senior Year		Spring
ENGR 465	Capstone Project	2
REE 4XX	Senior Sequence III	3
REE 463	Energy Systems Instrumentation	3
	Renewable Energy Engineering Elective	3
	Humanities Elective	3
Total		14

Total Credits Required for B.S. in Renewable Energy Engineering: 185

*CHE201/4 and CHE 202/5 can be substituted with CHE 221 and CHE 222 respectively.

**With advisor approval students may take REE 201 in place of ENGR 101 and ENGR 102.

***Choose from WRI327, WRI350, and WRI410.

Curriculum – Wilsonville Campus

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
CHE 201	General Chemistry I*	3
CHE 204	General Chemistry I Laboratory*	1
REE 201	Introduction to Renewable Energy 3	
MATH 251	Differential Calculus	4
WRI 121	English Composition	3
Total		14

Freshman Year		Winter
CHE 202	General Chemistry II*	3
CHE 205	General Chemistry II Laboratory*	1
ECO 201	Principles of Economics, Microeconomics	
Or		
ECO 202	Principles of Economics, Macroeconomics	3
MATH 252	Integral Calculus	4
WRI 122	Argumentative Writing	3
Total		14

Freshman Year		Spring
MATH 254N	Vector Calculus I	4
CHE 260	Electrochemistry for RE	4
SPE 111	Public Speaking	3
WRI 227	Technical Report Writing Social Science Elective	3
Total		17

Sophomore Year		Fall
EE 221	Circuits I	4
MATH 361	Statistical Methods I	4
Or		
MATH 465	Probability and Statistics	
PHY 221	General Physics with Calculus Writing Elective**	4
Total		15

Sophomore Year		Winter
EE 223	Circuits II	4
ENGR 267	Engineering Programming	3
MATH 341	Linear Algebra	4
PHY 222	General Physics with Calculus	4
Total		15

Sophomore Year		Spring
EE 225	Circuits III	4
MATH 321	Applied Differential Equations I	4
PHY 223	General Physics with Calculus	4
REE 243	Electrical Power	4
Total		16

Junior Year		Fall
EE 321	Electronics I	5
ENGR 211	Engineering Mechanics: Statics	4
ENGR 355	Thermodynamics	3
REE 337	Materials for RE Applications	3
Or		
EE 343	Solid-State Electronics Devices	
SPE 321	Small Group & Team Comm.	3
Total		18

Junior Year		Winter
HIST 356	A History of Energy	
Or		
HIST 357	History of Electrical Grid	3
MECH 318	Fluid Mechanics I	4
Or		
ENGR 318	Engineering Mechanics: Fluids	

REE 412	Photovoltaic Systems	3
REE 463	Energy Systems Instrumentation Humanities Elective	3
Total		16

Junior Year		Spring
EE 355	Control Systems Design	4
ENGR 465	Capstone Project	2
MECH 323	Heat Transfer I	3
REE 253	Electromechanical Energy Conversion Renewable Energy Engineering Elective	3
Total		15

Senior Year		Fall
REE 331	Fuel Cells	3
REE 4XX	Senior Sequence I Renewable Energy Engineering Elective Renewable Energy Engineering Elective Social Science Elective	3
Total		15

Senior Year		Winter
EE 419	Power Electronics	4
ENGR 465	Capstone Project	2
REE 4XX	Senior Sequence II Renewable Energy Engineering Elective Humanities Elective	3
Total		15

Senior Year		Spring
ENGR 465	Capstone Project	2
REE 4XX	Senior Sequence III	3
REE 413	Electric Power Conversion Systems Renewable Energy Engineering Elective Humanities Elective	3
Total		15

Total Credits Required for B.S. in Renewable Energy Engineering: 184

*CHE201/4 and CHE 202/5 can be substituted with CHE 221 and CHE 222 respectively.

**Choose from WRI327, WRI350, and WRI410.

Renewable Energy Engineering Electives

Students in the BSREE program are required to complete 15 credits of technical electives classes. At least 3 of these classes must be REE 300-level or above and up to two courses from the following list: 300- or 400-level EE courses (except for EE320), ENGR42X, or SEM42X. No more than three 1-credit courses are allowed. Enrollment in graduate-level courses at the undergraduate level requires special approval. Examples of acceptable elective courses are:

EE 341	Electricity and Magnetism with Transmission Lines	4
EE 347	Digital Logic	4
EE 343	Solid State Devices	3
MECH 433	HVAC	3
REE 331	Fuel Cells	3
REE 333	Batteries	3
REE 335	Hydrogen	3
REE 337	Materials for RE Applications	3
REE 344	Nuclear Energy	3
REE 345	Wind Power	3
REE 346	Biofuels and Biomass	3
REE 347	Hydroelectric Power	3
REE 348	Solar Thermal Energy Systems	3
REE 307/407	Independent Study/Special Topics/ Seminar	3****
REE 427	Greenhouse Gas Accounting	3
REE 439	Building Energy Auditing and Management	3
REE 451	Geothermal Energy and Direct Use Applications	3
REE 453	Power Systems Analysis	3
REE 454	Power System Protection/Control	3
REE 455	Energy Efficient Building Design	3
REE 465	RE Transportation Systems	3
REE 469	Grid Integration of RE	3

****Course may be repeated multiple times for credit with approval.

Senior Sequences:

Students are required to complete a minimum of one sequence (all three courses) from the list below:

Green Building: MECH 433, REE 439 and REE 455

Power Systems: REE 453, REE 454 and REE 469

Geothermal: REE 431, REE 451 and REE 471

With approval, students can complete a graduate-level REE sequence to meet the senior sequence requirement. Enrollment in graduate-level courses at the undergraduate level requires special approval.

Bachelor of Science in Renewable Energy Engineering with a Dual Major

Students completing the BSREE program have the option of selecting a dual major. The EERE department currently offers a dual major in Optical Engineering, and a dual major in Systems Engineering & Technical Management. Students completing a BSREE degree with a dual major will receive a single BS degree with both majors listed on their diploma and transcript. The degree is issued upon completion of the requirements for each major (some courses may be used to meet the requirements for both majors). The requirements for the dual major in Optical Engineering, as well as the dual major in Systems Engineering & Technical Management are listed under the corresponding sections of the catalog.

Concurrent Degree in Renewable Energy Engineering and Electrical Engineering

The EERE Department provides the opportunity for interested and motivated students to earn two Bachelor of Science degrees: a BS in Renewable Energy Engineering and a BS in Electrical Engineering. The purpose of this dual degree is to provide the top students with a challenging academic program that will prepare them for career opportunities in the electronics, electrical engineering, power, and energy industries. The students receive a BS degree in a classical engineering discipline (Electrical Engineering), as well as an emerging high-growth discipline (Renewable Energy Engineering). The degree program will take an additional year beyond the BSREE degree program (or 4.5 years total by taking courses in Summer term). To obtain both degrees (BSREE and BSEE) students must complete all of the courses required for the BSREE degree and the following BSEE courses. Consult with your advisor for details.

CST 116	C++ Programming	4
EE 323	Electronics II	5
EE 331	Digital System Design w/HDL	4
EE 333	Microcontroller Engineering**	4
EE 341	Electricity and Magnetism with Transmission Lines**	4
EE 343	Solid State Electronic Devices*	3
EE 347	Digital Logic***	4
EE 430	Linear Systems & DSP	5
EE 335	Advanced Microcontroller Engineering	4
MATH 253N	Sequences and Series	4

MATH 465	Mathematical Statistics*	4
MGT 345	Engineering Economy	3

* MATH465 can be used in place of MATH361 to meet BSREE degree requirements. EE343 can be used in place of REE337 to meet BSREE degree requirements.

**Can be used as Renewable Energy Engineering Electives

***Students can substitute EE131/133 sequence

Students must complete a minimum of 36 credit hours in addition to the BSREE degree requirements in order to get a dual degree.

Concurrent Degree in Renewable Energy Engineering and Environmental Sciences

Renewable Energy Engineering students have the opportunity to earn a dual degree: a BS in Renewable Energy Engineering and a BS in Environmental Sciences. The additional degree requires 54 credits in Environmental Sciences courses, which can be taken concurrent to Renewable Energy Engineering courses or in an add-on year. A second degree in Environmental Sciences places engineering projects in the context of environmental impacts and environmental regulations, and greatly increases job opportunities for Oregon Tech Renewable Energy Engineering graduates. The purpose of the concurrent programs is to challenge motivated students to become even better prepared for the engineering and environmental job markets. To obtain both degrees, students must complete the following listed courses along with the courses required for the Bachelor of Science in Renewable Energy Engineering.

BIO 111	Introduction to Environmental Sciences	4
BIO 211	Principles of Biology	4
BIO 212	Principles of Biology	4
BIO 213	Principles of Biology	4
BIO 327	General Ecology	4
BIO 434	Data Analysis Methods	4
or		
MATH 362	Statistical Methods II	4
BIO 484	Sustainable Human Ecology	4
CHE 223	General Chemistry III	5
CHE 331	Organic Chemistry I	4
ENV 314	Environmental Management and Restoration	3
GEOG 105	Physical Geography	4
GIS 134	Geographic Information Systems	3
	Chemistry Technical Emphasis Elective*	3

* This technical emphasis elective must have a CHE prefix; different courses are offered every year.

4+1 BSREE/MSREE Program

Students may earn both BSREE and MSREE degrees, awarded simultaneously upon completion of this curriculum. Students enrolled in the BSREE program who have a proven record of academic excellence have the option of completing the MSREE with one additional year of coursework. Students pursuing this option follow the standard BSREE curriculum map during the first three years, start their graduate-level courses in the senior year, and complete the MSREE requirements during their fifth (graduate) year, according to the following guidelines:

To meet BSREE requirements:

- Replace 9 credits of REE senior sequence with one graduate-level REE sequence.
- Replace 3 terms of ENGR465 - Capstone Project with 3 terms of Graduate Design Project (REE 599, 599, 599).

To meet additional MSREE requirements:

- Research Methods and Innovation sequence (REE 511, 512, 513)
- Energy Engineering sequence (REE 515, 516, 517)
- Graduate-level REE specialization sequence (REE 5xx, 5xx, 5xx)
- Graduate-level REE specialization sequence (REE 5yy, 5yy, 5yy)

To be eligible for this option, students must have a cumulative GPA of 3.0, and must contact the MSREE Program Director for admission into the graduate program by the end of Spring term of their junior year. Students will receive both their BSREE and MSREE degrees at the end of their fifth year. REE 599 requirement must be met by a design project supervised and approved by an REE advisor. Students should contact their academic advisors for details.

The Master of Science in Renewable Energy Engineering (MSREE)

The Master of Science in Renewable Energy Engineering (MSREE) program is offered at Oregon Tech Wilsonville campus. The MSREE program accommodates both full-time students and working professionals. The program is designed to prepare graduates to be energy engineering professionals who have advanced knowledge and skills that enable them to assume a broad range of technical leadership roles.

The MSREE curriculum is built upon core tracks in research methods & innovation and advanced energy engineering. These courses provide the foundation for three required specialized course sequences in renewable energy technologies and nine credits of thesis or graduate R&D project work.

Student Preparation

Students should be prepared to start graduate academic work. Typically, this means the successful new student has the following:

1. A baccalaureate degree in engineering, the physical sciences (e.g., physics, chemistry), or a related technical discipline
2. Evidence of potential for graduate academic work, success or potential for success in industry, and demonstrated interest in energy engineering

Accreditation

Oregon Institute of Technology is accredited by the Northwest Commission on Colleges and Universities, 8060 165th Ave. NE, Suite 100, Redmond, WA 98052-3981, an institutional accrediting body recognized by the Council for Higher Education Accreditation and/or the Secretary of the U.S. Department of Education.

Master of Science Degree Requirements

The Master of Science in Renewable Energy Engineering is a rigorous curriculum that requires 54 credit hours and approximately two years to complete.

Curriculum

Required courses and recommended terms during which they should be taken:

First Year		Fall
REE 511	Research Methods & Innovation I	3
REE 515	Energy Engineering I	3
REE 5xx	REE Specialization Sequence X: Course 1 of 3	3
Total		9

First Year		Winter
REE 512	Research Methods & Innovation II:	3
REE 516	Energy Engineering II	3
REE 5xx	REE Specialization Sequence X: Course 2 of 3	3
Total		9

First Year		Spring
REE 513	Research Methods & Innovation III:	3
REE 517	Energy Engineering III	3
REE 5xx	REE Specialization Sequence X: Course 3 of 3	3
Total		9

Second Year		Fall
REE 599	Graduate Research or Project	3
REE 5yy	REE Specialization Sequence Y: Course 1 of 3	3
REE 5zz	REE Specialization Sequence Z: Course 1 of 3	3

or		
	Elective	3
Total		9

Second Year		Winter
REE 599	Graduate Research or Project	3
REE 5yy	REE Specialization Sequence Y: Course 2 of 3	3
REE 5zz	REE Specialization Sequence Z: Course 2 of 3	3

or		
	Elective	3
Total		9

Second Year		Spring
REE 599	Graduate Research or Project	3
REE 5yy	REE Specialization Sequence Y: Course 3 of 3	3
REE 5zz	REE Specialization Sequence Z: Course 3 of 3	3

or		
	Elective	3
Total		9

Total Credits Required for M.S. in Renewable Energy Engineering: 54

Renewable Energy Specialization Sequences

Students must complete three REE specialization sequences from the list below. Other sequences may be used to satisfy this requirement with advisor and department chair approval. One of the sequences may be replaced with three approved elective courses. Not all sequences are offered every year.

Biofuels and Biomass

REE 521	Production of Biomass and Biofuels	3
REE 541	Utilization strategies of Bioenergy	3
REE 561	Process and Economic Eval. for Biomass Systems	3

Electrochemical Systems

REE 523	Hydrogen Production and Storage	3
REE 543	Materials for Electrochemical Processes	3
REE 563	Batteries	3

Photovoltaic Systems and Processes

REE 525	Solid-State Physics of Photovoltaic Materials	3
REE 545	Applied Photovoltaics	3
REE 565	Semiconductor Process Engineering	3

Wind Power Systems and Integration

REE 527	Wind Power Generators	3
REE 547	Electric Power Conversion	3
REE 567	Wind Energy Systems Integration	3

Electrical Power Systems

REE 529	Power Systems Analysis	3
REE 549	Power System Protection and Control	3
REE 569	Grid Integration of Renewables	3

Geothermal Energy

REE 531	Ground-Source Heat Pumps	3
REE 551	Advanced Geothermal Energy	3
REE 571	Geothermal Power Generation	3

Energy Efficient Building Systems

REE 533	Heating, Ventilation, and Air Conditioning	3
REE 553	Energy Systems Management and Auditing	3
REE 573	Energy-Efficient Building Design	3

Fuel Cell Systems

REE 535	Fuel Cell Fundamentals	3
REE 555	Stationary Fuel Cells	3
REE 575	Transportation Fuel Cells	3

Global Energy Issues

REE 537	Sustainability of Energy Systems	3
REE 557	Costing Renewable Energy	3
REE 577	Renewable Energy Integration	3

Hydro Power Systems and Integration

REE 539	Hydraulics and Fluid Mech. Of Hydropower	3
REE 559	Development of Hydropower Projects	3
REE 579	Economic, Regulatory, and Environmental Aspects of Hydropower	3

Energy Storage

REE 581	Energy storage Fundamentals	3
REE 582	Introduction to Batteries	3
REE 583	Introduction to Fuel Cells	3

Advanced Energy Storage

REE 591	Hydrogen Storage and Production	3
REE 592	Advanced Batteries	3
REE 593	Advanced Fuel Cells	3

Automation, Robotics, and Controls Engineering

Degree Offered

Automation, Robotics, and Controls Engineering (Dual major)

The major in Automation, Robotics, and Controls Engineering is designed as a dual major option for students with an ABET accredited primary major in an engineering discipline offered at Oregon Tech. Students first choose a primary ABET accredited major (e.g., Electrical Engineering, Renewable Energy Engineering, Mechanical Engineering), and complete additional specialized coursework to earn a second major in Automation, Robotics, and Controls Engineering. The program is designed so that both majors in the degree can be completed in 4 years by taking summer courses. ABET ETAC degree students may also pursue the dual major with departmental approval.

Career Opportunities

Automation, Robotics, and Control is a multidisciplinary engineering field concerned with the design, modeling, analysis, and control of predominantly computer-based automated systems or processes. Automated systems typically contain a mixture of equipment, devices, software, hardware, and humans. The discipline requires knowledge of elements of electrical engineering, mechanical engineering, chemical engineering, software programming, communications systems, and human factors engineering. The dual major curriculum provides students with design techniques that emphasize automation system integration, and contains subject matter and tools for modeling, analysis, and design including measurement and control system theory, modeling and simulation, hardware and programming, as well as systems engineering. Due to the multidisciplinary nature of their background, graduates of the program have the necessary skills to design or manage systems resulting from the integration of diverse components and technologies. Engineers working in this field design solutions to address problems in areas such as factory automation, building automation, process control, and motion control and robotics.

Student Preparation

Students interested in the Automation, Robotics, and Controls Engineering dual major should contact the Automation, Robotics, and Controls Engineering program director for an advising appointment early in their primary major programs to ensure timely completion of both majors.

Accreditation

Completion of a dual major in Automation, Robotics, and Controls Engineering is contingent upon finishing a primary major in an ABET accredited program.

Degree Requirements

A dual major in Automation, Robotics, and Controls Engineering requires 92 credits in automation and other engineering coursework. Many of these course credits may be used to meet requirements in the primary major; depending upon selection of primary major it is estimated that only 28-36 additional credits will be needed beyond the primary major requirements. The capstone project required in the student's primary major is expected to incorporate elements from both the primary and the Automation, Robotics, and Controls Engineering majors. Since the required courses for Automation, Robotics, and Controls Engineering must be taken along with those for the primary major, a full curriculum map is not provided. Students should carefully plan each term in consultation with their primary major advisor and with their Automation, Robotics, and Controls Engineering advisor. To obtain a dual major in Automation, Robotics, and Controls Engineering, students must complete the courses required for the Bachelor of Science degree in their primary engineering major as well as the following list of specialized Automation, Robotics, and Controls Engineering courses:

Automation, Robotics, and Controls Engineering Major Core (31 cr)

REE 463 (2-3-3) Energy System Instrumentation
 EE 355 (3-3-4) Control Systems Design
 ENGR 420 (3-3-4) Engineering Modeling
 ENGR 421 (3-3-4) Automation Systems
 ENGR 422 (3-3-4) Process Control
 ENGR 423 (3-3-4) Motion Control and Robotics

Electrical Engineering and Computer Science Requirements (36 cr)

EE 131 (3-3-4) Digital Electronics I
 EE 133 (3-3-4) Digital Electronics II
 EE 221 (3-3-4) Circuits I
 EE 223 (3-3-4) Circuits II
 EE 225 (3-3-4) Circuits III
 EE 333 (3-3-4) Microcontroller Engineering
 EE 430 (4-3-5) Linear Systems and DSP
 CST 116 (3-3-4) C++ Programming
 ENGR 267 (2-3-3) Engineering Programming

Supporting Engineering Requirements (25 cr)

REE 243 (3-3-4) Electric Power
 REE 253 (3-3-4) Electromechanical Energy Conversion
 ENGR 211 (4-0-4) Engineering Mechanics: Statics
 ENGR 212 (3-0-3) Engineering Mechanics: Dynamics
 ENGR 355 (3-0-3) Thermodynamics
 MECH 318 (3-3-4) Fluid Mechanics I
 MECH 323 (3-0-3) Heat Transfer I
 SEM 421 (4-0-4) Systems Engineering
 SEM 422 (4-0-4) Advanced Systems Engineering

Total: 92 credits (Note: many courses may be part of the primary major).

Optical Engineering

Degree Offered

Optical Engineering (Dual major)

The major in Optical Engineering is designed as a dual major degree option for students with an ABET-accredited primary major in an engineering discipline offered at Oregon Tech (e.g., Electrical Engineering, Mechanical Engineering). Students choose a primary ABET accredited engineering major and complete the additional specialized coursework to earn a second major in Optical Engineering. The Optical Engineering dual major is offered at the Wilsonville campus.

Program Objectives

Graduates of the Optical Engineering program will:

1. Have a strong technical background in addition to the analytical, critical-thinking, and problem-solving skills needed as engineering and science professionals.
2. Be employed as optical engineers, optomechanical engineers, optoelectronics engineers, laser engineers, and similar positions in the engineering industry.
3. Understand the value of and show a commitment to professional development and lifelong learning.
4. Be effective team members with excellent oral and written communication skills, which lead to technical and managerial leadership roles.

Career Opportunities

Optical Engineering is the branch of engineering that incorporates the production, modification, and detection of light into devices and processes. Graduates of the Optical Engineering program are employed as optical engineers, illumination engineers, metrology engineers, optomechanical engineers, optoelectronics engineers, laser engineers, and similar positions in the engineering industry. A dual major in Optical Engineering provides students with the opportunity to combine engineering disciplines. This provides a competitive advantage for graduates entering the workforce because optical subsystems are now common in many engineering applications. For example, a student seeking to become an optomechanical engineer might combine with mechanical engineering; an optoelectronics engineer would combine with

electrical engineering; a solar energy engineer with renewable energy engineering.

Employers of Optical Engineering graduates include more than eighty Oregon companies that encompass a diverse range of applications. These include semiconductor inspection, infrared imaging, automation, surface coatings, laser manufacture, lighting, camera design, optical fiber communication, and colorimetry.

Student Preparation

Students considering the Optical Engineering major must first select a primary engineering major and complete the freshman engineering coursework including calculus and calculus-based physics. Upon completion of the freshman primary major requirements, students interested in the Optical Engineering dual major should contact the Optical Engineering program director for an advising appointment. Students entering the Optical Engineering program by transfer are requested to contact their primary major department concerning transfer of technical coursework. Completing a year of calculus-based physics is mandatory before any optical engineering classes can be taken.

Accreditation

Completion of a dual major in Optical Engineering is contingent upon finishing a primary major in an ABET accredited program.

Degree Requirements

A dual major in Optical Engineering requires 40 specialized credits in optics and electrical engineering. Some of these courses may be used to meet requirements in the primary major also. The capstone project required in the student's primary major is expected to incorporate elements from both the primary and optical engineering majors. Since the required courses for Optical Engineering must be taken along with those for the primary major, a full curriculum map is not provided. Students should carefully plan each term in consultation with their primary major advisor and with their Optical Engineering advisor. To obtain a dual major in optical engineering, students must complete the courses required for the Bachelor of Science degree in their primary engineering major as well as the

following list of specialized Optical Engineering courses:

EE 221	Circuits I	4
EE 223	Circuits II	4
EE 225	Circuits III	4
EE 343	Solid-State Devices	4
EE/PHY 448	Geometric Optics	4
EE/PHY 449	Radiometry & Optical Detection	4
EE/PHY 450	Physical Optics	4
EE/PHY 451	Lasers	4
EE/PHY 452	Fiber Optics	4
EE/PHY 453	Optical Metrology	4

Systems Engineering & Technical Management

Degree Offered

Systems Engineering & Technical Management (Dual major)

The major in Systems Engineering & Technical Management” is designed as a dual major option for students with an ABET accredited primary major in an engineering discipline offered at Oregon Tech. Students first choose a primary ABET accredited major (e.g., Electrical Engineering, Renewable Energy Engineering, Mechanical Engineering, Civil Engineering), and complete additional specialized coursework to earn a second major in Systems Engineering & Technology Management. The program is designed so that both majors in the degree can be completed in 4 years by taking summer courses. ABET ETAC degree students may also pursue the dual major with departmental approval.

Career Opportunities

Systems engineers address complex problems in areas such as electrical & electronic systems, information systems, renewable energy systems, economic and financial systems, telecommunications, transportation, project management, and manufacturing. Systems engineering is not about specific technologies, but how to put heterogeneous technologies together to formulate system solutions to complex problems. As such, systems engineering is a multidisciplinary engineering discipline concerned with the design, modeling, analysis, and management of technological systems that employ a combination of devices, software, hardware, firmware, materials, and humans for such diverse purposes as communications, energy engineering, health care, transportation or manufacturing. The dual major curriculum provides engineering students with design viewpoints and methodologies that emphasize system integration, and with subject matter and tools for modeling and analysis especially appropriate for large complex systems including system theory, simulation, computational data analysis and statistics, and engineering management. This dual major is designed to address the need for both systems engineering and T-shape individuals at the BS level. After 4 years, graduates of the dual degree program are technically competent in an engineering discipline and ready to enter the workforce as functional engineers but also have formal education, training and skills in systems

engineering, project management, product development, strategy and innovation, and engineering management to assume functional managerial positions, such as project managers and technical team leaders.

Student Preparation

Students considering the dual major in Systems Engineering & Technical Management must first select a primary engineering major and complete the freshman engineering coursework including calculus and calculus-based physics. Upon completion of the freshman primary major requirements, students interested in the Systems Engineering & Technical Management dual major should contact the department chair for an advising appointment. Students who are planning to complete this dual major are encouraged to contact the department chair upon completion of the freshman year.

Accreditation

Completion of a dual major in Systems Engineering & Technical Management is contingent upon finishing a primary major in an ABET accredited program.

Degree Requirements

To obtain a dual major in Systems Engineering & Technical Management, students must complete the courses required for the Bachelor of Science degree in their primary engineering major, as well as the dual major requirements listed below. Some of these courses may be used to meet requirements in the primary major also.

SE Major Core Requirements (12 cr)

SEM 421	Systems Engineering	4
SEM 422	Advanced Systems Engineering	4
SEM 425	Advanced Management for Engineers	4

Mathematics Requirements (12 cr)

MATH 321	Applied Differential Equations I	4
MATH 341	Linear Algebra I	4
MATH 465	Mathematical Statistics	
or		
MATH 362	Statistical Methods II	4

Systems Electives (9 cr)

[Select 9 cr from the following electives or advisor approved Elective courses]		
EE 355	Control Systems Design	4
EE 430	Linear Systems & Digital Signal Processing	5
EE 432	Advanced Digital System Design with HDL	4

EE 401	Communications Systems	5
CST 236	Software Systems Testing	4
CST 316	Junior Team-Based Project Development I	4
CST 324	Database Systems and Design	4
MFG 447	Lean Manufacturing	3
MIS 311	Introduction to Systems Analysis	3
MIS 341	Relational Database Design	4
MIS 375	Decision Support Systems	3

Management Electives (9 cr)

[Select 9 cr from the following electives or advisor approved elective courses]		
ACC 203	Principles of Managerial Accounting	4
BUS 223	Marketing I (or higher)	3
BUS 226	Business Law	3
BUS 304	Engineering Management	3
BUS 308	Principles of International Business	3
MGT 321	Operations Management I	3
MGT 345	Engineering Economy	3
MGT 445	Project Management	3
MGT 461	Lean/Six Sigma Management	3
MGT 462	Lean/Six Sigma Management II	3
MGT 463	Lean/Six Sigma Management II	3

Total: 42 credits (Note: some courses may be part of the primary major).

Geomatics Department

Jack Walker, *Department Chair*

Professors: J. Ritter, J. Walker

Associate Professor: M. Marker

Wilsonville Program Director: T. Kent

Degree Offered

Bachelor of Science in Geomatics with options in:

Surveying

Geographic Information Systems

Minors Offered

Geographic Information Systems

Surveying

Geomatics is the modern surveying, engineering, geoscience, and IT-related discipline which employs an integrated approach to the measurement, mathematical modeling, and management of spatial data. Spatial data is obtained from a variety of sources including ground-based instruments, mobile mapping technologies, aerial imaging, hydrographic, and earth-orbiting satellite systems. Spatial data is used to create a detailed but understandable picture of the Earth's physical features. This data enables the design and development of land administration systems for sustainable planning and management of the built environment.

Geomatics provides the opportunity to work primarily outdoors, exclusively in an office, or in some combination of the two. Geomatics attracts individuals who enjoy working outdoors, as well as those who enjoy working indoors with computers, advanced technology, and high-tech instruments. Career employment is available in rural and urban areas.

Students within the Geomatics Program must choose between either an option in Surveying or Geographic Information Systems (GIS). Students may, with consent of their advisor, complete both options.

Program Objectives

Graduates of the Oregon Tech Geomatics program will:

1. Acquire the ability to obtain professional licensure and/or certifications in the geospatial industry.

2. Advance in the geospatial industry during their career by becoming involved in local, state, national, or international professional organizations.
3. Obtain industry positions requiring increased responsibility.
4. Assume responsibility for lifelong learning in professional and personal development.
5. Demonstrate readiness for graduate education and/or advanced technical education.

Student Preparation

It is recommended that students prepare for entrance into the program by emphasizing mathematics and science in high school. Two years of algebra and one year each of geometry, trigonometry and physics are desirable prerequisites.

Degree Requirements

A minimum of 180 term hours must be completed for the Surveying option, of which 80 term hours must be in the GIS and geomatics area. A minimum of 180 term hours must be completed for the GIS option, of which 74 term hours must be in the GIS and geomatics area.

Bachelor of Science in Geomatics, Surveying Option

The department offers a nationally-recognized professional degree program that prepares students for employment within the geomatics profession and licensure as a Professional Land Surveyor (PLS). Students enjoy small classes taught by licensed professionals that emphasize fundamental theory and problem solving in a computer-intensive curriculum. Field laboratory experiences integrated throughout the curriculum provide practical skills, and offer extensive opportunities to prepare students to work in teams using state-of-the-art technology. Upon completing the freshman year, students often have sufficient experience to obtain summer employment as a survey crew member.

Completion of the program qualifies graduates to take the Fundamentals of Surveying (FS) exam during the spring term of the senior year. The broad-based nature of the curriculum ensures that graduates will be

prepared to fulfill both the traditional and contemporary roles of the profession.

Cooperative Education

Geomatics students may, upon completion of the freshman year, apply for student career experience programs (Pathways) with the U.S. Bureau of Land Management, Bonneville Power Administration, U.S. Forest Service, or other appropriate federal employers. Work experiences are paid and may be for three or six month periods. Students may earn two or four credits for work experience periods. A maximum of four credits may be applied toward the bachelor's degree.

Geomatics students are also eligible for the Civil Engineering Cooperative Program (CE-COP), offering high-quality, paid industrial experience and related academic activities while students pursue their degree. The Oregon State Board of Examiners for Engineering and Land Surveying (OSBEELS) counts this internship time toward PLS licensure requirements.

Scholarships

Approximately 40 scholarships are available to geomatics students each year through an endowed Geomatics Department Scholarship, CLSA, PLSO, LSAW, WESTFED, NSPS, and other organizations.

Career Opportunities

The employment forecast for graduates in this field is exceptional. As an increasing number of licensed surveyors across the nation retire, a personnel shortage has been created within the geomatics profession. Graduates are prepared for a wide variety of career opportunities in the fields of surveying, engineering, construction, remote sensing, GIS, and land information management.

Accreditation

The Geomatics Program (surveying option) is accredited by the Applied Science Accreditation Commission (ASAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

Bachelor of Science in Geomatics, Surveying Option

Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
GIS 103	The Digital Earth	3
GME 161	Plane Surveying I	4
MATH 112	Trigonometry	4
WRI 121	English Composition	3
Total		14

Freshman Year		Winter
CE 203	Engineering Graphics	3
GIS 134	Geographic Information Systems	3
GME 175	Computations and Platting	3
MATH 251	Differential Calculus	4
WRI 122	Argumentative Writing	3
Total		16

Freshman Year		Spring
GIS 205	GIS Data Integration	2
GME 162	Plane Surveying II	4
MATH 252	Integral Calculus	4
SPE 111	Public Speaking	3
	Social Science Elective	3
Total		16

Sophomore Year		Fall
GME 163	Route Surveying	4
GME 241	Boundary Law I	3
MATH 254	NVector Calculus I	4
PHY 221	General Physics with Calculus	4
Total		15

Sophomore Year		Winter
GME 242	Land Descriptions and Cadastre	2
GME 264	Digital Design for Surveying	2
PHY 222	General Physics with Calculus	4
WRI 227	Technical Report Writing	3
	Social Science Elective	3
Total		14

Sophomore Year		Spring
GME 372	Subdivision Planning and Platting	3
MATH 361	Statistical Methods I	4
PHY 223	General Physics with Calculus	4
	Humanities Elective	3
Total		14

Junior Year		Fall
GIS 306	Geospatial Raster Analysis	4
GME 343	Boundary Surveys	4
MIS 113	Introductions to Database Systems	3
WRI 327	Advanced Technical Writing	3
	Social Science Elective	3
Total		17

Junior Year		Winter
GIS 316	Geospatial Vector Analysis I	4
GME 466	Boundary Law II	3
SPE 321	Small Group and Team Communication	3
	ENV/GIS/GME Elective	4
	Math Elective*	3
Total		17

Junior Year		Spring
BUS 226	Business Law	3
GME 351	Construction and Engineering Surveying	3
GME 444	Adjustment by Least Squares	4
MGT 345	Engineering Economy	3
	Humanities Elective	3
Total		16

Senior Year		Fall
BUS 304	Engineering Management	3
GME 425	Remote Sensing	4
GME 451	Geodesy	4
MIS 118	Programming Fundamentals	4
Total		15

Senior Year		Winter
GME 452	Map Projections	3
GME 454	GNSS Surveying	4
	Science Elective	4
	Social Science Elective	3
Total		14

Senior Year		Spring
GME 468	Geomatics Practicum	2
	Business Elective	3
	Humanities Elective	3
	Science Elective**	4
Total		12

* Students must demonstrate advancement in educational content, courses must not be lower level than courses in the required curriculum. MATH 341 or MATH 362 recommended.

** GEOL 201 Physical Geology recommended.

Note: Humanities and Social Science Electives must be approved by the department.

Total credits required for B.S. in Geomatics, Surveying Option: 180

Bachelor of Science in Geomatics, Geographic Information Systems (GIS) Option

Geographic Information Systems (GIS) is a systematic approach to the management, analysis, and display of geographic information. Although the management of such information often times requires the application of advanced RDBMS techniques, the ability to see a project through to completion requires fundamental project management skills as well. The analysis of geodatasets is predicated on a firm understanding of spatial reference/coordinate systems, topological relationships, and statistical methods. Techniques for displaying geographic information take various forms such as maps, geographic datasets, and data models. Students graduating from this course of study will understand how to manipulate geographically based data in order to solve geospatial problems.

Students learn in a project-based environment how to manage the flow of data through the project in terms of data acquisition, processing, analysis, and presentation. Within the GIS option, students are able to select individual areas of focus based on independent study and/or online courses.

Career Opportunities

The list of opportunities for students in the field of GIS has been, and is continuing to show substantial growth. As our society becomes more data centered, the importance of understanding the spatial location of this data and its spatial relationship to other data is becoming increasingly apparent. Understanding such geospatial relationships is fundamental to areas such as health care, land records management, transportation modeling, environmental engineering/science, and urban planning, to name only a few. Local, state, and federal agencies are embracing GIS more each year as these agencies realize that GIS is the appropriate tool to solve long-standing geospatial problems. Private industry is also embracing GIS since it can be used to streamline delivery and/or response routes. Both private and public entities have also realized that GIS provides an excellent decision support framework structure.

Bachelor of Science in Geomatics, Geographic Information Systems (GIS) Option Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall	Junior Year		Winter
GIS 103	The Digital Earth	3	GIS 332	Customizing the GIS Environment I	4
GME 161	Plane Surveying I	4	MIS 218	Database Programming	4
MATH 111	College Algebra	4	MIS 341	Relational Database Design I	4
WRI 121	English Composition	3		Math Elective*	3
Total		14	Total		15

Freshman Year		Winter	Junior Year		Spring
CE 203	Engineering Graphics	3	BUS 226	Business Law	3
GIS 134	Geographic Information Systems	3	GIS 432	Customizing the GIS Environment II	4
GME 175	Computations and Platting	3	MGT 345	Engineering Economy	3
MATH 112	Trigonometry	4		Social Science Elective	3
	Social Science Elective	3		Social Science Elective	3
Total		16	Total		16

Freshman Year		Spring	Senior Year		Fall
GIS 205	GIS Data Integration	2	BUS 304	Engineering Management	3
GME 162	Plane Surveying II	4	GME 425	Remote Sensing	4
MATH 251	Differential Calculus	4	GME 451	Geodesy	4
SPE 111	Public Speaking	3	WRI 327	Advanced Technical Writing	3
WRI 122	Argumentative Writing	3		Humanities Elective	3
Total		16	Total		17

Sophomore Year		Fall	Senior Year		Winter
GIS 306	Geospatial Raster Analysis	4	GIS 456	GIS Web Services and Management	3
GME 241	Boundary Law I	3	GME 452	Map Projections	3
MATH 252	Integral Calculus	4	GME 455	GNSS Surveying for GIS	4
PHY 221	General Physics with Calculus	4		Humanities Elective	3
				Science Elective	4
Total		15	Total		17

Sophomore Year		Winter	Senior Year		Spring
GIS 316	Geospatial Vector Analysis I	4	GME 468	Geomatics Practicum	2
GME 242	Land Descriptions and Cadastre	2		Business Elective (upper-division)**	3
MATH 254N	Vector Calculus I	4		Humanities Elective	3
PHY 222	General Physics with Calculus	4		Science Elective	4
Total		14	Total		12

Sophomore Year		Spring	Senior Year		Spring
GIS 426	Geospatial Vector Analysis II	4			
MATH 361	Statistical Methods I	4			
MIS 275	Introduction to Relational Databases	3			
	Social Science Elective	3			
Total		14			

Junior Year		Fall	Senior Year		Spring
GIS 446	GIS Database Development	4			
MIS 118	Programming Fundamentals	4			
SPE 321	Small Group and Team Communication	3			
WRI 227	Technical Report Writing	3			
Total		14			

Geographic Information Systems Minor

The Geographic Information Systems (GIS) minor is open to all majors and is especially recommended for students majoring in Geomatics (Surveying Option), Environmental Sciences, Business/Management/ Information Systems, Computer Software Engineering, Renewable Energy Engineering and Health Care. The minor provides the essential kernel of knowledge and skill necessary to approach geospatial issues pertaining to these disciplines. An advisor in the Geomatics Department must approve any substitution of courses from those listed. Preparation for this course of study entails a functional level of computer literacy that can be evaluated in consultation with an advisor. Students must also have successfully completed MATH 111 prior to enrolling in upper-division classes.

The Minor in Geographic Information Systems (GIS) acknowledges the achievement of 22 credits taken from the following GIS course listing.

Requirements of Minor

GIS 103	The Digital Earth	3
GIS 134	Geographic Information Systems	3

Elective Courses: 16 credits required

GIS 306	Geospatial Raster Analysis	4
GIS 316	Geospatial Vector Analysis I	4
GIS 332	Customizing the GIS Environment I	4
GIS 407	GIS Practicum	4
GIS 426	Geospatial Vector Analysis II	4
GIS 432	Customizing the GIS Environment II	4
GIS 446	GIS Database Development	4

* Students must demonstrate advancement in educational content, courses must not be lower level than courses in the required curriculum. MATH 341 or MATH 362 recommended.

** BUS 356 recommended.

Note: Humanities and Social Science Electives must be approved by the department.

Total credits required for B.S. in Geomatics, Geographic Information Systems Option: 180

Surveying Minor

The Surveying minor is open to all engineering majors, and is especially recommended for students majoring in Civil Engineering and Geomatics (GIS option). The minor provides the essential knowledge and skills which meet OSBEELS requirements (OAR 820-010-0226) allowing engineering students to sit for the Fundamentals of Surveying (FS) examination, and pursue licensure as a Professional Surveyor (PS). An advisor in the Geomatics Department must approve substitution of courses from those listed.

The Minor in Surveying acknowledges the achievement of 27 credits taken from the following geomatics course listing.

Requirements of Minor

GIS 134	Geographic Information Systems ³	3
GME 162	Plane Surveying ^{3,4}	4
GME 241	Boundary Law ³	3
GME 242	Legal Descriptions & Cadastre ³	2
GME 264	Digital Design for Surveying ¹	3
GME 343	Boundary Surveys	4

Elective Courses: 8 credits required

GME 163	Route Surveying	4
GME 351	Construction and Engineering Surveying ²	3
GME 372	Subdivision Planning and Platting	3
GME 425	Remote Sensing ³	4
GME 444	Adjustment by Least Squares	4
GME 451	Geodesy ³	4
GME 452	Map Projections ³	3
GME 455	GNSS Surveying ³	4
GME 466	Boundary Law II	3

Notes:

1 CIV 415 will substitute for GME 264.

2 CE 351 will substitute for the GME 163 prerequisite.

3 Required course for GIS majors.

4 MATH 221 will substitute for the GME 175 prerequisite.

Humanities and Social Sciences Department

Mark Neupert, *Department Chair*

Alishia Huntoon, *Program Director, Extern Coordinator and Curriculum Coordinator, Applied Psychology*

Maria Lynn Kessler, *Applied Psychology*

Professors: M. Clark, M. Kessler, M. Neupert

Associate Professor: A. Huntoon,

Assistant Professors: J. Becnel, R. Madden, S. Nathenson

Degrees Offered

Bachelor of Science in:
Applied Psychology
Population Health Management

Minors Offered

Arts, Literature, and Philosophy (ALPs)
Medical Sociology
Psychology

Graduate Certificates Offered

Applied Behavior Analysis (ABA)

Module Offered

Oregon Transfer (OTM)

The Humanities and Social Sciences Department offers a wide variety of classes that meet the general education requirements for all students. In addition, these classes meet the lower-division requirements for college transfer students in many pre-professional programs.

Department Goals and Objectives

1. To provide coursework in the humanities and social sciences in order to prepare students for employment in a rapidly changing global market.
2. To provide course offerings in multiculturalism and globalization.
3. To assist students in developing critical thinking and problem-solving abilities and to develop scientific knowledge and inquiry skills.
4. To assist students in developing ethical and cultural awareness.

5. To prepare students to be responsible citizens and lifelong learners.
6. To assist students in developing an aesthetic appreciation of the arts.

ALPs Minor

The ALPs minor may be completed by students from any major and is especially recommended to students who want an opportunity to take a secondary focus in the Humanities during their time at Oregon Tech. This secondary focus will give them an opportunity to further explore their passions in the fields of Arts, Literature, and Philosophy while receiving official recognition of their newly-acquired expertise. The minor will give students the ability to take more Humanities classes that are relevant to their major program and their future career goals while instilling in them the knowledge and values associated with a traditional liberal arts education.

The minor requires 18 credit hours, including one of the required courses listed below (3 credits). The remaining courses must be chosen from the following prefixes: ART, HUM, LIT, PHIL. At least 12 of these 15 credit hours must be upper division courses. Transfer students must take at least 9 hours of their minor credits at Oregon Tech to qualify.

Requirements of the Minor

Required Course (3 credits, one from this set is required, but others can be counted toward electives, below):

- HUM 105: Intro to Cultural Studies
HUM 125: Introduction to Technology, Society and Values
HUM 147: Western Culture in the Classical Age (f/k/a Introduction to Humanities I)
HUM 148: Western Culture in the Medieval Age (f/k/a Introduction to Humanities II)
HUM 149: Western Culture in the Modern Age (f/k/a Introduction to Humanities III)
LIT 253: 19th Century American Literature (f/k/a American Literature I)
LIT 254: 20th Century American Literature (f/k/a American Literature II)
LIT 255: Contemporary American Literature (f/k/a American Literature III)
PHIL 105: Intro to Ethics
PHIL 205: Intro to Logic

Electives (15 credits, at least 12 upper-division):

- ART 205: Intro to Watercolors
ART 210: Beginning Sculpture
ART 220: Basic Drawing
ART 226: Digital Photography
ART 280: Introductory Painting
ART 282: Introduction to Acrylic Painting
HUM 105: Intro to Cultural Studies
HUM 125: Introduction to Technology, Society and Values
HUM 147: Western Culture in the Classical Age (f/k/a Introduction to Humanities I)
HUM 148: Western Culture in the Medieval Age (f/k/a Introduction to Humanities II)
HUM 149: Western Culture in the Modern Age (f/k/a Introduction to Humanities III)
HUM 235: Introduction to Film
HUM 245: Digital Diversity
HUM 335: Game Studies
HUM 366: Engineering, Business, and the Holocaust
LIT 104: Introduction to Literature I
LIT 105: Introduction to Literature II
LIT 106: Introduction to Literature III
LIT 225: Contemporary Theater: Ashland Plays
LIT 235: American Multicultural Literature
LIT 246: Creative Writing
LIT 253: 19th Century American Literature (f/k/a American Literature I)
LIT 254: 20th Century American Literature (f/k/a American Literature II)
LIT 255: Contemporary American Literature (f/k/a American Literature III)
LIT 266: Native American Literature and Film
LIT 305: Ecological Issues in Nature Writing
LIT 315: Science Fiction Literature and Film
LIT 325: The Metropolis
LIT 335: Travel Literature: Fiction and Non-Fiction
LIT 345: Post-apocalyptic Literature and Film
LIT 367: Art and Trash in Contemporary Fiction
LIT 373: British Culture and Literature
LIT 381: Contemporary World Literature
LIT 456: Topics in Film
PHIL 105: Intro to Ethics
PHIL 205: Intro to Logic
PHIL 215: Ethical Theory
PHIL 305: Medical Ethics
PHIL 315: Ethics of Emerging Technologies
PHIL 325: Environmental Ethics
PHIL 331: Ethics in the Professions
PHIL 335: Philosophy of Science
PHIL 342: Business Ethics
PHIL 405: Advanced Logic

Medical Sociology Minor

The Department of Humanities and Social Sciences offers a Medical Sociology Minor as a supplement to the Oregon Tech technical and applied degrees related to health, health care, management and social science. The minor offers courses covering the central topics of medical sociology, including the social factors in health and illness, the patient experience of illness, the role of health care professionals, and the interaction between health and society.

The Medical Sociology Minor is designed with the current employer demands and changes in health care organization in mind. Many employers within the health care field seek employees who are culturally competent, prepared to work with diverse populations, and are familiar with social determinants of health.

A minimum of 20 or 21 credits is required to complete the minor. Enrollment in the minor is through the Humanities and Social Sciences Department; contact the department chair or your advisor for more information.

Required courses

SOC 204	Introduction to Sociology*
SOC 225	Medical Sociology
SOC 325	Global Population Health
SOC 335	Health Inequality and Cultural Competency

In addition, students will select three courses from the following list. Two of the three courses must be 300 or 400 level.

BIO 200	Medical Terminology
BUS 316	Total Quality in Health Care
COM 225	Interpersonal Communication
COM 345	Organizational Communication
COM 346	Health Communication
HIST 275	History of Medicine
MIS 217	Health Care Systems and Policy
PHIL 335	Medical Ethics
PSY 202	Psychology
PSY 330	Social Psychology
PSY 336	Health Psychology I
PSY 371	Human Sexuality I
PSY 372	Human Sexuality II
SOC 305	Rural Health
STAT 414	Statistical Methods in Epidemiology

SOC or PSY 307/407 will be considered as electives pending program director approval.
*Students are required to take SOC 204 before taking SOC 225

Psychology Minor

The psychology minor is open to all majors and is especially recommended for students majoring in allied health and medical sciences, management, and communication studies. The minor offers a variety of courses in psychology that can enhance knowledge. A minimum of 24 credits is required to complete the minor. Students should meet with a psychology advisor when choosing electives to fulfill the minor requirements. Enrollment in the minor is through the Humanities and Social Sciences Department; contact the department chair or your advisor for more information.

Requirements of the Minor

1. A minimum of 24 credits is required to earn the minor.
2. A minimum of 12 credits must be selected from upper-division coursework. Students must pay strict attention to prerequisite requirements.
3. Courses
Required lower division courses (9 credits):
PSY 201 Psychology
PSY 202 Psychology
PSY 203 Psychology
Additional Courses:
12 credits of upper division psychology courses
3 credits of lower or upper division courses
4. For all courses counted toward the Minor in Psychology, a letter grade of "C" or better is required to be awarded the minor.
5. At least 12 credits of courses in this minor must be completed at Oregon Tech.

Note: Not all courses are offered every term or every year.

Applied Psychology

Alishia Huntoon, *Program Director, Klamath Falls and Online*

MariaLynn Kessler, *Program Director, Wilsonville*

Alishia Huntoon, *Externship Coordinator*

Trevor Petersen, *Advising Coordinator*

Participating Faculty: A. Huntoon, M. Kessler, K. Konkell, A. Loukus, T. Petersen

Degree Offered

Bachelor of Science in Applied Psychology

The Bachelor of Science in Applied Psychology prepares students for careers that apply the principles of psychology in diverse settings. The program provides a strong core curriculum in order for students to understand the foundations, theories, and principles of each area of psychology. As an applied program, both core and elective courses have a skills-based focus, allowing students to identify personal strengths, apply knowledge to real-world situations, create and implement new ideas, and ultimately be prepared to enter the workforce or continue on to graduate programs. A diverse offering of elective courses allows for students to focus on one or many areas of psychology, creating a unique opportunity for students to have an in-depth and personalized psychology degree. Students should consult with their advisor about specific interests for guidance in regards to elective offerings. The Applied Psychology program also offers Capstone in Applied Psychology (CAP) courses. These CAP courses vary by term and give senior students the opportunity to synthesize knowledge learned throughout the degree program and apply core principles and theories of psychology to a selected topic. Through an Applied Experience, students have the opportunity to participate in externships, advanced research courses, or community work to prepare themselves for exciting and rewarding careers in psychology or for additional coursework in graduate programs.

Mission Statement

The mission of the Applied Psychology Program is to enable students to apply core principles and theories of psychology and in-depth knowledge and skills in specific areas of psychology to communicate effectively, think critically, behave ethically and with cultural awareness, and work interpersonally with

people from a wide variety of backgrounds.

Career Opportunities

Nationwide, college graduates with a bachelor's in psychology perform a wide variety of jobs or attend a wide variety of graduate programs. Graduates may work in counseling, education, social service, management, public relations, public health, and other fields. All of these jobs are potentially available to graduates of Oregon Tech's Applied Psychology Program. Many of Oregon Tech's Applied Psychology graduates have found jobs in Oregon and beyond. Human service employers include county and state agencies, as well as a wide range of private and non-profit agencies. Graduates of Oregon Tech's Applied Psychology Program benefit from the emphasis of hands-on training and applied experiences. Graduates have also completed a Master of Arts in Teaching (MAT) and pursue careers in education, such as teaching, school counseling, and special education. Graduates have also been employed in industry and are following management training programs. Finally, graduates have pursued various Master's and doctoral programs in psychology and related fields.

Degree Requirements

Students must meet the general education requirements, as stated elsewhere in this catalog, and satisfactorily complete the courses listed in this curriculum to obtain the Bachelor of Science in Applied Psychology. A total of 180 credits are required for the degree. Students must complete a core program consisting of 71 credits; those core courses are PSY 201, PSY 202, PSY 203, PSY 215, PSY 216, PSY 301, PSY 311, PSY 312, PSY 313, PSY 317, PSY 330, PSY 331, PSY 334, PSY 335, PSY 339, PSY 455, PSY 475, PSY 255 or MATH 243 or MATH 361, and 12 credits toward an Applied Experience. Any of the following can count toward the Applied Experience: PSY 314, PSY 420, PSY 421, PSY 422, PSY 423, PSY 441, PSY 442, PSY 443, PSY 445, and/or PSY 497. Additionally, students are required to take 54 elective credits, and should work with their advisors to select elective courses that align closely with their interests and career goals. Students electing to take externship are restricted to a maximum of 32 credits. All core courses must be completed with a minimum grade of "C" in order to earn the degree.

Bachelor of Science in Applied Psychology Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
PSY 201	Psychology	3
WRI 121	English Composition	3
	Laboratory Science Elective	4
	Social Science Elective	3
Total		13

Freshman Year		Winter
PSY 202	Psychology	3
WRI 122	Argumentative Writing	3
	Laboratory Science Elective	4
	Social Science Elective	3
	Elective	3
Total		16

Freshman Year		Spring
PSY 203	Psychology	3
SPE 111	Public Speaking	3
	Laboratory Science Elective	4
	Social Science Elective	3
	Elective	3
Total		16

Sophomore Year		Fall
MATH 111	College Algebra	4
PSY 215	Abnormal Psychology I	3
SPE 321	Small Group and Team Communication	3
	Humanities Elective	3
	Social Science Elective	3
Total		16

Sophomore Year		Winter
MATH 243	Introductory Statistics	
or		
MATH 361	Statistical Methods I	
or		
PSY 225	Applied Statistics for Social Sciences	4
PSY 216	Abnormal Psychology II	3
PSY 311	Human Growth and Development I	3
	Communications Elective	3
	Humanities Elective	3
Total		16

Sophomore Year		Spring
PSY 301	Basic Counseling Techniques	4
PSY 312	Human Growth and Development II	3
PSY 313	Psychological Research Methods I	4
PSY 317	Field and Career Preparation	3
Total		14

Graduate Certificate in Applied Behavior Analysis

The Certificate in Applied Behavior Analysis is a 27-credit, nine-course sequence for individuals who wish to pursue additional coursework in Applied Behavior Analysis. The Behavior Analyst Certification Board, Inc.¹ has approved this course sequence as meeting the course work requirements for eligibility to take the Board Certified Behavior Analyst² exam. (Applicants for the BCBA² exam will have to meet additional requirements to qualify.)

Junior Year		Fall
PSY 334	Behavior Modification I	4
PSY 339	Biopsychology	3
	Communication Elective	3
	Electives*	6
Total		16

Junior Year		Winter
PSY 330	Social Psychology I	3
PSY 335	Behavior Modification II	4
	Humanities Elective	3
	Electives*	
And/or	Applied Experience**	6
Total		16

Junior Year		Spring
PSY 331	Social Psychology II	3
PSY 455	Cognitive Psychology	3
	Electives*	
And/or	Applied Experience**	9
Total		15

Senior Year		Fall
PSY 475	Capstone in Applied Psychology	3
	Electives* or Applied Experience**	11
Total		14

Senior Year		Winter
	Electives* or Applied Experience**	14
Total		14

Senior Year		Spring
	Electives* or Applied Experience**	14
Total		14

Total credits required for B.S. in Applied Psychology: 180

(Note: 60 upper-division credits required)

*Electives – 54 credits

**Applied Experience – Student must complete at least 12 credits of the following: PSY 314, PSY 420, PSY 421, PSY 422, PSY 423, PSY 441, PSY 442, PSY 443, PSY 445, and PSY 497

Applied Behavior Analysis

Applied Behavior Analysis (ABA) is an evidence-based, data-driven, systematic approach to intervention. Practitioners of ABA apply principles of reinforcement and focus on applications that improve the quality of life for individuals.

Behavior analysts provide services in a variety of settings including schools, clinics, rehabilitation settings, residential facilities, social service agencies, mental health facilities, businesses, and client homes. They work with diverse populations including individuals and families affected by autism, developmental and intellectual disabilities, brain injury, mental health, geriatrics, child abuse, and neglect.

Program Objective

Meet the demand for competent behavior analysts by providing BACB³ approved course work to professionals seeking national certification and/or licensure as a behavior analyst in Oregon.

Required Courses (27 credits)

ABA 511 Foundations of Applied Behavior Analysis I	3
ABA 512 Foundations of Applied Behavior Analysis II	3
ABA 521 Ethics and Professionalism I	3
ABA 522 Ethics and Professionalism II	3
ABA 525 Research Methods in ABA	3
ABA 526 Behavioral Assessment	3
ABA 531 Behavior Change I	3
ABA 532 Behavior Change II	3
ABA 535 Special Topics in ABA	3

Population Health Management

Dr. Sophia Lyn Nathenson, *Program Director*

Dr. Sophia Lyn Nathenson, *Externship Coordinator*

Participating Faculty: Dr. M. Arthur

Degree Offered

Bachelor of Science in Population Health Management

The Population Health Management (PHM) professions are auxiliary or complementary to clinical healthcare. The PHM B.S. degree program includes core courses in applied and medical sociology, in addition to electives in applied psychology, management, mathematics, communication, and health sciences. Students may choose one of three emphases: Health Counseling/Outreach, Care Management and Coordination, and Applied Health Data Analytics.

The PHM program begins with a foundation in sociological theory, methods and research.

PHM graduates will gain competence in social theory, research methods, statistics, program planning and evaluation, and training in working with diverse and underserved populations.

Mission Statement

The mission of the PHM program is to provide students with the best possible training for careers that improve health and wellbeing. As the United States healthcare system changes to adapt to a new demographic and health landscape, increasing emphasis is placed on preventative medicine and health maintenance. PHM graduates will help fill this pressing need, providing much needed health resources to hospitals, schools, governmental and non-profit organizations, and local communities. Such work empowers individuals through health programs and policy, to create a healthier future for our nation.

Career Opportunities

Students who graduate from the PHM program may work in a wide variety of settings, all with the intent of improving the health and wellbeing of individuals and communities. Careers include health coaching, health research, community health program and evaluation, education, and patient advocacy. The PHM degree is an ideal preparation for

graduate study in sociology, epidemiology, public health and medicine.

Degree Requirements

Students must meet the general education requirements, as stated elsewhere in this catalog, and satisfactorily complete the courses listed in this curriculum to obtain the Bachelor of Science in Population Health Management. A total of 181 credits are required for the degree. Students must complete a core program; in addition, students must complete an emphasis area (listed below). A total of 18 credits are needed for an emphasis; a minimum of 9 upper division credits are needed. **Credits taken for externship or senior project do not count toward the emphasis.** Students electing to take externship are restricted to a maximum of 32 credits. All core and emphasis courses must be completed with a minimum grade of "C" in order to earn the degree.

Emphasis Requirements

Students completing the Health Counseling and Outreach emphasis must complete the following courses:

COM 205 Intercultural Communication
 COM 226 Non-verbal Communication
 PSY 215 Abnormal Psychology I
 PSY 216 Abnormal Psychology II
 PSY 220 Community Psychology
 PSY 301 Basic Counseling Techniques
 PSY 330 Social Psychology I
 PSY 331 Social Psychology II
 PSY 334 Behavior Modification I
 PSY 335 Behavior Modification II
 PSY 341 Psychoactive Drugs I
 PSY 342 Psychoactive Drugs II
 SOC 305 Rural Health
 SOC 315 Juvenile Delinquency
 SOC 405 Program Planning and Evaluation

Students completing the Care Management and Coordination emphasis must complete the following courses:

ANTH 103 Introduction to Cultural Anthropology
 BIO 200 Medical Terminology
 BIO 231 Human Anatomy and Physiology I
 BIO 232 Human Anatomy and Physiology II
 BIO 233 Human Anatomy and Physiology III
 BUS 313 Healthcare Systems and Policy
 BUS 316 Total Quality in Healthcare
 COM 205 Intercultural Communication
 COM 345 Organizational Communication
 PSY 347 Organizational Behavior
 PSY 360 Organizational Psychology
 PSY 410 Organizational Change and Development
 SOC 305 Rural Health

SOC 315 Juvenile Delinquency
 SOC 405 Program Planning and Evaluation

Students completing the Applied Health Data Analytics emphasis must complete the following courses:

BUS 316 Total Quality in Healthcare
 MATH 362 Statistical Methods II
 MATH 465 Mathematical Statistics,
 MIS 344 Healthcare Info Systems Management
 MIS 357 Information/Communication Systems-
 Healthcare
 MIS 445 Legal/Ethical/Social Issues in Healthcare
 Technology
 PSY 339 Biopsychology
 SOC 405 Program Planning and Evaluation
 WRI 123 Research Writing
 WRI 227 Technical Report Writing
 WRI 410 Proposal and Grant Writing

Bachelor of Science in Population Health Management (Applied Medical Sociology) Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
HIST 275	History of Medicine	3
SOC 204	Introduction to Sociology	3
WRI 121	English Composition	3
	Humanities Elective	3
	Elective	3
Total		15

Freshman Year		Winter
MATH 111	College Algebra	4
SOC 201	Classical Sociological Theory 3	3
WRI 122	Argumentative Writing	3
	Electives	6
Total		16

Freshman Year		Spring
SOC 202	Contemporary Sociological Theory	3
SOC 225	Medical Sociology	3
SPE 111	Public Speaking	3
	Communication Elective*	3
	Humanities Elective	3
Total		15

Sophomore Year		Fall
PSY 201	Psychology	3
SOC 206	Social Problems	3
SPE 321	Small Group and Team	3
	Communication	3
	Laboratory Science Elective	4
	Elective	3
Total		16

Sophomore Year		Winter
PSY 203	Psychology	3
SOC 205	Current Health Issues	3
	Laboratory Science Elective	4
	Electives	6
Total		16

Sophomore Year		Spring
MATH 243	Introductory Statistics	3
	or	
MATH 361	Statistical Methods I	4
	Emphasis Elective**	3
	Laboratory Science Elective	4
	Social Science Elective	3
Total		14

Junior Year		Fall
SOC 301	Social Science Research Methods I	4
SOC 325	Global Population Health	3
	Communication Elective*	3
	Emphasis Elective**	3
Total		13

Junior Year		Winter
ANTH 452	Globalization	3
PHIL 335	Medical Ethics	3
SOC 302	Social Science Research Methods II	4
	Emphasis Electives**	6
Total		16

Junior Year		Spring
SOC 335	Health Inequality and Cultural	3
	Competency	3
SOC 421	Senior Project Preparation	2
STAT 414	Statistical Methods in Epidemiology	4
	Emphasis Electives**	6
Total		15

Senior Year		Fall
	Externship*** or Electives*	15
Total		15

Senior Year		Winter
	Externship*** or Electives*	15
Total		15

Senior Year		Spring
	Externship*** or Electives*	15
Total		15

* See advisor or consult emphasis Elective list below for appropriate courses.

** To complete an emphasis, students must take courses from the appropriate list that follows. Credits taken for externship or senior project do not count as emphasis electives. A total of 18 credits are needed for an emphasis; a minimum of 9 upper division credits are needed.

*** Externship site and/or senior projects are coordinated in SOC 421 Senior Project Preparation. No more than 32 credits of externship allowed for graduation without departmental approval.

Emphasis Electives

Health Counseling and Outreach Emphasis:

COM 205 Intercultural Communication, COM 226 Non-verbal Communication, PSY 215/216 Abnormal Psychology I/II, PSY 220 Community Psychology, PSY 301 Basic Counseling Techniques, PSY 330/331 Social Psychology I/II, PSY 334/335 Behavior Modification I/II, PSY 341/342 Psychoactive Drugs I/II, SOC 305 Rural Health, SOC 315 Juvenile Delinquency, SOC 405 Program Planning and Evaluation.

Care Management and Coordination Emphasis:

ANTH 103 Introduction to Cultural Anthropology, BIO 200 Medical Terminology, BIO 231/232/233 Human Anatomy and Physiology I/II/III, BUS 313 Healthcare Systems and Policy, BUS 316 Total Quality in Healthcare, COM 205 Intercultural Communication, COM 345 Organizational Communication, PSY 347 Organizational Behavior, PSY 360 Organizational Psychology, PSY 410 Organizational Change and Development, SOC 305 Rural Health, SOC 315 Juvenile Delinquency, SOC 405 Program Planning and Evaluation.

Applied Health Data Analytics Emphasis:

BUS 316 Total Quality in Healthcare, MATH 362 Statistical Methods II, MATH 465 Mathematical Statistics, MIS 344 Healthcare Info Systems Management, MIS 357 Information/Communication Systems-Healthcare, MIS 445 Legal/Ethical/Social Issues in Healthcare Technology, PSY 339 Biopsychology, SOC 405 Program Planning and Evaluation, WRI 123 Research Writing, WRI 227 Technical Report Writing, WRI 410 Proposal and Grant Writing.

Total credits required for B.S. in Population Health Management: 181

Oregon Transfer Module (OTM)

The Oregon Transfer Module (OTM) provides a one-year curriculum for students who plan to transfer to a State of Oregon community college or university. The module allows students to complete one year of general education foundation course work that is academically sound and will meet the admission standards of the receiving school. Students should work closely with an academic advisor to ensure selection of appropriate course work. Upon transfer, students may be required to complete additional course work in general education or an academic major specific to the receiving institution. Students who transfer prior to the completion of the Oregon Transfer Module will have their courses individually evaluated by the receiving institution. Students must complete a minimum of 45 credits of lower division course work with a grade of “C-” or better in order to receive credit for the Oregon Transfer Module. A minimum of 12 credits must be earned at Oregon Tech. The following courses may be used to complete the Oregon Transfer Module:

FOUNDATIONAL SKILLS

Writing and Oral Communication

Writing

Two courses of college level composition

Oral Communication

One course of Public Speaking or Communication

Mathematics

One course of College level Math

INTRODUCTION TO DISCIPLINES

Arts and Letters/Humanities

3 courses of Arts and letters/Humanities

Oregon Tech only allows 3 credits of performance or studio-based courses in this category

Science/Math/Computer Science

3 courses, including at least one biological or physical science with a laboratory

Social Science

3 courses of Social Science

Management Department

Hallie Neupert, *Department Chair, Program Director, Health Care Management, and Curriculum Coordinator, Entrepreneurship/Small Business Management and Marketing*

Richard Bailey, *Curriculum Coordinator, Accounting*

Jeff Dickson, *Program Director and Curriculum Coordinator, Health Informatics*

Carmen Morgan, *Program Director, Accounting, Entrepreneurship/Small Business Management and Marketing*

Pat Schaeffer, *Program Director and Curriculum Coordinator, Operations Management*

Kris Rosenberg, *Program Director and Curriculum Coordinator, Information Technology*

Maureen Sevigny, *Program Director, Management Distance Education, Program Director and Curriculum Coordinator, BAS Technology and Management*

Professors: R. Bailey, H. Neupert, M. Sevigny

Associate Professors: G. Kirby, C. Morgan, M. Pierce, P. Schaeffer

Assistant Professors: M. Ahalt, S. Bailey, S. Beaudry, D. DaSaro, J. Dickson, J. Jackson, K. Rosenberg, K. Weidman

Degrees Offered

Bachelor of Science in Health Care Management, with options in:
Administration
Clinical
Radiologic Science Management

Bachelor of Science in Health Informatics

Bachelor of Science in Information Technology

Bachelor of Science in Management, with options in:
Accounting
Entrepreneurship and Small Business
Management
Marketing

Bachelor of Science in Operations Management

Bachelor of Applied Science in Technology and Management

Minors Offered

Business
International Business
Information Technology

Specializations Offered

Accounting
Entrepreneurship/Small Business Management
Marketing
Travel and Tourism

Certificate Offered

Accounting (post baccalaureate)

Emphasis Offered

Six Sigma Green Belt Certification
Renewable Energy Management Emphasis

The Management Department prepares students to take their place as leaders and managers in contemporary public and private organizations. Faculty members have been selected for their managerial experience and expertise in a diverse array of production and service industries.

Coursework in the Management programs builds upon a fundamental core of courses including management, marketing, accounting, finance, information systems, economics, ethics, organizational behavior, business law and business presentations. These courses, along with program-specific courses, prepare students for their senior year which includes a senior experience and a capstone course. The senior experience provides management students with an opportunity to integrate their educational experience in the context of a "real world" business problem or project.

As a result of this unique combination of resources and coursework, the Management Degree Programs remain vital and up-to-date, providing students with both the technical tools of management and the interpersonal skills that employers most desire. Equally important, each graduate will be ready to perform as an effective citizen in a culturally diverse, global work place.

Department Outcomes

Upon graduating, Management Department graduates should be able to:

1. Explain the major concepts in the func-

tion of accounting, marketing, finance and management.

2. Evaluate the legal, social and economic environments of business.
3. Describe the global environment of business.
4. Describe and explain the ethical obligations and responsibilities of business.
5. Apply decision-support tools to business decision making.
6. Construct and present effective oral and written forms of professional communication.
7. Apply knowledge of business concepts and functions in an integrated manner.
8. Use management processes in an applied organization or business situation.

Degree Completion and Co-enrollment at Community Colleges

The Management Department has worked with many Oregon community colleges to develop Joint Enrollment, Transfer Credit (Articulation) Agreements and course sequences so that students may complete a degree with coursework taken from multiple institutions. See the general education requirements section of this catalog, the Oregon Tech Registrar's Office's website, or a management advisor for additional information.

Oregon Tech Online

Many of the management degrees and core management courses are available online to facilitate the needs of degree completion students. Online courses are particularly appropriate for students capable of self-directed educational activities. Online degrees and courses are offered utilizing Internet delivery and collaborative learning. Degrees available online are: BS in Health Care Management, Clinical Option, Radiologic Sciences Management Option; BS in Operations Management; BS in Health Informatics; BS in Information Technology, Applications Development Option, and Business/Systems Analysis Option; BAS in Technology and Management.

Required Student Equipment

Successful completion of these degrees requires intensive, hands-on use of computers. Therefore, all students are required to own

their own computer. Financial aid may be available to help defray the cost of this equipment. Please consult the Financial Aid Office at Oregon Tech.

Accreditation

Oregon Tech has received specialized accreditation for its business programs through the International Assembly for Collegiate Business Education (IACBE).

Program Note

Students graduating with a Management Department degree are required to take a standardized exit exam in their last year.

Health Care Management

Degree Offered

Bachelor of Science in Health Care Management with options in:

- Administration
- Clinical
- Radiologic Science Management

The Health Care Management degree fully prepares students to assume managerial and supervisory positions in the healthcare industry. Health care managers plan, direct, and coordinate medical and health services. They might manage an entire facility, a specific clinical area or department, or a medical practice for a group of providers. Oregon Tech's Health Care Management degree includes three options to meet the student's specific needs and interests.

Bachelor of Science in Health Care Management, Administration Option

Administration Option

This program offers a BS in Health Care Management to students whose interests lie in business and health care administration. The curriculum is designed to prepare the graduate for entry- and mid-level management positions and/or preparation to enter a Master's program in Health Care Administration, Hospital Administration or Public Health. Based on a core of common management courses, the program builds a broader base of understanding of the health care system in the U.S. and its systems, policies and challenges. Students choosing the Administration option also complete a Medical Sociology minor as part of their studies. During their senior year, students will complete a capstone project or internship.

The BS degree in Health Care Management, Administration Option is offered in Klamath Falls.

Student Preparation and Admissions

Students must meet the standard Oregon Tech admissions requirements. Transfer students must arrange for official transcripts from each college and university attended to be sent to Oregon Tech.

Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall	Junior Year		Fall
BIO 200	Medical Terminology	2	ACC 325	Finance	4
BUS 101	Introduction to Business	3	BUS 308	International Business	3
MATH 111	College Algebra	4	BUS/ACC/MGT	Elective	3
PSY 201	Psychology	3	MGT 321	Operations Management	3
WRI 121	English Composition	3	PSY 336	Health Psychology	3
Total		15	Total		16
Freshman Year		Winter	Junior Year		Winter
BUS 223	Marketing I	3	BUS 349	Human Resource Management I	3
Or			COM 346	Health Communication	3
BUS 337	Principles of Health Care Marketing		PHIL 331	Ethics in the Professions	3
ECO 201	Principles of Economics, Microeconomics 3		Or		
MIS 102	Spreadsheets	1	PHIL 342	Business Ethics	3
SPE 111	Public Speaking	3	SOC 325	Global Population Health	3
WRI 122	Argumentative Writing	3	STAT 414	Epidemiology	4
Total		13	Total		16
Freshman Year		Spring	Junior Year		Spring
ECO 202	Principles of Economics, Macroeconomics	3	BUS 356	Business Presentations	4
SOC 204	Intro to Sociology	3	BUS 397	Human Resource Mgmt II3	
SPE 321	Small Group & Team Communication	3	BUS 495	Senior Project Proposal	1
WRI 227	Technical Report Writing	3	MGT 335	Project Management	3
	Elective	3	SOC 335	Health Inequality & Cultural Competency	3
Total		15	Humanities Elective		3
			Total		17
Sophomore Year		Fall	Senior Year		Fall
ACC 201	Principles of Accounting I	4	BUS 441	Leadership I	3
BUS 313	Health Care Systems and Policy	3	BUS 457	Research Methods	3
BIO 231	Human Anatomy and Physiology I	4	BUS 467	Service Management	3
Or			BUS 496	Senior Project	2
BIO 103	Introduction to Human Anatomy & Physiology		Or		
MIS 113	Introduction to Database Systems	3	BUS 420	Applied Management Internship	
Total		14	MIS 345	Health Care Information Systems Management	3
			Total		14
Sophomore Year		Winter	Senior Year		Winter
BUS 256	Business Communication	3	BUS 442	Leadership II	3
BUS 316	Total Quality in Health Care	3	BUS 497	Senior Project	3
COM 205	Intercultural Communication	3	Elective		3
MATH 361	Statistical Methods I	4	Elective		3
	Humanities Elective	3	Elective		3
Total		16	Total		15
Sophomore Year		Spring	Senior Year		Spring
ACC 203	Principles of Managerial Accounting	4	BUS 478	Strategic Management	3
BUS 317	Health Care Management	3	PSY 347	Organizational Behavior	3
SOC 225	Medical Sociology	3	WRI 410	Proposal and Grant Writing	3
Elective		3	Elective		3
Elective		3	Elective		3
Total		16	Total		15

Total credits required for B.S.in Health Care Management: Administration Option: 182

Bachelor of Science in Health Care Management, Clinical Option

Clinical Option

This program bridges two disciplines; Allied Health and Management. The clinical option requires a current state and/or national registry, license or certificate in an approved allied health field. The degree prepares Allied Health professionals for advancement to management or supervisory roles. During their senior year, students will complete a capstone project or internship.

The BS degree in Health Care Management, Clinical Option is offered in Klamath Falls and online.

Student Preparation and Admissions

To be eligible for admission to the Health Care Management, Clinical Option, students must meet the following criteria:

1. Meet the Oregon Tech general admissions requirements.
2. Provide documentation of a current state and/or national registry, license, or certificate in an approved allied health field.

Each prospective student's academic credits and registry, license, or certificate will be individually evaluated to determine transferability and acceptability of the coursework.

Curriculum

Required courses and recommended terms during which they should be taken:

Prior Learning		
Registry Transfer Credits		44

Sophomore Year		Fall
ACC 201	Principles of Accounting I	4
BIO 231	Human Anatomy and Physiology I	4
SPE 111	Public Speaking	3
WRI 121	English Composition	3
Total		14

Sophomore Year		Winter
BIO 232	Human Anatomy and Physiology II	4
MATH 111	College Algebra	4
MIS 102	Spreadsheets Lab	1
WRI 122	Argumentative Writing	3
	Elective	3
Total		15

Sophomore Year		Spring
ACC 203	Principles of Managerial Accounting	4
BIO 233	Human Anatomy and Physiology III	4
BUS 226	Business Law	3
BUS 317	Health Care Management	3
WRI 227	Technical Report Writing	3
Total		17

Junior Year		Fall
ACC 325	Finance	4
BUS 308	International Business	3
BUS 313	Health Care Systems and Policy	3
MIS 113	Introduction to Database Systems	3
PSY 201	Psychology	3
Total		16

Junior Year		Winter
BIO 200	Medical Terminology	2
BUS 349	Human Resource Management I	3
ECO 201	Principles of Economics, Microeconomics	3
MATH 243	Introductory Statistics	
Or		
MATH 361	Statistical Methods I	4
PHIL 331	Ethics in the Professions	
Or		
PHIL 342	Business Ethics	3
Total		15

Junior Year		Spring
BUS 356	Business Presentations	4
BUS 223	Marketing I	3
Or		
BUS 337	Principles of Health Care Marketing	
BUS 495	Senior Project Proposal	1
COM 205	Intercultural Communication	3
ECO 202	Principles of Economics, Macroeconomics	3
SPE 321	Small Group & Team Communication	3
Total		17

Senior Year		Fall
BUS 441	Leadership I	3
BUS 457	Research Methods	3
BUS 467	Service Management	3
BUS 496	Senior Project	2
Or		
BUS 420	Applied Management Internship	
MIS 345	Health Care Information Systems Management	3
Total		14

Senior Year		Winter
BUS 316	Total Quality in Health Care	3
BUS 497	Senior Project	3
	Upper Division Elective	3
	Humanities Elective	3
	Elective	3
Total		15

Senior Year		Spring
BUS 478	Strategic Management	3
PSY 347	Organizational Behavior	3
WRI 410	Proposal and Grant Writing	3
	Upper Division Elective	3
	Humanities Elective	3
Total		15

**Total credits required for B.S. in Health
Care Management: Clinical Option: 182**

Radiologic Science Management Option

This program offers a BS in Health Care Management to students who hold a current registry through the American Registry of Radiologic Technologists (ARRT) and who wish to enhance their career by obtaining a management degree with emphasis on management of a medical imaging facility or department. It is designed for the radiologic technologist seeking skills and credentials that enable advancement to positions of middle management. During their senior year, students will complete a capstone project or internship.

The BS degree in Health Care Management, Radiologic Science Management Option is fully online with no requirement to come to campus and does not require clinical practice involving patient contact.

Student Preparation and Admissions

Students must be registered through the ARRT and be in good standing. Students must meet the standard Oregon Tech admissions requirements. Transfer students must arrange for official transcripts from each college and university attended to be sent to Oregon Tech.

Curriculum

This curriculum map is arranged in the typical term by term format; however, online degree completion students should consult with their academic advisor regarding course scheduling.

Prior Learning

Registry Transfer Credits	89
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Sophomore Year

	Fall
ACC 201 Principles of Accounting I	4
MIS 113 Introduction to Database Systems	3
SPE 111 Public Speaking	3
WRI 121 English Composition	3
Total	13

Sophomore Year

	Winter
BIO 200 Medical Terminology	2
MATH 111 College Algebra	4
MIS 102 Spreadsheets Lab	1
SPE 321 Small Group & Team Comm.	3
WRI 122 Argumentative Writing	3
Total	13

Sophomore Year

	Spring
ACC 203 Principles of Managerial Accounting	4
BUS 223 Principles of Marketing	3
Or	
BUS 337 Health Care Marketing	
ECO 201 Principles of Economics, Micro	3
WRI 227 Technical Report Writing	3
Total	13

Junior Year

	Fall
ACC 325 Finance	4
BIO 231 Human Anatomy and Physiology I	4
Or	
BIO 103 Introduction to Human Anatomy & Physiology	
BUS 313 Health Care Systems and Policy	3
MATH 243 Introductory Statistics	
Or	
MATH 361 Statistical Methods I	4
Total	15

Junior Year

	Winter
ECO 202 Principles of Economics, Macro	3
PSY 201/202/203 Psychology	3
Math/Science Elective	4
Humanities Elective	3
Total	13

Junior Year

	Spring
BUS 226 Business Law	3
BUS 317 Health Care Management	3
BUS 356 Business Presentations	4
BUS 495 Senior Project Proposal	1
Business Elective*	3
Total	14

Senior Year

	Fall
BUS 308 International Business	3
BUS 457 Research Methods	3
BUS 496 Senior Project	2
Or	
BUS 420 Applied Management Internship	
MIS 345 Health Care Information Systems Management	3
Total	11

Senior Year

	Winter
BUS 316 Total Quality in Health Care	3
BUS 497 Senior Project	3
PHIL 331 Ethics in the Professions	
Or	
PHIL 342 Business Ethics	3
PSY 347 Organizational Behavior	3
Total	12

Senior Year

	Spring
BUS 478 Strategic Management	3
RDSC 365 Advanced Quality Assurance/Quality Control	3
WRI 410 Proposal and Grant Writing	3
Humanities Elective	3
Total	12

* Any ACC, BUS, MGT, MIS course which is not required in your program and as approved by your advisor.

Total credits required for B.S. in Health Care Management: Radiologic Science Option: 205

Health Informatics

Degree Offered

Bachelor of Science in Health Informatics

Objectives

The field of Health Informatics is encapsulated in the combination of biology, computer science and information science. This program evaluates the sub disciplines of clinical and computational informatics; emphasizing the integration of computer science and the impact of clinical outcomes.

The BS in Health Informatics is offered in Klamath Falls, Wilsonville and through Oregon Tech Online.

Career Opportunities

Health Informatics professionals work in operational and management positions throughout the healthcare industry in such locales as hospitals, clinics, managed care, software vendors and government agencies. Health Informatics professionals are called upon to design and use emerging information technologies with the goal of helping providers and patients access and utilize information to provide improved health care.

Health Informatics professionals provide support in clinical decision making, data architecture, application interfacing, clinical analytics, data analysis, systems analysis and project management.

Student Preparation and Admissions

Students must meet the standard Oregon Tech admissions requirements. Transfer students must arrange for official transcripts from each college and university attended to be sent to Oregon Tech.

Bachelor of Science in Health Informatics Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall	Junior Year		Fall
MATH 111	College Algebra	4	ACC 325	Finance	4
MIS 255	Health Informatics Concepts and Practices	3	BUS 313	Health Care Systems and Policy	3
SPE 111	Public Speaking	3	MIS 312	Systems Analysis I	4
WRI 121	English Composition Elective	3	MIS 334	Business Analytics	4
Total		16	Total		15
Freshman Year		Winter	Junior Year		Winter
BIO 200	Medical Terminology	2	BUS 356	Business Presentations	4
ECO 201	Principles of Economics, Microeconomics	3	MIS 322	Systems Analysis II	4
MIS 102	Spreadsheet Software Laboratory	1	MIS 341	Relational Database Design I	4
MIS 256	Hardware/Software Integration	4	SOC 305	Rural Heal	3
WRI 122	Argumentative Writing Humanities Elective	3	OR		
Total		16	SOC 325	Global Population Health	
Freshman Year		Spring	Total		15
BUS 317	Health Care Management	3	Junior Year		Spring
ECO 202	Principles of Economics, Microeconomics	3	BUS 316	Total Quality in Health Care	3
MIS 251	Networking I	4	MIS 344	Business Intelligence	3
MIS 275	Introduction to Relational Databases	3	MIS 442	Advanced Database Application Programming	4
MIS 311	Introduction to Systems Analysis	3	MIS 495	Senior Project Selection	1
Total		16	SPE 321	Small Group & Team Communication	3
Sophomore Year		Fall	Total		14
ACC 201	Principles of Accounting I	4	Senior Year		Fall
MATH 361	Statistical Methods I	4	BUS 457	Business Research Methods II	3
MIS 118	Programming Fundamentals	4	MIS 345	Health Care Info Systems Management	3
WRI 227	Technical Report Writing	3	MIS 445	Legal, Ethical & Social Issues in Health Care Technology	3
Total		15	MIS 496	Senior Project Management Humanities Elective	3
Sophomore Year		Winter	Total		15
MATH 362	Statistical Methods II	4	Senior Year		Winter
MIS 218	Database Programming	4	ANTH 452	Globalization	3
MIS 357	Information and Communication Systems in Health Care	3	MIS 446	Data Mining	3
PHIL 331	Ethics in the Professions	3	MIS 497	Senior Project II Humanities Elective	3
OR			STAT 414	Statistical Methods in Epidemiology Elective	4
PHIL 342	Business Ethics		Total		16
SOC 225	Medical Sociology	3	Senior Year		Spring
Total		17	BUS 478	Strategic Management	3
Sophomore Year		Spring	MIS 498	Senior Project III	3
ACC 203	Principles of Managerial Accounting	4	PSY 347	Organizational Behavior	3
BIO 103	Introduction to Human Anatomy	4	WRI 410	Proposal and Grant Writing	3
BUS 223	Marketing I		Total		12
or			Total credits required for B.S. in Health Informatics: 181		
BUS 337	Principles of Health Care Marketing	3			
MGT 335	Project Management	3			
Total		14			

Information Technology

Degree Offered

Bachelor of Science in Information Technology

Objectives

The Bachelor of Science in Information Technology with its three options offers a challenging, state-of-the-art education for those interested in learning the dynamic and growing field of information technology. The field is interdisciplinary, with applications to all aspects of the economy. Graduating students are prepared to bridge the technology and management disciplines in their organizations. Core business disciplines taught include analytical skills and problem solving, business organization and management, project management, leadership, teams, and communications. In addition to the core business disciplines students choose an information technology focus in one of four options: applications development, business/systems analysis, health informatics or accounting. Each option is designed to produce graduates with the competencies necessary to succeed in the workplace or pursue further graduate level education.

Career Opportunities

The Oregon Tech Information Technology degree with three options prepares students for a wide range of professions including accounting information systems, database administration, systems analyst, business systems consultant, network analyst, software applications specialist, PC support technician, technical writer, Web administrator and as vendor representatives for both hardware and software firms. Information Technology graduates are currently employed at firms including Consolidated Freightways, Hewlett-Packard, Microsoft and Intel. Through a combination of technical skills and business understanding, Information Technology graduates are uniquely prepared for faster advancement than many of their contemporaries.

Graduation Requirements

Graduation requirements for the Bachelor of Science Degree in Information Technology include 181 credit hours.

Bachelor of Science in Information Technology Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall	Junior Year		Fall
MATH 111	College Algebra	4	ACC 325	Finance	4
SPE 111	Public Speaking	3	BUS 356	Business Presentations	4
WRI 121	English Composition	3	MIS 312	Systems Analysis I	4
	Laboratory Science Elective	4		Focused Sequence Elective*	4
Total		14	Total		16
Freshman Year		Winter	Junior Year		Winter
ECO 201	Principles of Economics, Microeconomics	3	MIS 322	Systems Analysis II	4
MIS 102	Spreadsheet Software Laboratory	1	MIS 341	Relational Database Design I	4
MIS 145	Intro. To PC Hardware/Software	4	WRI 350	Documentation Development	3
WRI 122	Argumentative Writing	3		Focused Sequence Elective*	4
	Humanities Elective	3	Total		15
Total		14	Junior Year		Spring
Freshman Year		Spring	BUS 226	Business Law	3
BUS 215	Principles of Management	3	MIS 495	Senior Project Proposal	1
ECO 202	Principles of Economics, Macroeconomics	3		Focused Sequence Elective*	3
MIS 251	Networking I	4		Focused Sequence Elective*	4
MIS 275	Introduction to Relational Databases	3		Focused Sequence Elective*	4
MIS 311	Introduction to Systems Analysis	3	Total		15
Total		16	Senior Year		Fall
Sophomore Year		Fall	BUS 457	Business Research Methods II	3
ACC 201	Principles of Accounting I	4	MGT 461	Lean/Six Sigma Management I	3
MIS 118	Programming Fundamentals	4	MIS 496	Senior Project Management	3
MIS 273	Systems Administration I	4	PSY 347	Organizational Behavior	3
WRI 227	Technical Report Writing	3		Humanities Elective	3
Total		15	Total		15
Sophomore Year		Winter	Senior Year		Winter
BUS 223	Marketing I	3	ANTH 452	Globalization	3
MATH 361	Statistical Methods I	4	MIS 497	Senior Project II	3
MIS 218	Database Programming	4	PHIL 331	Ethics in the Professions	3
SPE 321	Small Group and Team Communications	3	OR		
	Elective	3	PHIL 342	Business Ethics	
Total		17		Elective	3
Sophomore Year		Spring		Focused Sequence Elective*	4
ACC 203	Principles of Managerial Accounting	4	Total		16
MATH 362	Statistical Methods II	4	Senior Year		Spring
MGT 335	Project Management	3	BUS 478	Strategic Management	3
PSY 201	General Psychology	3	MIS 498	Senior Project III	3
Total		14		Focused Sequence Elective*	4
				Focused Sequence Elective*	4
			Total		14

*Students must choose, in consultation with their advisor, a minimum of 31 credits of focused upper division Electives.

Total credits required for B.S. in Information Technology: 181

Management

Degree Offered

Bachelor of Science in Management, with options in:
Accounting
Entrepreneurship/Small Business
Management
Marketing

Objectives

The Management degree prepares leaders to manage organizations in the high technology environments of the 21st century. Students develop their abilities to contribute to an organization's performance through hands-on experience built on a solid theoretical base. The Management curriculum skillfully integrates a solid core of business/management courses with the unique benefits of one of the country's leading institutes of technology. Students will also be prepared for graduate level education, such as the Master's in Business Administration (MBA) degree.

Career Opportunities

The Management Department is known for producing "user-friendly" graduates.

Recruiters from industry and government agencies regularly visit the campus in search of Management Department bachelor degree candidates. Initial job titles include staff accountant, cost analyst, business unit manager, supervisor, marketing specialist, and sales manager.

Graduation Requirements

Graduation requirements for the Bachelor of Science degree in Management include 181 credit hours for the Entrepreneurship/Small Business Management option, the Marketing option, and the Accounting option.

Bachelor of Science in Management, Accounting Option Accounting Option

The accounting option is designed to prepare students for careers in public or private accounting. Students become familiar with computerized accounting applications and skilled in the principles of tax, financial, and cost accounting. Upon graduation students selecting this option should have sufficient knowledge to sit for the Certified Public Accountant (CPA) and the Certified Management Accountant (CMA) exams.

Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall	Junior Year		Fall
MATH 111	College Algebra	4	ACC 331	Intermediate Accounting I	4
PSY 201	Psychology	3	BUS 308	Principles of International Business	3
WRI 121	English Composition	3	BUS 356	Business Presentations	4
	Humanities Elective	3	MIS 312	Systems Analysis I	4
	Laboratory Science Elective	4	Total		15
Total		17			
Freshman Year		Winter	Junior Year		Winter
BUS 215	Principles of Management	3	ACC 320	Cost Accounting I	4
ECON 201	Principles of Economics, Microeconomics	3	ACC 325	Finance	4
MIS 102	Spreadsheet Software Laboratory	1	ACC 332	Intermediate Accounting II	4
SPE 111	Public Speaking	3	WRI 327	Advanced Technical Writing	3
WRI 122	Argumentative Writing Elective	3	Total		15
Total		16			
Freshman Year		Spring	Junior Year		Spring
ECO 202	Principles of Economics, Macroeconomics	3	ACC 321	Cost Accounting II	4
MIS 275	Introduction to Relational Databases	3	ACC 333	Intermediate Accounting III	4
SPE 321	Small Group and Team Communication	3	ACC 405	Accounting Information Systems Elective	4
	Humanities Elective	3	Total		15
	Elective	3			
Total		15			
Sophomore Year		Fall	Senior Year		Fall
ACC 201	Principles of Accounting I	4	ACC 411	Income Tax Procedures	4
MATH 361	Statistical Methods I	4	ACC 435	Auditing	4
MIS 311	Introduction to Systems Analysis	3	ACC 496	Senior Project	3
WRI 227	Technical Report Writing	3		Elective	3
Total		14	Total		14
Sophomore Year		Winter	Senior Year		Winter
ACC 202	Principles of Accounting II	4	ACC 412	Corporate Taxation	4
BUS 223	Marketing I	3	ACC 431	Advanced Accounting I	4
MATH 371	Finite Mathematics and Calculus I	4	ACC 497	Senior Project Elective	3
PHIL 331	Ethics in the Professions	3		Elective	3
Or			Total		17
PHIL 342	Business Ethics				
Total		14			
Sophomore Year		Spring	Senior Year		Spring
ACC 203	Principles of Managerial Accounting	4	ACC 432	Advanced Accounting II	4
ACC 205	Computerized Accounting	3	BUS 478	Strategic Management	3
BUS 226	Business Law	3	PSY 347	Organizational Behavior Elective	3
MIS 375	Decision Support Systems Elective	3	Total		13
Total		16			

Total credits required for B.S. in Management, Accounting Option: 181

Bachelor of Science in Management, Entrepreneurship/ Small Business Management Option

Entrepreneurship/Small Business Management Option

Students selecting the entrepreneurship/small business management option will equip themselves to be managers with complete understanding of all aspects of a business - either a small business or a business unit manager in a larger business. The focus is on the unique demands placed on this type of manager. Skills in writing business plans, starting and operating a business, cash flow management, costing and pricing products and global opportunities are emphasized and developed.

Curriculum

Required courses and recommended terms during which they should be taken:

<u>Freshman Year</u>		<u>Fall</u>	<u>Junior Year</u>		<u>Fall</u>
BUS 101	Introduction to Business	3	BUS 314	Entrepreneurship I	3
MATH 111	College Algebra	4	BUS 356	Business Presentations	4
PSY 201	Psychology	3	BUS 467	Service Management	3
WRI 121	English Composition	3	MGT 321	Operations Management I	3
	Laboratory Science Elective	4	MIS 375	Decision Support Systems	3
Total		17	Total		16
<u>Freshman Year</u>		<u>Winter</u>	<u>Junior Year</u>		<u>Winter</u>
BUS 215	Principles of Management	3	ACC 245	Payroll Accounting	3
ECO 201	Principles of Economics, Microeconomics	3	ACC 325	Finance	4
MIS 102	Spreadsheet Software Laboratory	1	BUS 226	Business Law	3
SPE 111	Public Speaking	3	BUS 335	Entrepreneurship II	3
WRI 122	Argumentative Writing Elective	3		Communication Elective	3
Total		16	Total		16
<u>Freshman Year</u>		<u>Spring</u>	<u>Junior Year</u>		<u>Spring</u>
ECO 202	Principles of Economics, Macroeconomics	3	ACC 205	Computerized Accounting	3
MIS 206	Introduction to Management Information Systems	3	BUS 456	Business Research Methods	3
SPE 321	Small Group and Team Communication	3	BUS 495	Senior Project Proposal	1
WRI 227	Technical Report Writing Humanities Elective	3	MGT 335	Project Management Elective Elective	3 3 3
Total		15	Total		16
<u>Sophomore Year</u>		<u>Fall</u>	<u>Senior Year</u>		<u>Fall</u>
ACC 201	Principles of Accounting I	4	BUS 308	Principles of International Business	3
BUS 223	Marketing I	3	BUS 420	Applied Management Internship or	
MATH 361	Statistical Methods I	4	BUS 496	Senior Project	2
MIS 113	Introduction to Database Systems	3	BUS 441	Leadership I	3
Total		14	PSY 347	Organizational Behavior Humanities Elective	3 3
<u>Sophomore Year</u>		<u>Winter</u>	Total		14
BUS 256	Business Communication	3	<u>Senior Year</u>		<u>Winter</u>
BUS 318	Marketing II	3	ANTH 452	Globalization	3
BUS 349	Human Resource Management I	3	BUS 447	Controversial Issues in Management	3
MATH 371	Finite Mathematics and Calculus I	4	BUS 497	Senior Project Elective Elective	3 3 3
PHIL 331	Ethics in the Professions or		Total		15
PHIL 342	Business Ethics	3	<u>Senior Year</u>		<u>Spring</u>
Total		16	BUS 434	Global Marketing	3
<u>Sophomore Year</u>		<u>Spring</u>	BUS 442	Leadership II	3
ACC 203	Principles of Managerial Accounting	4	BUS 478	Strategic Management Elective	3 3
BUS 397	Human Resource Management II	3	Total		12
MIS 225	Business on the Internet Elective	4 3	Total credits required for B.S.in Management, Entrepreneurship/Small Business Option: 181		
Total		14			

Bachelor of Science in Management, Marketing Option

Marketing Option

The marketing option provides students with a broad background in business management with a strong emphasis in modern marketing concepts and practices. Marketing graduates enjoy careers in management, advertising, research, consulting, distribution, sales and entrepreneurial enterprises. This program provides students with core management courses, in-depth business computer applications, detailed marketing courses, experience on individual and team projects, and preparation for entry into a master's program.

Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
BUS 101	Introduction to Business	3
MATH 111	College Algebra	4
PSY 201	Psychology	3
WRI 121	English Composition	3
	Laboratory Science Elective	4
Total		17

Freshman Year		Winter
BUS 215	Principles of Management	3
ECO 201	Principles of Economics, Microeconomics	3
MIS 102	Spreadsheet Software Laboratory	1
SPE 111	Public Speaking	3
WRI 122	Argumentative Writing	3
	Elective	3
Total		16

Freshman Year		Spring
ECO 202	Principles of Economics, Macroeconomics	3
MIS 206	Introduction to Management Information Systems	3
SPE 321	Small Group and Team Communication	3
WRI 227	Technical Report Writing	3
	Humanities Elective	3
Total		15

Sophomore Year		Fall
ACC 201	Principles of Accounting I	4
BUS 223	Marketing I	3
MATH 361	Statistical Methods I	4
MIS 113	Introduction to Database Systems	3
Total		14

Sophomore Year		Winter
BUS 256	Business Communication	3
BUS 318	Marketing II	3
BUS 349	Human Resource Management I	3
MATH 371	Finite Mathematics and Calculus I	4
PHIL 331	Ethics in the Professions	
or		
PHIL 342	Business Ethics	3
Total		16

Sophomore Year		Spring
ACC 203	Principles of Managerial Accounting	4
BUS 397	Human Resource Management II	3
MIS 225	Business on the Internet	4
	Elective	3
Total		14

Junior Year		Fall
BUS 319	Integrated Marketing Communication	3
BUS 356	Business Presentations	4
BUS 467	Service Management	3
MGT 321	Operations Management	3
MIS 375	Decision Support Systems	3
Total		16

Junior Year		Winter
ACC 325	Finance	4
BUS 226	Business Law	3
BUS 326	Sales and Sales Management	3
	Communication Elective	3
	Elective	3
Total		16

Junior Year		Spring
BUS 435	Marketing III	3
BUS 456	Business Research Methods	3
BUS 473	Marketing Plan Development	3
BUS 495	Senior Project Proposal	1
MGT 335	Project Management	3
	Elective	3
Total		16

Senior Year		Fall
BUS 308	Principles of International Business	3
BUS 420	Applied Management Internship	
or		
BUS 496	Senior Project	2
BUS 441	Leadership I	3
PSY 347	Organizational Behavior	3
	Humanities Elective	3
Total		14

Senior Year		Winter
ANTH 452	Globalization	3
BUS 447	Controversial Issues in Management	3
BUS 497	Senior Project	3
	Elective	3
	Elective	3
Total		15

Senior Year		Spring
BUS 434	Global Marketing	3
BUS 442	Leadership II	3
BUS 478	Strategic Management	3
	Elective	3
Total		12

Total credits required for B.S. in Management, Marketing Option: 181

Operations Management

Degree Offered

Bachelor of Science in Operations Management

Objectives

Operations Management is concerned with the oversight and coordination of equipment, materials, human capital and information required of a business operation to profitably deliver goods and services to the customers it serves. It involves the responsibility of ensuring operations are efficient and effective in terms of meeting and exceeding customer requirements. Operations Managers successfully blend the art of management with applied science through creativity, people skills, rational analysis and application of technology.

The Bachelor of Science in Operations Management degree program prepares students for leadership positions within a wide variety of product and service industries. Students selecting Operations Management develop mastery of concepts, tools, and skills in management sciences and specialties tailored to the industries of interest to the student upon graduation. Particular emphasis is directed toward development of skills in problem solving, project management, communication, and managing effectively in team-based work environments. Students are also prepared for graduate level education, such as the MBA (Master's in Business Administration) degree. The BS in Operations Management is offered in Klamath Falls, Wilsonville and online.

Career Opportunities

Recruiters from industry and government agencies regularly visit the campus in search of bachelor's degree candidates in operations management. Initial job titles include: production planner, inventory control analyst, industrial engineer, production supervisor, and quality control manager. Typical departments in which graduates find themselves working are manufacturing, manufacturing engineering, industrial engineering, production control, finance, and quality assurance.

Students selecting the Operations Management degree will equip themselves to be managers in the challenging environment of modern manufacturing and service industries. Upon graduation they should be prepared to address critical issues related to

productivity management in a global competitive economy and play leadership roles in the design and implementation of quality control and management programs. They will have mastered a wide array of microcomputer technology and software applications, giving them a competitive edge in the job market.

Graduation Requirements

Graduation requirements for the Bachelor of Science degree in Operations Management includes 180 credit hours.

Bachelor of Science in Operations Management

Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year			Fall			Junior Year			Fall		
BUS 215	Principles of Management	3	ACC 325	Finance	4	BUS 457	Business Research Methods II	3	MGT 321	Operations Management I	3
PSY 201	Psychology	3	MGT 461	Lean/Six Sigma Management I	3						
WRI 121	English Composition	3		Elective	3						
	Humanities Elective	3									
	Elective	3									
Total		15	Total		16						
Freshman Year			Winter			Junior Year			Winter		
MATH 111	College Algebra	4	MGT 322	Operations Management II	3	MGT 462	Lean/Six Sigma Management II	3	WRI 327	Advanced Technical Writing	3
MIS 102	Spreadsheet Software Laboratory	1				BUS 349	Human Resource Management I	3		Elective	3
SPE 111	Public Speaking	3									
WRI 122	Argumentative Writing	3									
	Elective	3									
Total		14	Total		15						
Freshman Year			Spring			Junior Year			Spring		
BUS 223	Marketing I	3	BUS 495	Senior Project Proposal	1	MGT 323	Operations Management III	3	MGT 335	Project Management	3
ECO 201	Principles of Economics, Microeconomics	3				MGT 463	Lean/Six Sigma Management III	3	MIS 375	Decision Support Systems	3
MIS 206	Introduction to Management Information Systems	3					Elective	3			
WRI 227	Technical Report Writing	3									
	Humanities Elective	3									
Total		15	Total		16						
Sophomore Year			Fall			Senior Year			Fall		
ACC 201	Principles of Accounting I	4	BUS 420	Applied Management Internship		BUS 496	Senior Project	2	BUS 441	Leadership I	3
MATH 361	Statistical Methods I	4		or			Laboratory Science Elective	4	BUS 467	Service Management	3
MIS 113	Introduction to Database Systems	3				MGT 421	Quality Management	3			
	Elective	3									
	Elective	3									
Total		17	Total		15						
Sophomore Year			Winter			Senior Year			Winter		
BUS 226	Business Law	3	ANTH 452	Globalization		PSCI 326	World Politics in Transition	3	BUS 497	Senior Project	3
ECO 202	Principles of Economics, Macroeconomics	3		or		BUS 422	Materials Management	3	PHIL 331	Ethics in the Professions	3
MATH 371	Finite Mathematics and Calculus I	4				PSY 347	Organizational Behavior	3			
	Elective	3									
	Elective	3									
Total		16	Total		15						
Sophomore Year			Spring			Senior Year			Spring		
ACC 203	Principles of Managerial Accounting	4	BUS 478	Strategic Management	3	MGT 423	Logistics Management	3		Elective	3
BUS 356	Business Presentations	4					Elective	3			
BUS 456	Business Research Methods	3					Elective	3			
SPE 321	Small Group and Team Communication	3									
Total		14	Total		12						

Total credits required for B.S. in Operations Management: 180

Technology and Management

Degree Offered

Bachelor of Applied Science in Technology and Management

Objectives

The Bachelor of Applied Science (BAS) in Technology and Management degree is designed specifically for students who have completed a technical Associate of Applied Science (AAS) or Associate of Science (AS) degree from an accredited institution recognized by the Council for Higher Education and are seeking career advancement into management or in their technical career fields. The BAS builds on a core of 60 credits of career and technical education (CTE) courses taken as part of the AAS or AS degree, adding 65 credits of business, management, and information technology courses and 55 credits of broad-based general education courses to enable the BAS graduate to advance in the workplace or continue on to graduate school. The management core includes a two-term capstone senior project to enable the student to demonstrate successful integration of technical and managerial coursework. The BAS in Technology and Management is offered in Klamath Falls, Wilsonville, and online.

Graduation Requirements

The BAS in Technology and Management requires 180 credits including 60 upper division credits and up to 60 lower-division career and technical education (CTE) credits transferred from an AAS or AS degree. In addition, the BAS includes 55 general education credits including 18 credits in communication, 12 credits of social science, 9 credits in humanities and 16 credits of math and science including 4 credits of mathematics with a prerequisite of intermediate algebra or higher and 4 credits of laboratory science.

Bachelor of Applied Science in Technology and Management Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year

Up to 60 Career Technical Elective credits

Sophomore Year		Winter
ACC 201	Principles of Accounting I	4
BUS 215	Principles of Management	
or		
BUS 304	Engineering Management	
or		
BUS 317	Health Care Management	3
ECO 201	Principles of Economics, Microeconomics	3
MATH 111	College Algebra	4
WRI 121	English Composition	3
Total		17

Sophomore Year		Spring
ACC 203	Principles of Managerial Accounting	4
ECO 202	Principles of Economics, Macroeconomics	3
MIS 206	Introduction to Management Information Systems	3
SPE 111	Public Speaking	3
WRI 122	Argumentative Writing	3
Total		16

Junior Year		Fall
MGT 321	Operations Management I	3
MGT 461	Lean/Six Sigma Management I	3
MIS 275	Introduction to Relational Databases	3
Or		
MIS 113	Introduction to Database Systems	
WRI 227	Technical Report Writing	3
MATH 361	Statistical Methods I	4
Total		16

Junior Year		Winter
ACC 325	Finance	4
BUS 349	Human Resource Management I	3
MIS 102	Spreadsheet Software Laboratory	1
PHIL 331	Ethics in the Professions	
or		
PHIL 342	Business Ethics	3
	Technical Elective (upper-division)*	3
Total		14

Junior Year		Spring
BUS 223	Marketing I	3
BUS 356	Business Presentations	4
BUS 495	Senior Project Proposal	1
MGT 335	Project Management	3
	Laboratory Science	4
Total		15
Senior Year		Fall
BUS 441	Leadership I	3
BUS 457	Business Research Methods II	3
BUS 467	Service Management	3
BUS 496	Senior Project	2
SPE 321	Small Group and Team Communication	3
Total		14

Senior Year		Winter
ANTH 452	Globalization	3
BUS 497	Senior Project	3
PSY 347	Organizational Behavior	3
	Humanities Elective	3
	Math/Science Elective	4
Total		16

Senior Year		Spring
BUS 226	Business Law	3
BUS 478	Strategic Management	3
WRI 327	Advanced Technical Writing	3
	Humanities Elective	3
Total		12

* Technical Electives include upper-division courses in ACC, BUS, MGT, MIS, GIS, or PSY.

Note: The BAS degree specifies 60 upper-division credits. Students transferring in lower-division course equivalents do not receive upper-division credit and may be required to take upper-division electives to meet the minimum 60 credits of upper-division credits required for the BAS degree.

Total credits required for B.A.S. in Technology and Management: 180

Business Minor

The Minor in Business recognizes the achievement of 23 credits in business courses, some of which can be related to the student's chosen profession. Some of the courses may be included in the student's requirements for a bachelor's degree from Oregon Tech. The Minor in Business may prove valuable to a technical student who ventures into management or consulting in his or her career field. It may enhance employability and improve graduate school possibilities. This minor is open to all majors except those in the Management Department.

Requirements of Minor:

ACC 201	Principles of Accounting I	4
ACC 203	Principles of Managerial Accounting	4
BUS 215	Principles of Management	3
or		
BUS 304	Engineering Management	3
or		
BUS 317	Health Care Management	3
BUS 223	Marketing I	3
PSY 347	Organizational Behavior	3

And two courses chosen from upper-division BUS or MGT courses not on the required list, or MIS 311 or PSY 410.

A passing grade and a cumulative GPA of 2.0 or better in the business minor courses is required. Students are encouraged to consult with a Management Department advisor to select business courses that would be most applicable to their major and/or career goals.

Information Technology Minor

The Information Technology (IT) Minor recognizes the achievement of 29/30 credits in technical courses. Some of the courses may be included in the student's requirements for a bachelor's degree from Oregon Tech. The IT minor may prove valuable to management or technical students who want to demonstrate that they have additional skills in management information systems and information technology areas. It may enhance employability and improve graduate school possibilities. The minor is open to all majors except IT and HI.

Requirements of Minor:

MIS 118	Programming Fundamentals or Programming Elective	4
MIS 218	Database Programming or Programming Elective	4
MIS 275	Introduction to Relational Databases	3

MIS 311	Introduction to Systems Analysis	3
MIS 312	Systems Analysis I	4
MIS 341	Relational Database Design I	4
MIS 442	Advanced Database Application Programming	4
MIS 322	Systems Analysis II or	
BUS 344	Business Intelligence	4/3

International Business Minor

The Minor in International Business recognizes the achievement of 22 credits in international courses. The Minor in International Business may prove valuable to a technical student who ventures into management or consulting in his or her career field. It may enhance employability and improve graduate school possibilities. This minor is open to all majors and is especially recommended for students with an interest in management and/or global affairs.

Requirements of Minor:

BUS 308	Principles of International Business	3
BUS 387	International Human Resource Management	
or		
PSCI 326	World Politics in Transition	
or		
PSCI 497	United States Foreign Policy	3
BUS 434	Global Marketing	3
COM 205	Intercultural Communication	3
ECO 367	International Economics and Finance Management	4
MIS 311	Introduction to Systems Analysis	3
PSCI 250	Introduction to World Politics	3
Total		22

Suggested Social Science Electives

GEOG 106	Cultural Geography I	3
HIST 103	History of Western Civilization	3
PSCI 326	World Politics in Transitions	3
PSCI 497	United States Foreign Policy	3

Suggested Open Electives

COM 320	Advanced Intercultural Communication	3
	Any foreign language sequence	4-4-4

Suggested Humanities Electives

	Any second year foreign language sequence	4-4-4
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Strongly Recommended

	Study Abroad Program—	
	1 semester/2 terms	4-4-4

A passing grade in all courses and a cumulative GPA of 2.0 or better is required to be awarded the minor. Students are encouraged to consult with a Management Department advisor to schedule courses.

Specialization Programs

Oregon Tech offers four specializations as a complement to the three Bachelor of Science degree options in Management. These are Accounting, Entrepreneurship and Small Business Management, Marketing, and Travel and Tourism. The courses in the Accounting, Entrepreneurship and Small Business Management, and Marketing specializations have been selected from the curricular content of the three corresponding degree options. The courses in the Travel and Tourism specialization have been developed specifically for this specialization. They are online courses offered by the Department of Management through Oregon Tech Online.

Accounting

Oregon Tech's specialization in Accounting prepares the student for a wide range of accounting related positions in modern technological industries, financial institutions and other service-oriented businesses. The program includes training in computer software essential to accounting functions. This hands-on exposure can qualify the student for work in many high technology industries which utilize computer accounting applications.

Required Courses

ACC 201	Principles of Accounting I	4
ACC 202	Principles of Accounting II	4
ACC 203	Principles of Managerial Accounting	4
ACC 205	Computerized Accounting	3
MIS 102	Spreadsheet Software Laboratory	1

Entrepreneurship and Small Business Management

Oregon Tech's specialization in Entrepreneurship/Small Business Management provides the student with foundational skills and background in business management emphasizing entrepreneurship. The student should learn skills needed to start a business successfully, gain the knowledge required to run small businesses, and develop the entrepreneurship skills to make big companies run like small companies.

Required Courses

BUS 215	Principles of Management	3
BUS 223	Marketing I	3
BUS 314	Entrepreneurship I	3

BUS 335	Entrepreneurship II	3
BUS 434	Global Marketing	3
BUS 447	Controversial Issues in Management	3

Marketing

Oregon Tech's specialization in Marketing provides the student with a foundational background in business management with an emphasis in modern marketing concepts and practices. Upon completion, the student should be better qualified for a career in management, advertising, consulting, distribution or sales.

Required Courses

BUS 215	Principles of Management	3
BUS 223	Marketing I	3
BUS 318	Marketing II	3
BUS 319	Integrated Marketing Communication	3
BUS 326	Sales and Sales Management	3

Travel and Tourism

Oregon Tech's 15 credit online specialization in Travel and Tourism provides students with a broad foundational background in the hospitality and tourism industries. The information contained in these courses is important for anyone interested in learning more about the travel industry or who likes to travel. This specialization also gives students the knowledge necessary to obtain entry level positions in the hospitality and tourism industries.

Required Courses

BUS 309	Introduction to Tourism	3
BUS 347	Geography of Travel and Tourism	3
BUS 350	Hospitality Management	3
BUS 358	Marketing for Hospitality and Tourism	3
or		
BUS 399	Marketing Special Topics: Marketing Tourism	3
BUS 385	Ecotourism	3

Six Sigma Green Belt Emphasis

The Management Department offers students the opportunity to earn a Six Sigma Green Belt Certificate. The Green Belt Certificate is an emphasis under the Bachelor of Science in Management, Entrepreneurship/Small Business Management option, Management, Marketing option or the Operations Management degree program. In addition to the fundamental management curriculum, the emphasis requires the completion of a Lean/Six Sigma project. Those attaining the

emphasis will be well-positioned to work in companies that deploy Lean Six Sigma.

Additionally, employees of companies that deploy Lean Six Sigma may complete the course work and project to obtain their certificate.

Students completing the Six Sigma Green Belt Emphasis must complete the following courses and their prerequisites. Prerequisites may be waived for industry students depending on their individual backgrounds and abilities.

BUS 457	Business Research Methods II	3
BUS 496	Senior Project	3
BUS 497	Senior Project	3
MGT 335	Project Management	3
MGT 461	Lean/Six Sigma Management I	3
MGT 462	Lean/Six Sigma Management II	3
MGT 463	Lean/Six Sigma Management III	3

It should be noted that for OM majors, all of these courses are currently in the curriculum map. No additional coursework is required. With approval, the student's senior project may also be considered for the Six Sigma Green Belt Certificate.

Renewable Energy Management Emphasis

The Management Department offers students the opportunity to complete a Renewable Energy Management emphasis under the Bachelor of Science in Management, Entrepreneurship/Small Business Management option or the Operations Management degree program. In addition to the fundamental management curriculum, the emphasis requires additional coursework in chemistry, management information systems, humanities, history, economics and management. Those attaining the emphasis will be prepared to successfully integrate skills in the social, environmental, economic, business and management aspects of energy management.

Requirement of Emphasis

CHE 201	General Chemistry I	3
CHE 204	General Chemistry I Laboratory	1
or		
PHY 201	General Physics	4
ECO 357	Energy Economics and Policy	3
HIST 356	A History of Energy	3
HUM 125	Introduction to Technology, Society and Values	3
MATH 112	Trigonometry	4

MIS 115	Visual BASIC Programming	4
MGT 212	Fundamentals of Renewable Energy Management	3
REE 201	Introduction to Renewable Energy	3

Post Baccalaureate Certificate in Accounting

This certificate is available to students who have a baccalaureate degree and are continuing their education in accounting. Completion of the certificate will allow students to meet the requirements for admission to the Certified Public Accountant (CPA) exam and prepare them for a variety of career paths including CPA and Certified Management Accountant (CMA).

Required Courses (32 credits)

ACC 320	Cost Accounting I	4
ACC 331	Intermediate Accounting I	4
ACC 332	Intermediate Accounting II	4
ACC 333	Intermediate Accounting III	4
ACC 405	Accounting Information Systems	4
ACC 411	Income Tax Procedures	4
ACC 431	Advanced Accounting I	4
ACC 435	Auditing	4

Elective Courses (Choose at least 15 credits from the following courses)

ACC 321	Cost Accounting II	4
ACC 325	Finance	4
ACC 412	Corporate Taxation	4
ACC 432	Advanced Accounting II	4
ACC 465	Case Studies in Accounting	4
BUS 226	Business Law	3
BUS 345	Fraud Examination	3
MIS 312	Systems Analysis I	4

Note: At least 36 credits must be taken at Oregon Tech

Manufacturing and Mechanical Engineering and Technology Department

Jeffrey Hayen, *Department Chair*

Steve Edgeman, *Program Director, Undergraduate Manufacturing Engineering Technology*

Joe Stuart, *Program Director, Graduate Manufacturing Engineering Technology*

John-Glen Swanson, *Program Director, Mechanical Engineering*

David Culler, *Program Director, Mechanical Engineering Technology*

Wangping Sun, *Program Director, Wilsonville Programs*

Brian Moravec, *Interim Program Director, Seattle-Boeing Programs*

Professors: D. Culler, N. Mead, B. Moravec, R. Shih, L. Wolf

Associate Professors: I. Demeshko-Prosnik, Y. Gao, J. Hayen, J. Stuart, W. Sun

Assistant Professors: S. Edgeman, D. Lee, S. Sloan, J-G. Swanson

Degrees Offered

Master of Science in Manufacturing Engineering Technology

Bachelor of Science in Manufacturing Engineering Technology

Bachelor of Science in Mechanical Engineering

Bachelor of Science in Mechanical Engineering Technology

Manufacturing Engineering Technology

Degrees Offered

Master of Science in Manufacturing Engineering Technology

Bachelor of Science in Manufacturing Engineering Technology

Program Mission Statement

The Manufacturing Engineering Technology Program at Oregon Institute of Technology is an applied engineering technology program. Its mission is to provide graduates with the skills and knowledge for successful careers in Manufacturing Engineering Technology.

Program Educational Objectives

Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve. The Program Educational Objectives of Oregon Tech's Manufacturing Engineering Technology Program are to produce graduates who:

- are able to analyze and design practical mechanical and manufacturing systems.
- communicate effectively and work well on team-based engineering projects.
- succeed in entry-level manufacturing engineering positions.
- pursue continued professional development.

Career Opportunities

Manufacturing Engineering graduates will find a wide range of opportunities for employment in manufacturing design, research and development, testing, educational institutions, consulting and business. Manufacturing Engineering Technology also prepares students for further study in graduate school. In today's engineering environment, manufacturing engineers are often called upon to perform a wide range of tasks, from designing and purchasing manufacturing equipment to improving and troubleshooting the manufacturing process. Manufacturing engineers are involved in the design and continuous improvement of products, manufacturing equipment and production tooling. The Manufacturing Engineering curriculum provides education in a variety of areas including manufacturing process, robotics and automation, industrial controls, manufacturing tool design, computer aided design and manufacturing, engineering materials, manufacturing planning and quality control. Technical Electives allow the student flexibility in developing technical breadth or focus in their areas of interest.

Bachelor Program Objectives

The objective of the Manufacturing Engineering Technology undergraduate program is to offer the student a quality education that provides the greatest possible oppor-

tunity for rewarding and successful careers. This includes practical training and technical education in engineering, manufacturing processes, and manufacturing equipment as well as supplemental coursework in communications, mathematics, science, social science, and business.

Master Program Objectives

The objective of the graduate program in Manufacturing Engineering Technology is to offer students an advanced level of education that will help them to be successful in their professional career. This includes the theoretical and practical training in manufacturing systems, design for manufacturability, development of lean enterprise, quality engineering, computer-aided manufacturing, project management and information systems. The master's degree is also available online to students meeting the admission requirements for the program. There are no residency requirements for this degree. The same degree requirements apply to the online program.

Student Preparation

Students planning to enter the Manufacturing Engineering Technology Program are strongly encouraged to take mathematics and science training in high school. In addition, courses such as drafting, CAD, computer skills, and industrial arts will prove beneficial.

Cooperative Education Program

Students in the bachelor of science degree program have an opportunity to work in industry for a specified time and receive college credit. They are encouraged to meet with the Manufacturing Engineering Technology Undergraduate Program Director. MFG students have the opportunity to participate in the state-wide MECOP internship program. For information, see the following Web site: <https://mecopinc.org>.

Accreditation

The Bachelor of Science in Manufacturing Engineering Technology is accredited by the Engineering Technology Accreditation Commission (ETAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

Degree Requirements— Master of Science

The Master of Science in Manufacturing Engineering Technology requires completing 45 credit hours of graduate work, with at least 30 credit hours of graduate coursework from the following four Curriculum Content Areas (CCAs):

1. Engineering Science and Design Technology
2. Manufacturing Software and Computer Integration
3. Advanced Manufacturing Materials and Processes Technology
4. Business, Financial and Management Processes

In addition to the 30 CCA credit hours, students must complete 12 credits toward thesis or 9 credits toward an approved project and three credits in graduate seminars. Students must take at least one course in each of the four CCAs and three courses in at least one CCA. All graduate courses are three credits each. See Master's student advisor to complete an academic plan.

Degree Requirements

The Bachelor of Science in Manufacturing Engineering Technology requires completing 192 credit hours, as prescribed in the following curriculum outline. Several of these courses are titled manufacturing elective, and allow the student some flexibility to pursue specific career objectives within the manu-

facturing engineering field. Upper-division manufacturing engineering technology courses not specifically required for graduation, as well as selected upper-division mechanical engineering technology courses and other approved courses, may be used as manufacturing electives. Students should contact their advisor for specific details as to which courses qualify as manufacturing electives. In order to satisfy the engineering science elective, the student must complete one of the following courses: Engineering Mechanics: Dynamics (ENGR 212), Fluid Mechanics (MET 218), or Thermodynamics (ENGR 355). In order to satisfy the business/management restricted elective the student must complete one of the following courses: BUS 226, BUS 304, BUS 335, MGT 321, MGT 461, or MGT 462.

Bachelor of Science in Manufacturing Engineering Technology Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
ENGR 111	MMET Orientation	2
MATH 111	College Algebra	4
WRI 121	English Composition	3
	Humanities/Social Science Elective ¹	3
	Humanities/Social Science Elective ¹	3
Total		15

Freshman Year		Winter
CHE 101	Introduction to General Chemistry	3
CHE 104	Introduction to General Chemistry Laboratory	1
MATH 112	Trigonometry	4
MET 241	CAD for Mechanical Design I	2
MFG 120	Manufacturing Processes I	4
WRI 122	Argumentative Writing	3
Total		17

Freshman Year		Spring
MATH 251	Differential Calculus	4
MET 242	CAD for Mechanical Design II	2
MFG 103	Introductory Welding Processes	3
SPE 111	Public Speaking	3
	Humanities/Social Science Elective ¹	3
Total		15

Sophomore Year		Fall
MATH 252	Integral Calculus	4
MET 160	Engineering Materials I	3
MFG 314	Geometric Dimensioning and Tolerancing	3
PHY 201/221	General Physics	4
	Humanities/Social Science Elective ¹	3
Total		17

Sophomore Year		Winter
ENGR 211	Engineering Mechanics: Statics ²	4
MATH 361	Statistical Methods I	4
MFG 112	Introduction to Manufacturing Processes	3
PHY 202/222	General Physics	4
Total		15

Sophomore Year		Spring
ENGR 213	Engineering Mechanics: Strength of Materials ²	4
ENGR 236	Fundamentals of Electric Circuits	3
ENGR 266	Engineering Computation	3
MATH 362	Statistical Methods II	4
WRI 227	Technical Report Writing	3
Total		17

Junior Year **Fall**

MET 315	Machine Design I	3
MET 360	Engineering Materials II	3
MET 375	Solid Modeling	3
MFG 313	Manufacturing Analysis and Planning	3
MFG 341	Numerical Control Programming	3
Total		15

Junior Year **Winter**

MET 316	Machine Design II	3
MET 326	Electric Power Systems	3
MFG 333	Statistical Methods for Quality Improvement	3
MFG 342	Computer Aided Machining	3
MFG 343	Manufacturing Tool Design	3
	Humanities/Social Science Elective ¹	3
Total		18

Junior Year **Spring**

MFG 331	Industrial Controls	3
MFG 344	Design of Manufacturing Tooling	3
SPE 321	Small Group and Team Communication	3
	Engineering Science Elective ³	3
	Project Management Requirement ⁴	3
Total		15

Senior Year **Fall**

ANTH 452	Globalization	3
MFG 453	Automation and Robotics in Manufacturing	3
MFG 454	Thermal Systems for Manufacturing	3
MFG 461	Senior Project I	3
WRI 327	Advanced Technical Writing	3
	MFG Elective ⁵	3
Total		18

Senior Year **Winter**

MFG 462	Senior Project II	3
	BUS/MGT Restricted Elective ⁶	3
	Humanities/Social Science Elective ¹	3
	MFG Elective ⁵	3
	MFG Elective ⁵	3
Total		15

Senior Year **Spring**

ENGT 415	Occupational Safety	3
MFG 447	Lean Manufacturing	3
MFG 463	Senior Project III	3
MGT 345	Engineering Economy	3
	MFG Elective ⁵	3
Total		15

- 1 – Select 9 credits of Humanities electives and 9 credits of Social Science electives. ANTH 452 fulfills the remaining credits needed to satisfy the 12 credits of Social Science courses for the Baccalaureate general education requirements.
- 2 – ENGT 230, 231, 232 may be alternatively taken (as an entire sequence) to satisfy the ENGR 211 and 213 requirements.
- 3 – Select **one** course from the following list: ENGR 212 (Dynamics), ENGR 355 (Thermodynamics), or MET 218 (Fluid Mechanics).
- 4 – Select either ENGR 445 (Engineering Project Management) or MGT 335 (Project Management).
- 5 – Consult with an academic advisor or program director regarding available and appropriate MFG elective courses. MECH and MET electives **are also** acceptable.
- 6 – Select **one** course from the following list: BUS 226, 304, or 335; MGT 321, 461, or 462.

Total credits required for B.S. in Manufacturing Engineering Technology: 192**Concurrent Degree**

The Mechanical and Manufacturing Engineering Technology Department provides the opportunity for the interested student to earn concurrent degrees in Manufacturing Engineering Technology (MFG) and Mechanical Engineering Technology (MET) or Mechanical Engineering (MECH). Students who earn both degrees are highly sought after and have been very successful in industry. The concurrent degree program usually requires the student to complete an additional year of study beyond the Bachelor's Degree in Mechanical Engineering or Mechanical Engineering Technology.

Fall

MFG 313	Manufacturing Analysis and Planning	3
MFG 341	Numerical Control Programming	3
MFG 453	Automation and Robotics in Manufacturing	3
	BUS/MGT Restricted Elective*	3
	Manufacturing Elective***	3
Total		15

Winter

MFG 112	Introduction to Manufacturing Processes**	3
MFG 333	Statistical Methods for Quality Improvement	3
MFG 342	Computer Aided Machining	3
MFG 343	Manufacturing Tool Design	3
	BUS/MGT Restricted Elective*	3
	Manufacturing Elective***	3
Total		18

Spring

ENGT 415	Occupational Safety	3
MFG 344	Design of Manufacturing Tooling	3
MFG 447	Lean Manufacturing	3
MATH 362	Statistical Methods II	4
Total		13

* Restricted Elective from the following courses: BUS 226, BUS 304, BUS 335, MGT 321, MGT 461 or MGT 462.

** This course is already required for the BSMET degree.

*** These courses must be different than those used to satisfy the BS degree in MET or MECH. In all cases the student must have at least 36 credits of additional coursework beyond the MET or MECH degree to qualify for the concurrent degree in MFG.

Mechanical Engineering

Degree Offered

Bachelor of Science in Mechanical Engineering

Program Mission Statement

The Mechanical Engineering Program at Oregon Institute of Technology is an applied engineering program. Its mission is to provide graduates the skills and knowledge for successful careers in mechanical engineering.

Program Educational Objectives

Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing alumni to achieve.

The program expects graduates to achieve, within several years of graduation, the following objectives. Mechanical Engineering graduates will have:

- demonstrated the ability to analyze, design and improve practical thermal and/or mechanical systems.
- shown the ability to communicate effectively and work well on team-based engineering projects.
- succeeded in entry-level mechanical engineering positions regionally and nationally.
- pursued continued professional development, including professional registration, if desired.
- successfully pursued engineering graduate studies and research, if desired.

Career Opportunities

Mechanical Engineering is the broadest branch of engineering providing graduates the ability to pursue many varied career paths. It encompasses a wide variety of specialties including alternative energy, mechanical design, thermal/fluids/heat transfer, and mechatronics to name a few. Graduates will find a wide range of opportunities for employment in design, research and development, testing, manufacturing, government agencies, educational institutions, consulting and business. The Mechanical Engineering degree also prepares the student for further study in graduate school.

Objectives of the Program

The Mechanical Engineering Program at Oregon Institute of Technology provides an

excellent theoretical and applied or hands on engineering education. The program provides graduates with a foundation in fundamentals, applications, design, project management, communications, and professional and ethical responsibility.

The program offers coursework in all of the above areas beginning with mathematics, science, machining, welding, and computer aided design topics in the freshman year. Engineering science and physics courses are typically taken by the student in the sophomore year. Junior and senior curriculum is devoted to analysis, design, and testing aspects of mechanical engineering. Technical electives are available for students to pursue their particular fields of interest.

Throughout the four-year curriculum, emphasis is placed on oral and written communication skills, teamwork and cooperation, and hands on laboratory and project work. Graduates are well-rounded engineers and readily accepted into industry or graduate programs.

Student Preparation

Students planning to enter the Mechanical Engineering curriculum should undertake Mathematics/science training in high school. Such courses as algebra, trigonometry, calculus, physics, chemistry, drafting, CAD, writing, speech, and shop classes will prove beneficial.

Cooperative Field Experience

There is an opportunity for students in the Bachelor of Science degree program to work in industry for a specified time and receive college credit. Those interested in such an opportunity are encouraged to work out the details with the Mechanical Engineering Program Director. Mechanical Engineering students have the opportunity to participate in the state-wide MECOP internship program. For information, see the following Web site: <https://mecopinc.org>.

Accreditation

The Mechanical Engineering Program is accredited by the Engineering Accreditation Commission (EAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education.

Fall

MFG 313	Manufacturing Analysis and Planning	3
MFG 341	Numerical Control Programming	3
MFG 453	Automation and Robotics in Manufacturing	3
	BUS/MGT Restricted elective*	3
	Manufacturing elective***	3
Total		15

Winter

MFG 112	Introduction to Manufacturing Processes**	3
MFG 333	Statistical Methods for Quality Improvement	3
MFG 342	Computer Aided Machining	3
MFG 343	Manufacturing Tool Design	3
	BUS/MGT Restricted elective*	3
	Manufacturing elective*	3
Total		18

Spring

ENGT 415	Occupational Safety	3
MFG 344	Design of Manufacturing Tooling	3
MFG 447	Lean Manufacturing	3
MATH 362	Statistical Methods II	4
Total		13

* Restricted elective from the following courses: BUS 226, BUS 304, BUS 335, MGT 321, MGT 461 or MGT 462.

** This course is already required for the BSMET degree.

*** These courses must be different than those used to satisfy the BS degree in MET or MECH. In all cases the student must have at least 36 credits of additional coursework beyond the MET or MECH degree to qualify for the concurrent degree in MFG.

Degree Requirements

In the curriculum listings appear several courses titled “MECH Elective.” MECH electives allow the student to select and pursue specific career objectives within the mechanical engineering field. MECH electives are upper-division MECH courses, not specifically required for graduation.

Students from other institutions should refer to the sections of this catalog titled “Transfer Students” and “Admission to Baccalaureate Programs.”

The Bachelor of Science in Mechanical Engineering requires 192 credit hours as prescribed in the following curriculum outline.

Bachelor of Science in Mechanical Engineering Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall	Junior Year		Winter
CHE 201	General Chemistry I	3	ENGR 212	Engineering Mechanics: Dynamics	3
CHE 204	General Chemistry I Laboratory	1	ENGR 355	Thermodynamics	3
ENGR 111	MMET Orientation	2	MECH 315	Machine Design I	3
WRI 121	English Composition	3	MECH 360	Engineering Materials II	3
	Humanities/Social Science Elective ¹	3	MET 326	Electric Power Systems	3
	College Algebra (if suggested by advisor) ²	3	SPE 321	Small Group and Team Communication ³	3
Total		12	Total		18
Freshman Year		Winter	Junior Year		Spring
CHE 202	General Chemistry II	3	HUM 125	Introduction to Technology, Society and Values	3
CHE 205	General Chemistry II Laboratory	1	MATH 451	Numerical Methods I	4
MFG 103	Introductory Welding Processes	3	MECH 313	Thermodynamics II	3
WRI 122	Argumentative Writing	3	MECH 316	Machine Design II	3
	Humanities/Social Science Elective ¹	3		MECH Elective ⁴	3
	Trigonometry (if suggested by advisor) ²	3	Total		16
Total		13			
Freshman Year		Spring	Senior Year		Fall
MATH 251	Differential Calculus	4	MECH 323	Heat Transfer I	3
MFG 120	Manufacturing Processes I	4	MECH 351	Finite Element Analysis	3
MET 160	Engineering Materials I	3	MECH 490	Senior Projects I	3
MET 241	CAD for Mechanical Design I	2	WRI 327	Advanced Technical Writing	3
SPE 111	Public Speaking	3		Fluid Mechanics II Requirement ⁵	3
Total		16		MECH Elective ⁴	3
			Total		18
Sophomore Year		Fall	Senior Year		Winter
MATH 252	Integral Calculus	4	MECH 437	Heat Transfer II	2
MET 242	CAD for Mechanical Design II	2	MECH 480	Mechanical Vibrations	3
PHY 221	General Physics with Calculus	4	MECH 491	Senior Projects II	3
WRI 227	Technical Report Writing	3	PHIL 331	Ethics in the Professions	3
	Economics Elective	3		Humanities/Social Science Elective ¹	3
Total		16		MECH Elective ⁴	3
			Total		17
Sophomore Year		Winter	Senior Year		Spring
ENGR 211	Engineering Mechanics: Statics	4	MGT 345	Engineering Economy	3
MATH 254N	Vector Calculus I	4	MECH 436	Classical Control Systems	3
	Statistics Requirement ³	4	MECH 492	Senior Projects III	3
PHY 222	General Physics with Calculus	4		Humanities/Social Science Elective ¹	3
Total		16		MECH Elective ⁴	3
			Total		15
Sophomore Year		Spring			
ENGR 213	Engineering Mechanics: Strength of Materials	4			
ENGR 236	Fundamentals of Electric Circuits	3			
ENGR 266	Engineering Computation	3			
MATH 321	Applied Differential Equations I	4			
PHY 223	General Physics with Calculus	4			
Total		18			
Junior Year		Fall			
MATH 341	Linear Algebra I	4			
MECH 318	Fluid Mechanics I	4			
MECH 363	Engineering Instrumentation	3			
MET 375	Solid Modeling	3			
MFG 314	Geometric Dimensioning and Tolerancing	3			
Total		17			

Total Credits Required for B.S. in Mechanical Engineering: 192

1 – Along with HUM 125, PHIL 331, and an Economics course, another 3 credits of Humanities courses and 9 credits of Social Science courses. Furthermore, activity or performance-based Humanities courses are not accepted.

2 – MATH 111 (College Algebra) and MATH 112 (Trigonometry) should be taken if needed to adequately prepare for MATH 251. Any credits earned from these courses do not apply to the degree program. Consult with an academic advisor for further guidance.

3 – Select either MATH 361 (Statistical Methods I) or MATH 465 (Mathematical Statistics). MATH 465 is required for students who are pursuing a minor field of study in Applied Mathematics.

4 – Consult with an academic advisor or program director regarding available and appropriate MECH elective courses. MET and MFG electives are not acceptable.

5 – Select either MECH 417 or MECH 418, depending upon which course is currently offered.

Mechanical Engineering Technology

Degree Offered

Bachelor of Science in Mechanical Engineering Technology

Program Mission Statement

The Mechanical Engineering Technology Program at Oregon Institute of Technology is an applied engineering technology program. Its mission is to provide graduates with the skills and knowledge for successful careers in mechanical engineering and manufacturing.

Program Educational Objectives

Program educational objectives are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve. The Program Educational Objectives of Oregon Tech's Mechanical Engineering Technology Program

are to produce graduates who:

- are able to analyze and design practical mechanical systems.
- communicate effectively and work well on team-based engineering projects.
- succeed in entry-level mechanical and manufacturing engineering positions.
- pursue continued professional development.

Career Opportunities

Mechanical Engineering Technology graduates find a wide range of opportunities for employment in design, research and development, testing, manufacturing, government agencies, educational institutions, consulting and business. The largest number of graduates are employed by manufacturing firms. There, the graduates may develop new products, improve existing products, modify existing products for easier manufacture, or develop equipment for use in the production process. The work done by Mechanical Engineering Technologists varies widely. Interfacing computers and machines is a rapidly growing area of employment. This involvement with robotics and automation is having an impact on most mechanical systems. New materials such as high strength ceramics and polymers, fiber reinforced plastics, and new

bonding agents are growing in importance and their applications will offer many interesting and fulfilling careers. Energy systems become increasingly important as energy costs rise. Aerospace firms employ many Oregon Tech graduates in design, testing, and manufacturing. Careers in such traditional areas as power plants, heating and cooling systems, gas and steam turbines, and automotive systems are within the domain for the Mechanical Engineering Technologist.

Objectives of the Program

The objective of the Mechanical Engineering Technology Program is to ensure that graduates of this curriculum acquire competency in those theoretical, applied engineering and practical subjects necessary to become successful in their careers. The program strives to maintain a reputation for academic standards that will assure graduates a welcome by prospective employers.

Student Preparation

Students planning to enter the Mechanical Engineering Technology curriculum should undertake mathematics-science training in high school. Such courses as algebra, geometry, trigonometry, physics, chemistry, drafting, CAD, English, writing, speech, and shop classes will prove beneficial.

Cooperative Field Experience

There is an opportunity for students in the bachelor of science degree program to work in industry for a specified time and receive college credit. Those interested in such an opportunity are encouraged to work out the details with the Mechanical Engineering Technology program director. MET students have the opportunity to participate in the state-wide MECOP internship program. For information, see the following Web site: <https://mecopinc.org>.

Accreditation

The Mechanical Engineering Technology Program is accredited by the Engineering Technology Accreditation Commission (ETAC) of ABET, Inc., <http://www.abet.org>. ABET is a specialized accrediting board rec-

ognized by the Council for Higher Education and/ or the Secretary of the U.S. Department of Education.

Degree Requirements

In the curriculum listings appear several courses titled "MET Elective." MET electives allow the student to select and pursue specific career objectives within the mechanical engineering technology field. MET electives are upper-division MET courses, not specifically required for graduation.

Students from other institutions should refer to the sections of this catalog titled "Transfer Students" and "Admission to Baccalaureate Programs." The Bachelor of Science in Mechanical Engineering Technology requires 191 credit hours as prescribed in the following curriculum outline.

Bachelor of Science in Mechanical Engineering Technology

Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year	Fall	Junior Year	Winter
CHE 101/201 Chemistry	3	ENGR 212 Engineering Mechanics: Dynamics	3
CHE 104/204 Chemistry Laboratory	1	ENGR 355 Thermodynamics ³	3
ENGR 111 MMET Orientation	2	MET 316 Machine Design II	3
MATH 111 College Algebra	4	MET 375 Solid Modeling	3
WRI 121 English Composition	3	Social Science Elective	3
Psychology Elective ¹	3	Total	15
Total	16		
Freshman Year	Winter	Junior Year	Spring
MATH 112 Trigonometry	4	MATH 321 Applied Differential Equations I	4
MFG 103 Introductory Welding Processes	3	MET 313 Applied Thermodynamics	3
WRI 122 Argumentative Writing	3	MET 351 Finite Element Analysis	3
Humanities Elective	3	MFG 314 Geometric Dimensioning and Tolerancing	3
Social Science Elective	3	Project Management Requirement ⁴	3
Total	16	Total	16
Freshman Year	Spring	Senior Year	Fall
MATH 251 Differential Calculus	4	MET 323 Heat Transfer I	3
MFG 120 Manufacturing Processes I	4	MET 326 Electric Power Systems	3
SPE 111 Public Speaking	3	MET 490 Senior Projects I	3
Economics Elective	3	MGT 345 Engineering Economy	3
Humanities Elective	3	MET Elective ⁵	3
Total	17	Total	15
Sophomore Year	Fall	Senior Year	Winter
MATH 252 Integral Calculus	4	MET 426 Fluid Power Systems	3
MET 160 Engineering Materials I	3	MET 437 Heat Transfer II	2
MET 241 CAD for Mechanical Design I	2	MET 491 Senior Projects II	3
PHY 201/221 General Physics	4	WRI 327 Advanced Technical Writing	3
WRI 227 Technical Report Writing	3	MET Elective ⁵	3
Total	16	Social Science Elective	3
		Total	17
Sophomore Year	Winter	Senior Year	Spring
ENGR 211 Engineering Mechanics: Statics ²	4	MET 492 Senior Projects III	3
MATH 254N Vector Calculus I	4	MFG 331 Industrial Controls	3
MET 242 CAD for Mechanical Design II	2	Humanities Elective	3
MFG 112 Introduction to Manufacturing Processes	3	MET Elective ⁵	3
PHY 202/222 General Physics	4	MET Elective ⁵	3
Total	17	Total	15
Sophomore Year	Spring	Total credits required for B.S. in Mechanical Engineering Technology: 191	
ENGR 213 Engineering Mechanics: Strength of Materials ²	4	1 – PSY 201 is highly recommended.	
MATH 361 Statistical Methods I	4	2 – ENGT 230, 231, 232 may be alternatively taken (as an entire sequence) to satisfy the ENGR 211 and 213 requirements.	
MET 218 Fluid Mechanics	4	3 – MET 232 (when offered) may be alternatively taken to satisfy the ENGR 355 requirement.	
PHY 203/223 General Physics	4	4 – Select either ENGR 445 (Engineering Project Management) or MGT 335 (Project Management).	
Total	16	5 – Consult with an academic advisor or program director regarding available and appropriate MET elective courses. MECH and MFG electives are also acceptable.	
Junior Year	Fall		
ENGR 236 Fundamentals of Electric Circuits	3		
ENGR 266 Engineering Computation	3		
MET 315 Machine Design I	3		
MET 360 Engineering Materials II	3		
MET 363 Engineering Instrumentation	3		
Total	15		

Applied Mathematics Department

Tiernan Fogarty, Department Chair

Jim Ballard, Scheduling Coordinator

Randall Paul, Advising Coordinator and Program Director

Christina Negoita, Curriculum Coordinator

Professors: J. Fischer, C. Negoita, T. Thompson

Associate Professors: J. Ballard, T. Fogarty, R. Paul, T. Torres, G. Waterman

Assistant Professors: J. Reid, D. Deb, D. Hammond

General Education

Courses offered by the Department of Applied Mathematics are designed to satisfy the needs of majors and non-majors interested in mathematics primarily as part of a broad technical education. A major emphasis is on development of skills required to solve applied problems.

Success in mathematics requires that entering students begin their study in the course which best matches their ability and background. Accordingly, all entering students must pass a placement examination at the appropriate level before being allowed to register for their initial mathematics course.

Degree Offered

Bachelor of Science in Applied Mathematics

Minor Offered

Applied Mathematics
Applied Statistics

Program Objectives

Coursework for the bachelor's degree is intended to provide a solid foundation of mathematical theory and a broad selection of applied work both in and outside mathematics. The prospective major will complete coursework in calculus, differential equations and numerical methods. Students also take a sequence of introductory physics courses and a further sequence in a technical field outside mathematics.

Career Opportunities

Upon completing the requirements for the Applied Mathematics degree students will be prepared for a variety of jobs in indus-

try including numerical modeling, signal processing, data analysis, and many others. The degree also provides students a sufficient background to further their education by entering a Masters or Ph.D. program in Mathematics or Applied Mathematics.

Student Preparation

Students entering the Applied Mathematics Program from high school should have a minimum of two years of algebra, one year of pre-calculus, one year of geometry, and two years of physical science (physics or chemistry preferred). Additional courses in mathematics, science, English and computer programming will be very helpful. Students entering the Applied Mathematics Program by transfer are requested to contact the Mathematics Department concerning transfer of technical course work.

Degree Requirements

In addition to the mathematics requirements listed below, students will be required to complete the 200 level calculus-based general physics sequence as well as other general education requirements and Electives necessary to bring the total credit hours to 182. Please see the recommended curriculum map below.

All mathematics courses must be completed with a grade "C" or better. Transfer students should consult the Admissions Office and the Mathematics Department to determine which of their courses will satisfy Oregon Tech course requirements.

Lower-Division Required Courses (18 credits)

MATH 221 Introduction to Computational Software
MATH 251 - MATH 254N Calculus Sequence

Upper-Division Core Requirements (43 credits)

MATH 311 Introduction to Real Analysis
MATH 321-322 Applied Differential Equations I, II
MATH 327 Discrete Mathematics
MATH 341 Linear Algebra I
MATH 354 Vector Calculus II
MATH 361 Statistical Methods I
MATH 421 Applied Partial Differential Equations I
MATH 451 Numerical Methods I

Plus two additional courses chosen from:

MATH 422 Applied Partial Differential Equations II
MATH 423 Applied Partial Differential Equations III
MATH 452 Numerical Methods II
MATH 453 Numerical Methods III

Upper-Division Math/Physics Electives (At least 7 credits)

Students will choose 2 upper-level mathematics or physics courses with the approval of a mathematics advisor. No more than 3 credits can be MATH 407.

Focused Electives (16 credits)

Students will choose appropriate electives from outside of mathematics. These courses should support the program objectives and must be approved by a mathematics advisor. The focused electives must total at least 16 credits at least 9 of which are from a 3 course sequence; see below for examples.

Examples of Focused Electives Sequences

- CST 116, 126, 223 Programming Languages
- CHE 221, 222, 223 General Chemistry
- ENGR 211, 212, 213 Engineering Mechanics: Statics, Dynamics, Strength of Materials
- PHY 311, 312, 313 Introduction to Modern Physics

Examples of Focused Electives

- CHE 331, 332, 333 Organic Chemistry
- ENGR 318 Engineering Mechanics: Fluids
- ENGR 236 Fundamentals of Electric Circuits
- PSY 361 Industrial Psychology
- RDSC 356 Magnetic Resonance

Notes:

1. Some of the above courses have an additional lab requirement.
2. PHY 221, 222, 223 may not be used as focused electives.

Bachelor of Science in Applied Mathematics Curriculum

Required courses and recommended terms during which they should be taken:

<u>Freshman Year</u>		<u>Fall</u>	<u>Junior Year</u>		<u>Winter</u>
MATH 251	Differential Calculus	4	MATH 311	Introduction to Real Analysis	4
SPE 111	Public Speaking	3	WRI 227	Technical Report Writing	3
WRI 121	English Composition	3		Focused Elective*	3
	Social Science Elective	3		Elective (upper-division)	3
	Elective	3		Elective	3
Total		16	Total		16

<u>Freshman Year</u>		<u>Winter</u>	<u>Junior Year</u>		<u>Spring</u>
MATH 221	Introduction to Computational Software	2	MATH 322	Applied Differential Equations II	4
MATH 252	Integral Calculus	4	MATH 451	Numerical Methods I	4
PHY 221	General Physics with Calculus	4		Focused Elective*	3
WRI 122	Argumentative Writing	3		Math/Physics Elective **	3
	Social Science Elective	3		Elective	2
Total		16	Total		16

<u>Freshman Year</u>		<u>Spring</u>	<u>Senior Year</u>		<u>Fall</u>
MATH 253N	Sequences and Series	4	MATH 421	Applied Partial Differential Equations I	4
PHY 222	General Physics with Calculus	4		Focused Elective *	4
	Humanities Elective	3		Math/Physics Elective **	4
	Social Science Elective	3		Elective	3
Total		14	Total		15

<u>Sophomore Year</u>		<u>Fall</u>	<u>Senior Year</u>		<u>Winter</u>
MATH 254N	Vector Calculus I	4	MATH	Mathematics Core (upper-division) ***	4
MATH 327	Discrete Mathematics	4		Focused Elective *	3
PHY 223	General Physics with Calculus Elective	4		Social Science Elective	3
		3		Elective	3
		3		Elective	3
Total		15	Total		16

<u>Sophomore Year</u>		<u>Winter</u>	<u>Senior Year</u>		<u>Spring</u>
MATH 341	Linear Algebra I	4	MATH	Mathematics Core (upper-division) ***	4
MATH 354	Vector Calculus II	4		Focused Elective *	3
	Humanities Elective	3		Social Science Elective	3
	Elective	4		Elective	3
Total		15	Total		13

<u>Sophomore Year</u>		<u>Spring</u>	<u>Senior Year</u>		<u>Spring</u>
MATH 361	Statistical Methods I	4	MATH	Mathematics Core (upper-division) ***	4
	Humanities Elective	3	WRI 327	Advanced Technical Writing	3
	Elective	3	or		
	Elective	3	WRI 350	Documentation Development	3
	Elective	3		Elective	3
Total		16	Total		13

<u>Junior Year</u>		<u>Fall</u>	<u>Senior Year</u>		<u>Spring</u>
MATH 321	Applied Differential Equations I	4	MATH	Mathematics Core (upper-division) ***	4
SPE 321	Small Group and Team Communication	3	WRI 327	Advanced Technical Writing	3
	Focused Elective *	3	or		
	Elective (upper division)	4	WRI 350	Documentation Development	3
Total		14	Total		13

* Students will choose at least 16 credits from outside of mathematics with the approval of a mathematics advisor. At least 9 credits should be from a 3 course sequence. See above for examples.

** Students will choose 2 upper-division courses from mathematics or physics with the approval of a mathematics advisor.

*** See "Upper-Division Core Requirements" listed above in the degree requirements section. The years and terms that these courses are offered will vary. For questions about availability, please consult with an advisor or contact the Mathematics Department.

Total credits required for B.S. in Mathematics: 182

Applied Mathematics Minor

The minor in Applied Mathematics provides formal recognition of mathematical proficiency. It is composed of a core of required courses and upper-division electives related to the student's major. The minor consists of 29 credits, 19 from required courses and 10 from elective courses.

This minor is open to all majors and is especially recommended for students with an interest in pursuing a career related to mathematics. It will enhance their employability and improve graduate school possibilities.

Curriculum

1. Required courses: MATH 251, MATH 252, MATH 253N, MATH 254N and MATH 341, plus 10 additional upper-division mathematics credits selected from the list below.
2. A passing grade in all courses and a cumulative GPA of 2.0 or better is required to be awarded the minor.
3. At least 12 credits must be taken at Oregon Tech.

Students are required to consult an advisor from the Mathematics Department to select upper-division mathematics courses that would be most applicable to their major and/or career goals.

Upper-Division Electives:

MATH 311 Introduction to Real Analysis
 MATH 321 Applied Differential Equations I
 MATH 322 Applied Differential Equations II
 MATH 327 Discrete Mathematics
 MATH 342 Linear Algebra II
 MATH 346 Number Theory
 MATH 347 Fundamentals of Abstract Algebra
 MATH 354 Vector Calculus II
 MATH 362 Statistical Methods II
 MATH 421 Applied Partial Differential Equations I
 MATH 422 Applied Partial Differential Equations II
 MATH 423 Applied Partial Differential Equations III
 MATH 451 Numerical Methods I
 MATH 452 Numerical Methods II
 MATH 453 Numerical Methods III
 MATH 465 Mathematical Statistics

Note: Not all courses are offered every term or every Year

Applied Statistics Minor

The Minor in Applied Statistics is open to students in all majors and is specifically recommended for those students who wish to pursue graduate school or work in research. Students pursuing the minor will have enhanced statistical skills and a deeper understanding of statistics than what is received in one or two introductory courses. A minimum of 18 credits is required to complete this minor, 8 credits from required courses and 10 credits from elective courses.

Curriculum list

1. A minimum of 18 credits (all earned with grade of "C" or above) is required to earn the minor.
2. Required courses: MATH 361 and MATH 362 (Statistical Methods I and II). In addition, at least 10 more credits of upper-division courses are needed from the lists below. Note that at least 4 credits of those must come from MATH/STAT courses listed below.
3. At least 12 credits must be taken at OIT.

Students are advised to consult an advisor from the Mathematics Department of select upper-division mathematics courses that would be most applicable to their major and/or career goals.

Courses

Upper-Division MATH/STAT Electives (at **least** 4 credits)

MATH 465 Mathematical Statistics

STAT 413 Categorical Data Analysis

STAT 431 Sampling Methods

STAT 412 Regression and Time Series

STAT 415 Design and Analysis of Planned Experiments

STAT 414 Epidemiological Research Methods

Additional Courses (at **most** 6 credits)

BIO 434 Data Analysis Methods

BUS 456 or 457 Business Research Methods I or II

COM 326 Communication Research

GME 444 Adjustment by Least Squares

MFG 333 Statistical Methods for Quality Improvement

MGT 461,462 or 463 Lean Management I, II or III

PSY 313 or 314 Psychological Research Methods I or II

Note: Not all courses are offered every term or every year.

Medical Imaging Technology Department

Debbie McCollam, *Department Chair*

Robyn Cole, *Diagnostic Medical Sonography Program Director*

Barry Canaday, *Echocardiography Program Director*

Don McDonnell, *Radiologic Science Program Director*

Chris Caster, *Vascular Technology Program Director*

Richard Hoylman, *Nuclear Medicine Technology Program Director and Clinical Coordinator*

Tara Guthrie, *Echocardiography Clinical Coordinator*

Jenny Kellstrom, *Radiologic Science Clinical Coordinator*

Bobbi Kowash, *Diagnostic Medical Sonography Clinical Coordinator*

Leah Jolly, *Vascular Technology Clinical Coordinator*

Janette Isaacson, *Vascular Technology and Echocardiography Degree Completion Program Director*

Gary Zimmerman, *Radiologic Science Degree Completion Program Director*

Robyn Cole, *Diagnostic Medical Sonography Degree Completion Program Director*

Professors: J. Kellstrom, D. McCollam, T. McVay, S. Schultz, G. Zimmerman

Associate Professors: C. Caster, R. Cole, R. Hoylman

Assistant Professors: B. Canaday, D. McDonnell, R. Carson

Instructors: V. Bennett, M. Breedlove, T. Guthrie, B. Kowash, S. Templeton

Participating Faculty: J. Isaacson (Online Education)

Participating Faculty: M. Benson (Online PACS)

Degrees Offered

Bachelor of Science in Diagnostic Medical Sonography

Bachelor of Science in Echocardiography

Bachelor of Science in Nuclear Medicine Technology

Bachelor of Science in Radiologic Science

Bachelor of Science in Vascular Technology

Specialization Offered

Picture Archiving and Communication Systems (PACS)

Department Objectives

The objectives of the Medical Imaging Technology Department are:

1. To prepare students to become effective participants in the medical imaging professions.
 2. To provide the residents of Oregon and the Pacific Northwest with Bachelor of Science degrees in Medical Imaging Technology.
- To prepare students for professions that require critical-thinking and problem solving skills.
4. To instill an effective influence of professional character, the knowledge and experience to pass the National Registry exams.
 5. To instill lifelong learning.

Accreditation

Oregon Institute of Technology is accredited by Northwest Commission on Colleges and Universities, 8060 165th Ave. NE, Suite 100, Redmond, WA 98052-3981, an institutional accrediting body recognized by the Council for Higher Education Accreditation and/or the Secretary of the U.S. Department of Education.

Program Descriptions

The Department of Medical Imaging Technology offers bachelor's degrees in five professional programs, which encompass the spectrum of imaging sciences. The curriculum of each bachelor's degree program provides the technical, scientific, and communication skills essential for the application of learned concepts. Each program prepares students for immediate employment and for successfully passing the national and state registry examinations in each field.

Diagnostic Medical Sonography: (also called sonography, ultrasound, or general ultrasound). Sonography uses high frequency sound wave imaging and Doppler instrumentation to aid in the diagnosis of pathology and disease processes. The sonographer gathers pertinent patient history, creates images, and submits preliminary findings to the reading physician. Common exams include: obstetric,

gynecological, peritoneal, retroperitoneal, pelvic, thoracic, musculoskeletal, extremity, neurological, and superficial procedures. Invasive applications are also performed in most clinical settings.

Echocardiography

Echocardiography is a safe method of obtaining ultrasound images for diagnosis of cardiac pathology in adult and pediatric patient populations. Echocardiographers perform imaging exams that include acquisition of detailed images of heart anatomy, evaluation of pathologies, and measurement/analysis of hemodynamic flow patterns within the heart and the heart's major vessels. The Echocardiographer prepares the study images and reports pertinent findings to the interpreting cardiologist as part of the diagnostic process.

Nuclear Medicine Technology

Nuclear medicine is an imaging science that demonstrates pathology through physiologic processes, as opposed to detailed anatomic images. This branch of imaging science has been in existence for over four decades, and provides unique diagnostic information obtained by the patient's ingestion, inhalation, or being injected with a radioactive isotope.

Radiologic Science

This program has been in existence at Oregon Tech for more than 50 years. The training prepares the future radiologic technologist with a wide variety of skills, including radiography, fluoroscopy, mobile and surgical radiography, Computed Tomography (CT), Magnetic Resonance Imaging (MRI), Mammography, Cardiovascular Interventional Technology (CIT), Quality Assurance, and imaging department management.

Vascular Technology

Vascular technology is a profession which utilizes ultrasound, Doppler, color Doppler and various physiologic testing procedures to aid in the diagnosis of disease of the vascular system. Vascular technologists conduct patient interviews, compile health histories and determine risk assessments pertaining to vascular disease. The technologists choose appropriate testing modalities and provide referring physicians with preliminary interpretation of results.

Facilities

Oregon Tech's state-of-the-art imaging equipment allows medical imaging students to become familiar with a wide variety of imaging procedures like those performed in most medical centers. Students may also spend significant time at Sky Lakes Medical Center where they will gain experience directly with patients, prior to externship. This experience plus the academic coursework prepares the student well for the medical imaging professions.

Externships

All five of the bachelor's degree programs in medical imaging culminate in a senior year of clinical externship at a medical center. The 11-month externship is spent at the affiliate institution under the supervision of a clinical instructor. Students do not have classes on the Oregon Tech campus during this year. The location of externship will be determined by a lottery conducted by medical imaging faculty. All students will be guaranteed an externship subject to the following:

1. All academic requirements must be met before externship assignments will be made.
2. Students must satisfy Oregon requirements for clinical placement as listed in Oregon Administrative Rules (OAR 409-030-0100 to 409-030-0250).

Upon successful completion of the externship year, imaging students will be eligible to sit for the professional registry pertaining to their degree.

Admission Requirements

Pre-Medical Imaging

Technology: Freshman Year

Enrollment is open to all students who meet the general entry requirements to the university. Students will be listed as Pre-Medical Imaging Technology (Pre-MIT) students. Admittance to the Oregon Tech Pre-MIT Program does not mean the student has been accepted into a specific MIT program.

Program Selection Criteria

Selection criteria are available on the MIT website at www.oit.edu/mit. Students must complete all the courses, including general education, in the specified freshman year (pre-medical imaging) curriculum. Selection will be made at the end of the spring term of the pre-medical imaging technology year. The number of students selected each year will be determined by the number of qualified applicants, and by the availability of clinical sites. Therefore, the number of qualified applicants may exceed the number of spaces available. Prior acceptance does not guarantee future acceptance into any MIT Program. Students must reapply yearly.

Selection will be based upon the following criteria and point system:

1. **GPA:** Students must have a total of a 2.75 **weighted** GPA (though a 3.0 or higher is highly recommended), in the following courses (or equivalent transfer courses) to apply to one of the five MIT Programs.

BIO 200	Medical Terminology	2
BIO 231	Human Anatomy and Physiology I	4
BIO 232	Human Anatomy and Physiology II	4
BIO 233	Human Anatomy and Physiology III	4
CHE 101	Introduction to General Chemistry	3
CHE 104	Elementary Chemistry	1
MATH 111	College Algebra	4
MATH 112	Trigonometry	4
MIT 103	Introduction to Medical Imaging	3

GPA points are calculated as GPA x 10. (For example, a 3.5 GPA x 10 = 35). To determine how to calculate weighted GPA, see website at www.oit.edu/mit.

2. All applicants must attend an Oregon Tech hosted selection event at the end of spring term. Several activities are conducted during this event to allow students to demonstrate communication skills, writing skills, and professionalism.

Faculty from the MIT Department and industry leaders are present at the selection event to evaluate those skills.

Application Requirements

Applications are available on the MIT website at www.oit.edu/mit.

Applications are due spring term. Incomplete applications will not be accepted. An application fee of \$75 is required. There are no refunds of the application fee. Repeat applicants must follow the same procedures as first-time applicants.

The application form allows ranking of programs by choice (first and second) and only one application per student will be accepted. If multiple applications are received, they will be returned along with the application fees.

Transfer Students

Transfer students who meet the academic requirements of the pre-medical imaging technology year, will not find a course at another college which substitutes for MIT 103 Introduction to Medical Imaging. This course may be taken as a distance learning course. It must be completed in the summer, fall, winter or spring term prior to the application to a professional program. The MIT application is available at www.oit.edu/mit. Transfer students must apply to both Oregon Tech and MIT using two separate application processes.

Graduation Requirements

All credits listed in the curriculum for the catalog year a student begins a program must be fulfilled.

Students must maintain a 2.00 GPA to be eligible for graduation. In addition, a final grade of "C" or better must be earned in all professional courses (DMS, ECHO, NMT, RDSC, VAS), and science/mathematics courses to continue in the program. A final grade of "C" or better must be also earned in all required communications courses by the end of the junior year to continue on in the program. Once the student is admitted into a professional program as a sophomore, all curricular requirements must be met within four academic years. Rare exceptions to the time limitation will be considered on a case by case basis, at the discretion of the readmittance committee described below. When a student unsuccessfully attempts a programmatic course fall term, sophomore

year, they must reapply to the program or another imaging program. If the student has an unsuccessful attempt subsequent to fall term sophomore year the student must submit a letter of intent to the program director of the specific program they seek to re-enter. The MIT re-admittance committee will determine if another opportunity will be granted. If re-admittance is approved additional requirements will be prescribed by the MIT committee.

Other requirements such as auditing courses, attending labs, and/or remedial work will be specified by the committee. The student must remain in compliance with committee's recommendations and requirements to satisfy degree progress. When a student attempts unsuccessfully a second time in the same or a different programmatic course, they are terminated from that program. Additionally, if a student receives a "D," "F" or "W" in two or more programmatic courses in one term, they will be dismissed from that program. The student may apply for admittance to a second imaging program under the same application criteria as other applicants. After two unsuccessful attempts to complete two different programs, the student may not apply for a third program.

Career Opportunities

There continues to be a high demand for bachelor's degree prepared medical imaging professionals. Graduates have excellent opportunities for employment in hospitals, clinics, private practice, state and federal agencies, and with appropriate experience, in supervision, education and industry.

Bachelor of Science in Diagnostic Medical Sonography Curriculum

Required courses and recommended terms during which they should be taken:

Pre-Medical Imaging Technology

Freshman Year		Fall
BIO 231	Human Anatomy and Physiology I	4
CHE 101	Introduction to General Chemistry	3
CHE 104	Introduction to General Chemistry Laboratory	1
MATH 111	College Algebra	4
MIT 103	Introduction to Medical Imaging	3
Total		15

Freshman Year		Winter
BIO 232	Human Anatomy and Physiology II	4
MATH 112	Trigonometry	4
WRI 121	English Composition	3
	Humanities Elective	3
	Social Science Elective	3
Total		17

Freshman Year		Spring
BIO 200	Medical Terminology	2
BIO 233	Human Anatomy and Physiology III	4
PSY	Psychology (PSY 201, PSY 202 or PSY 203)	3
SPE 111	Public Speaking	3
WRI 122	Argumentative Writing	3
Total		15

Professional Courses

Sophomore Year		Fall
BIO 335	Cross-Sectional Anatomy *	3
DMS 223	Applications of Abdominal Sonography I *	3
DMS 252	Sophomore Laboratory I *	1
PHY 217	Physics of Medical Imaging	3
	Humanities Elective	3
	Social Science Elective	3
Total		16

Sophomore Year		Winter
DMS 224	Applications of Abdominal Sonography II *	3
DMS 235	Diagnostic Medical Sonography Patient Care*	3
DMS 253	Sophomore Laboratory II *	1
MIT 231	Sonographic Principles and Instrumentation I *	4
WRI 227	Technical Report Writing	3
Total		14

Sophomore Year		Spring
DMS 225	Applications of Abdominal Sonography III *	3
DMS 234	Pelvic Sonography *	3
DMS 254	Sophomore Laboratory III *	1
MIT 232	Sonographic Principles and Instrumentation II *	4
	Social Science Elective	3
Total		14

Junior Year		Fall
DMS 346	Musculoskeletal Sonography	3
DMS 352	Junior Laboratory I *	1
DMS 365	Sonographic Pathology *	3
DMS 337	Breast Sonography	3
SPE 321	Small Group and Team Communication	3
Total		13

Junior Year		Winter
	BUS Elective (BUS 316, BUS 317, or BUS 313)	3
DMS 316	Survey of Vascular Technology *	3
DMS 342	Survey of Adult Echocardiography *	3
DMS 353	Junior Laboratory II *	1
DMS 370	Obstetrical Sonography	3
Total		13

Junior Year		Spring
DMS 343	Fetal Echo, Neonatal, and Pediatric Sonography *	3
DMS 354	Junior Laboratory III *	1
DMS 373	Obstetrical Pathology *	3
DMS 388	Externship Preparation *	2
	Communication Elective **	3
	Humanities Elective	3
Total		15

Senior Year		Summer
DMS 430	Diagnostic Medical Sonography Externship *	15
Total		15

Senior Year		Fall
DMS 430	Diagnostic Medical Sonography Externship *	15
Total		15

Senior Year		Winter
DMS 430	Diagnostic Medical Sonography Externship *	15
Total		15

Senior Year		Spring
DMS 430	Diagnostic Medical Sonography Externship *	15
Total		15

* Core Imaging Courses

** Courses listed under Communication requirements for General Education.

Total credits required for B.S. in Diagnostic Medical Sonography 192

Bachelor of Science in Echocardiography Curriculum

Required Courses and recommended terms during which they should be taken:

Pre-Medical Imaging Technology

Freshman Year		Fall	Junior Year		Fall
BIO 231	Human Anatomy and Physiology I	4	BUS Elective (BUS 316, BUS 317, or BUS 313)	3	
CHE 101	Introduction to General Chemistry	3	ECHO 333 Echocardiography III*	4	
CHE 104	Introduction to General Chemistry Laboratory	1	ECHO 321 Stress and Transesophageal Echo*	3	
MATH 111	College Algebra	4	SPE 321 Small Group and Team Communication	3	
MIT 103	Introduction to Medical Imaging	3	Humanities Elective	3	
Total		15	Total	16	

Freshman Year		Winter	Junior Year		Winter
BIO 232	Human Anatomy and Physiology II	4	CHE 360 Clinical Pharmacology for the Health Professions*	3	
MATH 112	Trigonometry	4	ECHO 325 Pediatric Echocardiography*	3	
WRI 121	English Composition Humanities Elective	3	ECHO 376 Survey of Vascular Testing* Social Science Elective	3	
Total		17	Total	12	

Freshman Year		Spring	Junior Year		Spring
BIO 200	Medical Terminology	2	ECHO 334 Echocardiography IV*	4	
BIO 233	Human Anatomy and Physiology III	4	ECHO 385 Echocardiography Laboratory Management*	3	
PSY	Psychology (PSY 201, PSY 202 or PSY 203)	3	ECHO 388 Externship Preparation*	3	
SPE 111	Public Speaking	3	Communication Elective	3	
WRI 122	Argumentative Writing	3	Humanities Elective	3	
Total		15	Total	16	

Professional Courses

Sophomore Year		Fall	Senior Year		Summer
BIO 220	Cardiovascular Physiology*	4	ECHO 420 Echocardiography Externship*	15	
ECHO 231	Echocardiography I*	4	Total	15	
PHY 217	Physics of Medical Imaging*	3	Senior Year	Fall	
WRI 227	Technical Report Writing	3	ECHO 420 Echocardiography Externship*	15	
Total		14	Total	15	

Sophomore Year		Winter	Senior Year		Winter
BIO 346	Pathophysiology I*	3	ECHO 420 Echocardiography Externship*	15	
ECHO 232	Echocardiography II*	4	Total	15	

Sophomore Year		Spring	Senior Year		Spring
MIT 231	Sonographic Principles and Instrumentation I*	4	ECHO 420 Echocardiography Externship*	15	
	Social Science Elective	3	Total	15	
Total		14			

Sophomore Year		Spring	Senior Year		Spring
BIO 347	Pathophysiology II*	3	ECHO 420 Echocardiography Externship*	15	
ECHO 225	Cardiopulmonary Patient Management Practices*	3	Total	15	
ECHO 320	Cardiographic Methods*	3			
ECHO 332	Invasive Cardiology*	3			
MIT 232	Sonographic Principles and Instrumentation II	4			
Total		16			

* Core Imaging Courses

** Courses listed under Communication requirement for General Education.

Total credits required for B.S. in Echocardiography: 195

Bachelor of Science in Nuclear Medicine Technology Curriculum

Required courses and recommended terms during which they should be taken:

Pre-Medical Imaging Technology

Freshman Year		Fall
BIO 231	Human Anatomy and Physiology I	4
CHE 101	Introduction to General Chemistry	3
CHE 104	Introduction to General Chemistry Laboratory	1
MATH 111	College Algebra	4
MIT 103	Introduction to Medical Imaging	3
Total		15

Freshman Year		Winter
BIO 232	Human Anatomy and Physiology II	4
MATH 112	Trigonometry	4
WRI 121	English Composition Humanities Elective	3
	Social Science Elective	3
Total		17

Freshman Year		Spring
BIO 200	Medical Terminology	2
BIO 233	Human Anatomy and Physiology III	4
PSY	Psychology (PSY 201, PSY 202 or PSY 203)	3
SPE 111	Public Speaking	3
WRI 122	Argumentative Writing	3
Total		15

Professional Courses

Sophomore Year		Fall
CHE 350	Clinical Pharmacology for Nuclear Medicine *	3
NMT 212	Nuclear Medicine Physics/ Radiation Biophysics *	3
NMT 217	Patient Care *	4
PHY 217	Physics of Medical Imaging *	3
Total		13

Sophomore Year		Winter
NMT 205	Nuclear Medicine Administration *	2
NMT 215	Radiochemistry and Radiopharmacy *	4
SPE 321	Small Group and Team Communication	3
WRI 227	Technical Report Writing	3
Total		12

Sophomore Year		Spring
NMT 225	Nuclear Physics/Instrumentation *	4
NMT 256	Cardiovascular Imaging *	3
	Communication Elective **	3
	Humanities Elective	3
Total		13

Bachelor of Science in Radiologic Science Curriculum

Required courses and recommended terms during which they should be taken:

Pre-Medical Imaging Technology

Junior Year		Fall	Freshman Year		Fall	Junior Year		Fall
BUS Elective (BUS 316, BUS 317, or BUS 313)		3	BIO 231	Human Anatomy and Physiology I	4	BIO 336	Essentials of Pathophysiology	3
NMT 311	Imaging Procedures I *	4	CHE 101	Introduction to General Chemistry	3	RDSC 301	Radiographic Positioning III *	4
NMT 346	Magnetic Resonance *	4	CHE 104	Introduction to General Chemistry Laboratory	1	RDSC 320	Surgical, Trauma and Mobile Radiography *	4
NMT 367	PET Imaging *	3	MATH 111	College Algebra	4	RDSC 355	Computed Tomography *	4
Total		14	MIT 103	Introduction to Medical Imaging	3	Total		15
Junior Year		Winter	Freshman Year		Winter	Junior Year		Winter
BIO 335	Cross-Sectional Anatomy *	3	BIO 232	Human Anatomy and Physiology II	4	BUS Elective (BUS 316, BUS 317, or BUS 313)		3
BIO 346	Pathophysiology I *	3	MATH 112	Trigonometry	4	RDSC 356	Magnetic Resonance *	4
NMT 312	Imaging Procedures II *	4	WRI 121	English Composition Humanities Elective	3	SPE 321	Small Group and Team Communication	3
NMT 355	Computed Tomography *	4		Social Science Elective	3	WRI 227	Technical Report Writing	3
	Social Science Elective	3	Total		17	Total		16
Total		17	Freshman Year		Spring	Junior Year		Spring
Junior Year		Spring	BIO 200	Medical Terminology	2	RDSC 326	Cardiovascular/Interventional Technology *	4
NMT 313	Therapeutic Procedures*	3	BIO 233	Human Anatomy and Physiology III	4	RDSC 354	Mammography *	
NMT 325	SPECT Imaging and Computer Applications *	4	PSY	Psychology (PSY 201, PSY 202 or PSY 203)	3	or		
NMT 388	Externship Preparation *	3	SPE 111	Public Speaking	3	RDSC 365	Advanced Quality Assurance/Quality Control *	4
	Humanities Elective	3	WRI 122	Argumentative Writing	3	RDSC 388	Externship Preparation * Social Science Elective	2
	Social Science Elective	3	Total		15	Total		13
Total		16	Professional Courses			Senior Year		Summer
Senior Year		Summer	Sophomore Year		Fall	RDSC 410	Radiologic Science Externship*	15
NMT 410	Nuclear Medicine Technology Externship	15	PHY 217	Physics of Medical Imaging*	3	Total		15
Total		15	RDSC 201	Imaging Techniques I *	4	Senior Year		Fall
Senior Year		Fall	RDSC 235	Equipment Operation and Maintenance *	3	RDSC 410	Radiologic Science Externship*	15
NMT 410	Nuclear Medicine Technology Externship *	15		Communication Elective **	3	Total		15
Total		15		Humanities Elective	3	Senior Year		Winter
Senior Year		Winter	Sophomore Year		Winter	RDSC 410	Radiologic Science Externship*	15
NMT 410	Nuclear Medicine Technology Externship *	15	RDSC 202	Imaging Techniques II *	4	Total		15
Total		15	RDSC 205	Patient Care *	4	Senior Year		Spring
Senior Year		Spring	RDSC 210	Radiographic Positioning I *	4	RDSC 410	Radiologic Science Externship*	15
NMT 410	Nuclear Medicine Technology Externship *	15	RDSC 366	Radiographic Pathology *	3	Total		15
Total		15	Total		15	Senior Year		Spring
Senior Year		Spring	Sophomore Year		Spring	RDSC 410	Radiologic Science Externship*	15
NMT 410	Nuclear Medicine Technology Externship *	15	BIO 335	Cross-Sectional Anatomy*	3	Total		15
Total		15		Social Science Elective	3	Senior Year		Winter
Senior Year		Winter	RDSC 211	Radiographic Positioning II *	4	RDSC 410	Radiologic Science Externship*	15
			RDSC 233	Contrast Media Procedures *	4	Total		15
			RDSC 272	Radiation Protection *	3	Senior Year		Spring
			Total		17	RDSC 410	Radiologic Science Externship*	15
						Total		15

* Core Imaging Courses

** Courses listed under Communication requirement for General Education.

Total credits required for B.S. in Nuclear Medicine Technology: 192

* Core Imaging courses

** Courses listed under Communication requirement for General Education.

Total credits required for B.S. in Radiologic Science: 199

Bachelor of Science in Vascular Technology Curriculum

Required courses and recommended terms during which they should be taken:

Pre-Medical Imaging Technology

Freshman Year		Fall
BIO 231	Human Anatomy and Physiology I	4
CHE 101	Introduction to General Chemistry	3
CHE 104	Introduction to General Chemistry Laboratory	1
MATH 111	College Algebra	4
MIT 103	Introduction to Medical Imaging	3
Total		15

Freshman Year		Winter
BIO 232	Human Anatomy and Physiology II	4
MATH 112	Trigonometry	4
WRI 121	English Composition	3
	Humanities Elective	3
	Social Science Elective	3
Total		17

Freshman Year		Spring
BIO 200	Medical Terminology	2
BIO 233	Human Anatomy and Physiology III	4
PSY	Psychology (PSY 201, PSY 202 or PSY 203)	3
SPE 111	Public Speaking	3
WRI 122	Argumentative Writing	3
Total		15

Professional Courses

Sophomore Year		Fall
BIO 220	Cardiovascular Physiology*	4
PHY 217	Physics of Medical Imaging*	3
VAS 214	Vascular Anatomy*	4
WRI 227	Technical Report Writing	3
Total		14

Sophomore Year		Winter
BIO 346	Pathophysiology I*	3
MIT 231	Sonographic Principles and Instrumentation I*	4
VAS 246	Peripheral Arterial Disease*	4
VAS 335	Radiographic Vascular Anatomy*	3
Total		14

Sophomore Year		Spring
BIO 347	Pathophysiology II*	3
MIT 232	Sonographic Principles and Instrumentation II*	4
VAS 225	Patient Management Practices*	3
VAS 245	Peripheral Venous Disease*	4
	Social Science Elective	3
Total		17

Junior Year		Fall
BUS Elective (BUS 316, BUS 317, or BUS 313)		3
SPE 321	Small Group and Team Communication	3
VAS 365	Abdominal Vascular Disease*	4
VAS 375	Survey of Abdominal Sonography*	3
	Social Science Elective	3
Total		16

Junior Year		Winter
CHE 360	Clinical Pharmacology for the Health Professions*	3
VAS 366	Special Circulatory Problems*	4
VAS 337	Survey of Echocardiography*	3
	Humanities Elective	3
Total		13

Junior Year		Spring
VAS 367	Cerebrovascular Disease*	4
VAS 385	Vascular Laboratory Management*	3
VAS 388	Externship Preparation	3
	Communication Elective**	3
	Humanities Elective	3
Total		16

Senior Year		Summer
VAS 420	Vascular Technology Externship*	15
Total		15

Senior Year		Fall
VAS 420	Vascular Technology Externship*	15
Total		15

Senior Year		Winter
VAS 420	Vascular Technology Externship*	15
Total		15

Senior Year		Spring
VAS 420	Vascular Technology Externship*	15
Total		15

* Core Imaging courses

** Courses listed under Communication requirement for General Education.

Total credits required for B.S. in Vascular Technology: 197

Picture Archiving and Communication Systems (PACS) Specialization

Medical Imaging Technology students with an interest and aptitude in computer science have a unique opportunity at Oregon Tech. Networked digital imaging has created the need for technologists with specialized training. Career opportunities for managers of image networks are on the rise, but few working technologists have the training to prepare them for entering this field.

With the availability of Computer Systems and Management Information Systems majors at Oregon Tech, a specialization in Picture Archiving and Communication Systems (PACS) is available for motivated students to pursue this opportunity.

Requirements of the Specialization

MIT 209	PACS I: Intro to Picture Archiving Communications Systems	3
MIT 219	PACS II: PACS Communication and Administration	3
MIT 229	PACS III: PACS Technical Requirements and Image Quality	3
MIT 239	PACS IV: PACS Implementation and System Management	3
MIT 249	PACS V: DICOM	3
MIT 259	PACS VI: PACS Security	3

Students must earn a "C" or better in all courses to be awarded the specialization.

Degree Completion Programs

The Diagnostic Medical Sonography, Echocardiography, Radiologic Science and Vascular Technology programs offer degree completion programs for registered technologists (in good standing) who wish to pursue a bachelor's degree in their field. These programs are fully online. There is no requirement to come to campus.

Bachelor's Degree Completion: Diagnostic Medical Sonography Courses granted for Registry

DMS 223	Applications of Abdominal Sonography I	3
DMS 224	Applications of Abdominal Sonography II	3
DMS 225	Applications of Abdominal Sonography III	3
DMS 234	Pelvic Sonography	3
DMS 235	Diagnostic Medical Sonography Patient Care	3
DMS 252	Sophomore Laboratory I	1
DMS 253	Sophomore Laboratory II	1
DMS 254	Sophomore Laboratory III	1
DMS 370	Obstetrical Sonography	3
DMS 388	Externship Preparation (waived)	0
DMS 430	Diagnostic Medical Sonography Externship	45
MIT 103	Introduction to Medical Imaging	3
MIT 231	Sonographic Principles and Instrumentation I	4
MIT 232	Sonographic Principles and Instrumentation II	4
PHY 217	Physics of Medical Imaging	3
Total		80

Oregon Tech Degree Completion Credits

BIO 335	Cross-Sectional Anatomy	3
BUS 313	Health Care Systems & Policies or	3
BUS 316	Total Quality in Health Care or	3
BUS 317	Health Care Management	3
DMS 316	Survey of Vascular Technology *	3
DMS 337	Breast Sonography	3
DMS 342	Survey of Adult Echocardiography	3
DMS 343	Fetal Echo, Neonatal and Pediatric Sonography	3
DMS 346	Musculoskeletal Sonography	3
DMS 352	Junior Laboratory I	1
DMS 353	Junior Laboratory II	1
DMS 354	Junior Laboratory III	1
DMS 365	Sonographic Pathology	3
DMS 373	Obstetrical Pathology	3
DMS 430A	Diagnostic Medical Sonography Externship	8
DMS 430B	Diagnostic Medical Sonography Externship	7

SPE 321	Small Group and Team Communication	3
	Communication Elective	3
Total		51

Transfer Courses

BIO 200	Medical Terminology	2
BIO 231	Human Anatomy and Physiology I	4
BIO 232	Human Anatomy and Physiology II	4
BIO 233	Human Anatomy and Physiology III	4
CHE 101	Introduction to General Chemistry	3
CHE 104	Introduction to General Chemistry Laboratory	1
MATH 111	College Algebra	4
MATH 112	Trigonometry	4
PSY	Psychology (PSY 201, PSY 202, PSY 203)	3
SPE 111	Public Speaking	3
WRI 121	English Composition	3
WRI 122	Argumentative Writing	3
WRI 227	Technical Report Writing	3
	Humanities Electives	9
	Social Science Electives	9
	Elective	2
Total		61

* Credits may be granted for additional specialty registry exams. Please contact Program Director for more information.

Bachelor's Degree Completion: Echocardiography Courses granted for Registry

BIO 220	Cardiovascular Physiology	4
BIO 346	Pathophysiology I	3
BIO 347	Pathophysiology II	3
ECHO 225	Cardiopulmonary Patient Management Practices	3
ECHO 231	Echocardiography I	4
ECHO 232	Echocardiography II	4
ECHO 320	Cardiographic Methods	3
ECHO 321	Stress and Transesophageal Echo	3
ECHO 333	Echocardiography III	4
ECHO 420	Echocardiography Externship	45
MIT 103	Introduction to Medical Imaging	3
MIT 231	Sonographic Principles and Instrumentation I	4
MIT 232	Sonographic Principles and Instrumentation II	4
PHY 217	Physics of Medical Imaging	3
Total		90

Oregon Tech Degree Completion Courses

BUS 313	Health Care Systems & Policies or	3
BUS 316	Total Quality in Health Care or	3
BUS 317	Health Care Management	3
CHE 360	Clinical Pharmacology for the Health Professions	3

ECHO 325	Pediatric Echocardiography *	3
ECHO 332	Invasive Cardiology	3
ECHO 334	Echocardiography IV	4
ECHO 365	Abdominal/Renal Testing	4
ECHO 376	Survey of Vascular Testing *	3
ECHO 385	Echocardiography Laboratory Management	3
ECHO 420A	Echocardiography Externship	8
ECHO 420B	Echocardiography Externship	7
ECHO 421	Echo Senior Project	4
SPE 321	Small Group and Team Communication	3
	Communication Elective	3
Total		51

* Optional credits may be awarded for additional registries.

Transfer Courses

BIO 200	Medical Terminology	2
BIO 231	Human Anatomy and Physiology I	4
BIO 232	Human Anatomy and Physiology II	4
BIO 233	Human Anatomy and Physiology III	4
CHE 101	Introduction to General Chemistry	3
CHE 104	Introduction to General Chemistry Laboratory	1
MATH 111	College Algebra	4
MATH 112	Trigonometry	4
PSY	Psychology (PSY 201, PSY 202 or PSY 203)	3
SPE 111	Public Speaking	3
WRI 121	English Composition	3
WRI 122	Argumentative Writing	3
WRI 227	Technical Report Writing	3
	Humanities Electives	9
	Social Science Electives	9
	Elective	3
Total		62

Bachelor's Degree Completion: Radiologic Science

Courses granted for Registry

MIT 103	Introduction to Medical Imaging	3
PHY 217	Physics of Medical Imaging	3
RDSC 201	Imaging Techniques I	4
RDSC 202	Imaging Techniques II	4
RDSC 205	Patient Care	4
RDSC 210	Radiographic Positioning I	4
RDSC 211	Radiographic Positioning II	4
RDSC 233	Contrast Media Procedures	4
RDSC 235	Equipment Operation and Maintenance	3
RDSC 272	Radiation Protection	3
RDSC 301	Radiographic Positioning III	4
RDSC 320	Surgical, Trauma and Mobile Radiography	4
RDSC 410	Radiologic Science Externship	45
Total		89

Oregon Tech Degree Completion Courses

BIO 335	Cross-Sectional Anatomy	3
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BIO 336	Essentials of Pathophysiology	3
BUS 313	Health Care Systems & Policies	3
or		
BUS 316	Total Quality in Health Care	3
or		
BUS 317	Health Care Management	3
RDSC 326	Cardiovascular/Interventional Technology *	4
RDSC 354	Mammography *	
or		
RDSC 365	Advanced Quality Assurance/Quality Control	4
RDSC 355	Computed Tomography	4
RDSC 356	Magnetic Resonance	4
RDSC 366	Radiologic Pathology	3
RDSC 411	Special Radiologic Science Externship	15
SPE 321	Small Group and Team Communication	3
	Communication Elective	3
Total		49

* Optional credit may be awarded for additional registries.

Transfer Courses

BIO 200	Medical Terminology	2
BIO 231	Human Anatomy and Physiology I	4
BIO 232	Human Anatomy and Physiology II	4
BIO 233	Human Anatomy and Physiology III	4
CHE 101	Introduction to General Chemistry	3
CHE 104	Introduction to General Chemistry Laboratory	1
MATH 111	College Algebra	4
MATH 112	Trigonometry	4
PSY	Psychology (PSY 201, PSY 202 or PSY 203)	3
SPE 111	Public Speaking	3
WRI 121	English Composition	3
WRI 122	Argumentative Writing	3
WRI 227	Technical Report Writing	3
	Humanities Electives	9
	Social Science Electives	9
	Elective	2
Total		61

Bachelor's Degree Completion: Vascular Technology

Courses granted for Registry

BIO 346	Pathophysiology I	3
BIO 347	Pathophysiology II	3
MIT 103	Introduction to Medical Imaging	3
MIT 231	Sonographic Principles and Instrumentation I	4
MIT 232	Sonographic Principles and Instrumentation II	4
PHY 217	Physics of Medical Imaging *	3
VAS 214	Vascular Anatomy	4
VAS 225	Patient Management Practices	3
VAS 245	Peripheral Venous Disease	4
VAS 246	Peripheral Arterial Disease	4
VAS 367	Cerebrovascular Disease	4
VAS 420	Vascular Technology Externship	45
Total		84

Oregon Tech Degree Completion Credits

BIO 220	Cardiovascular Physiology	4
BUS 313	Health Care Systems & Policies	3
or		
BUS 316	Total Quality in Health Care	3
or		
BUS 317	Health Care Management	3
CHE 360	Clinical Pharmacology for the Health Professions	3
SPE 321	Small Group and Team Communication	3
VAS 335	Radiographic Vascular Anatomy	3
VAS 337	Survey of Echocardiography	3
VAS 365	Abdominal Vascular Disease	4
VAS 366	Special Circulatory Problems	4
VAS 375	Survey of Abdominal Sonography *	3
VAS 385	Vascular Laboratory Management	3
VAS 420A	Special Vascular Technology Externship	8
VAS 420B	Special Vascular Technology Externship	7
	Communication Elective	3
Total		51

* Optional credit may be awarded for additional registries.

Transfer Courses

BIO 200	Medical Terminology	2
BIO 231	Human Anatomy and Physiology I	4
BIO 232	Human Anatomy and Physiology II	4
BIO 233	Human Anatomy and Physiology III	4
CHE 101	Introduction to General Chemistry	3
CHE 104	Introduction to General Chemistry Laboratory	1
MATH 111	College Algebra	4
MATH 112	Trigonometry	4
PSY	Psychology (PSY 201, PSY 202 or PSY 203)	3
SPE 111	Public Speaking	3
WRI 121	English Composition	3
WRI 122	Argumentative Writing	3
WRI 227	Technical Report Writing	3
	Humanities Electives	9
	Social Science Electives	9
	Elective	3
Total		62

Natural Sciences Department

Rosalind McClure, *Department Chair*

Professors: B. Burda, B. Clark, H.-Y. Li, T. McVay, M. O'Shaughnessy, E. Schechtel, R. Swisher, K. Usher

Associate Professors: R. Wilde, R. McClure

Assistant Professors: S. Anthony, M. Beekman, K. Byrne, M. Hughes, J. Kellermann, G. Pak, L. Parratt, E. Taylor

Degrees Offered

Bachelor of Science in Biology-Health Sciences

Bachelor of Science in Environmental Sciences

Minor Offered

Applied Physics
Biology
Chemistry
Sustainability

The Department of Natural Sciences prepares students for challenging, rewarding careers in health, biological, and environmental sciences. The department also provides courses in biology, chemistry, and physics in support of degrees in nursing, medical imaging, dental hygiene, respiratory care, management and engineering programs.

Biology Program

Many students have an interest in biology. At Oregon Tech we have designed two programs that prepare graduates for rewarding careers that require a strong foundation in biology. For outdoor or field-oriented options, please refer to the Environmental Sciences program in our department. It offers several emphases

including Watershed Science, that can readily be tailored to biological interests and student research projects. Graduates from our Environmental Sciences program often go on to careers with public and private agencies such as US Fish and Wildlife Service, US Forest Service and the Nature Conservancy. For

medically-oriented options in biology, please see our Biology-Health Sciences program. It offers a strong preparation to apply to professional programs, exceeding the minimum requirements for highly competitive fields such as Medicine, Pharmacy, Dentistry, Veterinary Medicine, Physician Assistant, and others.

Biology-Health Sciences Program

Ken Usher, *Program Director*

Degree Offered

Bachelor of Science in Biology-Health Sciences

Objective and Career Opportunities

If you are interested in pre-medical, pre-dental, pre-veterinary, pre-pharmacy, pre-physical therapy, etc., then this is the major you want. The degree program provides an intensive course of study in the basic sciences, social sciences, communication, and mathematics to prepare students for entry into professional programs. The program will meet prerequisite requirements for schools of medicine, dentistry, veterinary medicine, osteopathic medicine, optometry, pharmacy, and podiatry and for graduate programs in physical therapy and occupational therapy. Courses in health management, medical microbiology, biochemistry, and molecular & cell biology also provide strong preparation

for graduate work in biotechnology, public health, and medical administration. This major can also prepare one for a career in education with an emphasis in biology.

Student Preparation

The Biology-Health Sciences curriculum is a demanding instructional program requiring considerable effort in science and mathematics coursework. Prospective students are advised to complete two to three years of high school mathematics and a minimum of three years of high school science (biology, chemistry, and physics).

Degree Requirements

The minimum graduation requirement is 181 credit hours of prescribed coursework. Students must meet the general education requirements, as stated elsewhere in this catalog, and satisfactorily complete the courses listed in this curriculum to obtain a Bachelor of Science degree in Biology-Health Sciences. Biology-Health Sciences students must complete every science course with a minimum

grade of "C" and must maintain a minimum grade point average of 2.5 in lower division science courses to advance to upper-division science courses in the major.

Because the prerequisite requirements and recommended courses for entry into health professions and graduate schools differ, some upper-division courses may be substituted for others, with approval of your academic advisor.

Bachelor of Science in Biology-Health Sciences Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year	Fall	Junior Year	Fall	Health Biology Electives (lower-division):	
BIO 211 Principles of Biology	4	BIO 331 Human Anatomy and Physiology I	5	BIO 200 Medical Terminology	2
MATH 111 College Algebra	4	CHE 331 Organic Chemistry I	4	BIO 205 Nutrition	3
WRI 121 English Composition	3	PHY 221 General Physics with Calculus ⁴	4	BIO 216 Introduction to Veterinary Medicine	4
Social Science Elective	3	Total	13	BIO 226 Introduction to Wildlife Rehabilitation	3
Total	14				
Freshman Year	Winter	Junior Year	Winter	Health Biology Electives (upper-division):	
BIO 109 Introduction to the Medical Sciences	2	BIO 332 Human Anatomy and Physiology II	5	BIO 341 Medical Genetics	3
BIO 212 Principles of Biology	4	CHE 332 Organic Chemistry II	4	BIO 342 Cell Biology	4
MATH 112 Trigonometry	4	PHY 222 General Physics with Calculus ⁴	4	BIO 347 Pathophysiology II	3
WRI 122 Argumentative Writing	3	Humanities Elective	3	BIO 352 Developmental Biology	4
Social Science Elective	3	Total	16	BIO 357 Introduction to Neuroscience	3
Total	16			BIO 426 Evolutionary Biology	3
Freshman Year	Spring	Junior Year	Spring	BIO 436 Immunology	4
BIO 213 Principles of Biology	4	BIO 333 Human Anatomy and Physiology III	5	BIO 461 Human Cadaver Dissection	1
MATH 361 Statistical Methods I ¹	4	CHE 333 Organic Chemistry III	4	BIO 462 Human Cadaver Dissection	1
Health Biology Elective (lower-division) ²	2	PHY 223 General Physics with Calculus ⁴	4	CHE 360 Clinical Pharmacology for the Health Professions	3
Humanities Elective	3	WRI 327 Advanced Technical Writing	3	CHE 452 Biochemistry III	4
Total	13	Total	16		
Sophomore Year	Fall	Senior Year	Fall	Footnotes:	
BIO 345 Medical Microbiology	5	CHE 450 Biochemistry I	4	1 MATH 243 may be substituted with advisor consent.	
CHE 221 General Chemistry I	5	Health Biology Elective (upper-division) ³	3	2 Minimum of 2 credits of lower-division health biology elective must be completed, chosen from the lower-division list above. Alternately, an additional elective from the upper-division list may be taken, in which case a total of at least 23 credits of upper-division health biology electives are required.	
MATH 251 Differential Calculus	4	Social Science Elective	3	3 Minimum of 21 credits of upper-division health biology electives must be completed, chosen from the upper-division list above.	
SPE 111 Public Speaking	3	Elective ⁵	3	4 PHY 201, PHY 202, PHY 203 may be substituted with advisor consent.	
Total	17	Elective ⁵	3	5 Advisor approval of all elective choices is required. Additional courses from the health biology lists above, and/or suitable courses from BUS, MATH, or PSY are recommended.	
Sophomore Year	Winter	Senior Year	Winter		
BIO 209 Current Research Topics in Medical Sciences I	1	BIO 346 Pathophysiology I	3	When choosing electives or substituting courses, students are responsible for completing a minimum of 60 credits of upper-division work before a degree will be awarded. Upper-division work is defined as 300 and 400 level classes at a bachelor's degree granting institution.	
CHE 222 General Chemistry II	5	BIO 409 Current Research Topics in Medical Sciences II	2		
MATH 252 Integral Calculus	4	CHE 451 Biochemistry II	4		
SPE 321 Small Group and Team Communication	3	Social Science Elective	3		
Health Biology Elective (upper-division) ³	3	Elective	3		
Total	16	Total	15		
Sophomore Year	Spring	Senior Year	Spring		
CHE 223 General Chemistry	5	Health Biology Elective (upper-division) ³	3		
WRI 227 Technical Report Writing	3	Health Biology Elective (upper-division) ³	4		
Health Biology Elective (upper-division) ³	4	Health Biology Elective (upper-division) ³	4		
Humanities Elective	3	Elective ⁵	3		
Total	15	Total	14		

Total credits required for B.S. in Biology-Health Sciences: 181

Pre-Professional Program in Dentistry

Burt Clark, *Advising Coordinator*

The pre-professional program in dentistry prepares the student for entrance into dental school. While the requirements for admission to dental schools vary and some will accept students earlier, a bachelor's degree is highly encouraged for acceptance. In fact, 82% of first-year dental students have completed a four-year baccalaureate degree before starting dental school and 90% have four years of pre-dental college courses before acceptance. The curriculum at Oregon Institute of Technology provides the prerequisite courses for dental school including a full year of general biology, general chemistry, organic chemistry, biochemistry, advanced anatomy & physiology, and physics. All of these have year-long labs. In addition, health-specific courses in cell biology, clinical pharmacology, medical genetics, medical microbiology, neuroscience, nutrition, pathophysiology, and immunology are taken along with calculus, humanities, psychology, and English composition courses.

Because the pre-dental requirements for each dental school vary slightly, it is suggested by sophomore year of college that students look at the requirements for several dental schools along with their dream school. It is also recommended that students do not use AP credit to fill prerequisites for dental school since most do not accept them. There are eight advisors in Oregon Tech's pre-dental program and it is encouraged that students work closely with the advisor they connect best with. The Biology-Health Sciences Program also urges students to begin volunteering in dental settings, possibly during high school and especially during college. For students still in high school, it is advisable to enroll in many sciences courses before college to help prepare for future success.

Admission to dental school is very competitive and requires strong academic achievement. Besides a strong college GPA and application, students must take the dental admission test (DAT) offered by the American Dental Association. The test measures a student's comprehension of scientific information and academic ability. Once accepted, it will take approximately four years to complete dental school.

For complete program requirements and a list of appropriate courses, please see the Biology-Health Sciences Program. Completion of this program will lead to a Bachelor of Science in Biology-Health Sciences.

Pre-Professional Program in Medicine

Burt Clark, *Advising Coordinator*

This program prepares students for entrance into medical school and is often referred to as pre-med. The curriculum at Oregon Institute of Technology provides a pathway to complete all the prerequisites that medical schools like to see and more. There are eight advisors in the pre-med program and students are encouraged to work closely with the advisor they connect best with. Advisors guide students on courses selection, job or volunteer experience, and lead them through the medical school application process. Admission into medical school requires a four-year bachelor's degree with a preference for a science major over a non-science major. Once accepted, medical school then requires approximately four years of education and three to six years of internship and residency. More than 17,000 students enter medical school each year with half of the class being women.

Students are urged to volunteer in medical settings, possibly during high school and especially during college. For students currently in high school, it is advised that the student enrolls in many sciences courses before college to help them prepare for future success. It is recommended that students do not use AP credit to fill medical school prerequisites since they often do not accept them. Nonetheless, it is encouraged to take AP courses in high school since the rigor is excellent college preparation.

Students considering a career in medicine should explore the websites of the schools they have interest in as the prerequisites for each may vary. Students are suggested to read the Medical School Admissions Requirements (MSAR) published by the Association of American Medical Colleges. The pre-med program at Oregon Tech includes a full year of general biology, general chemistry, organic chemistry, biochemistry, advanced anatomy & physiology, and physics. All of these have year-long labs. In addition, health-specific

courses in cell biology, clinical pharmacology, medical genetics, medical microbiology, neuroscience, nutrition, pathophysiology, and immunology are taken along with calculus, humanities, psychology, and English composition courses. While the curriculum is very challenging, admission into medical school is highly competitive and requires strong academic achievement. The coursework at Oregon Tech helps students prepare for the medical college admission test (MCAT) required by nearly all medical schools. The test, which is divided into four sections includes physical sciences, biological sciences, verbal reasoning, and writing sample, is used to predict a student's ability to succeed academically.

For complete program requirements and a list of appropriate courses please see the Biology-Health Sciences Program. Completion of this program will lead to a Bachelor of Science in Biology-Health Sciences.

Pre-Professional Program in Pharmacy

Burt Clark, *Advising Coordinator*

A pharmacy degree normally takes four years to complete. Most first-year pharmacy students have completed four years of undergraduate education and possess a bachelor's degree in the sciences. One also must complete the prerequisites for the pharmacy school. The curriculum at Oregon Institute of Technology provides the prerequisite courses including a full year of general biology, general chemistry, organic chemistry, biochemistry, advanced anatomy & physiology, and physics. All of these have year-long labs. Additional courses in cell biology, clinical pharmacology, medical genetics, medical microbiology, neuroscience, nutrition, pathophysiology, and immunology are taken along with calculus, humanities, psychology, statistics and English composition courses.

The pre-professional program in pharmacy at Oregon Tech has eight advisors and students are encouraged to work closely with the advisor they connect best with. Students are urged to begin volunteering in pharmacy settings, possibly during high school and especially during college. For students currently in high school, it is recommended to shadow and talk with pharmacists and to take many science courses before college to help prepare

for future success.

The application process to pharmacy school is done through the Pharmacy College Application Service (PharmCAS). Students are encouraged to look at their web site while also looking at the sites of schools they have an interest in. Some pharmacy schools require the Pharmacy College Admissions Test (PCAT). Oregon State University and the pharmacy schools in California do not. Admission to school is competitive so a strong undergraduate GPA, community service, and communications and leadership skills will help.

For complete program requirements and a list of appropriate courses please see the Biology-Health Sciences Program. Completion of this program will lead to a Bachelor of Science in Biology-Health Sciences.

Pre-Professional Program in Veterinary Medicine

Burt Clark, *Advising Coordinator*

The pre-professional program in veterinary medicine prepares students for entrance into veterinary school. There are twenty-eight veterinary schools in the United States and it is highly recommended that students visit the websites of the schools they are interested in. The prerequisites for each school vary slightly. There are eight advisors in the program and students should work closely with the advisor they connect best with.

Admission to veterinary school is competitive and requires a good undergraduate GPA in addition to shadowing or working with a veterinarian. Students are encouraged to work in a clinical practice, volunteer in an animal shelter, or work at a zoo or rehabilitation facility while completing their undergraduate courses. Students currently in high school should continue to take sciences courses and, if available, be involved in 4H or FFA. Advisors recommend that students do not use AP credit to fill prerequisites for veterinary school since most do not accept them.

Being a resident of a state that has a veterinary school is also a major advantage to being accepted since most schools take few out-of-state applicants. If the student's home state does not have a veterinary school, hope-

fully the state "buys" seats from a veterinary school in a neighboring state for its residents. The WICHE program in the western United States allows out-of-state students to attend veterinary school at Colorado State University at Fort Collins, Oregon State University, Washington State University or the University of California at Davis veterinary schools for in-state tuition.

Many veterinary schools require students to take the general test of the Graduate Record Examination (GRE). It is offered monthly and is often taken in the junior year of undergrad. The majority of first-year veterinary student have completed their bachelor's degree at a four-year university.

The program at Oregon Institute of Technology offers the prerequisite courses (and more) for veterinary school including a full year of general biology, general chemistry, organic chemistry, biochemistry, advanced anatomy & physiology, and physics. All of these have year-long labs. In addition, health-specific courses in wildlife rehabilitation, cell biology, clinical pharmacology, medical genetics, medical microbiology, neuroscience, nutrition, pathophysiology, and immunology are taken along with calculus, humanities, psychology, English composition and public speaking courses. Business-related courses are also recommended.

For complete program requirements and a list of appropriate courses please see the Biology – Health Sciences Program. Completion of this program will lead to a Bachelor of Science in Biology – Health Sciences.

Applied Physics Minor

Students wishing to pursue the minor in Applied Physics should consult with physics faculty in the Natural Sciences Department for advising.

The Minor in Applied Physics is available to any student and is especially recommended for individuals interested in pursuing careers or graduate studies in physical or applied sciences and engineering. The Minor in Applied Physics requires completion of 32 credits of coursework as outlined below. A grade of "C" or better is required in all courses applied toward the minor.

Required Coursework:

1. PHY 221, 222, 223 – General Physics w/ Calculus (12 credits total)
2. MATH 254N – Vector Calculus I (4

credits)

3. MATH 321 – Applied Differential Equations I (4 credits)
4. At least 12 credits of upper-division physics Electives (PHY prefix)

Up to six credits of the upper-division elective coursework may be satisfied by approved non-PHY electives that utilize the technical application of physics (see list below; other courses must be approved by the physics faculty and the chair of the Natural Sciences department on a case-by-case basis). Of the 12 upper-division elective credits, six cannot be counted toward the student's major program.

Approved Upper-Division Electives:

Any course 300-level or higher that has a PHY prefix. Examples include:

PHY 311	Introduction to Modern Physics
PHY 330	Electricity and Magnetism
PHY 448	Geometric Optics
PHY 449	Radiometry & Optical Detection
PHY 450	Physical Optics
PHY 451	Lasers
PHY 452	Fiber Optics
PHY 453	Optical Metrology
PHY 410	Mathematical Methods

Approved non-PHY Electives:

EE 341	Electricity and Magnetism with transmission lines
EE 343	Solid State Electronic Devices
REE 344	Nuclear Energy
REE 345	Wind Power
REE 347	Hydroelectric Power
MECH 312	Dynamics II
MECH 318	Fluid Mechanics I
MECH 323	Heat Transfer I
MECH 417	Fluid Mechanics II
MECH 480	Mechanical Vibrations
MECH 313	Thermodynamics II

Note: Not all courses are offered every year or on every campus. Additional prerequisites may be required; see catalog descriptions and recent course schedules for details.

Biology Minor

For advising, see Kerry Byrne

The biology minor is open to all majors except Biology-Health Sciences majors. It is especially recommended for students who want to further their knowledge in biology as it relates to their chosen field. The minor offers specialized courses in biology and will document student proficiency in specific areas of biology. A minimum of 24 credits is required to complete the minor. Any substitution for elective courses must be approved by an

advisor in the Natural Sciences Department. Students are advised to pay strict attention to prerequisites when selecting courses for the biology minor.

Requirements of Minor

Required core courses:

- BIO 211 Principles of Biology
 BIO 212 Principles of Biology
 BIO 213 Principles of Biology

And a minimum of 12 credits upper-division course work from the following list:

- BIO 313 Botany*
 BIO 317 Invertebrate Biology
 BIO 327 General Ecology*
 BIO 331 Human Anatomy and Physiology I
 BIO 332 Human Anatomy and Physiology II
 BIO 333 Human Anatomy and Physiology III
 BIO 337 Aquatic Ecology*
 BIO 341 Medical Genetics
 BIO 342 Cell Biology
 BIO 345 Medical Microbiology
 BIO 351 Vertebrate Biology
 BIO 352 Developmental Biology
 BIO 357 Introduction to Neuroscience
 BIO 426 Evolutionary Biology
 BIO 436 Immunology

* Courses offered in alternating years.

Chemistry Minor

For advising, see Seth Anthony

Oregon Tech offers a minor in chemistry to students in all majors interested in deepening their knowledge of chemistry, the “central science”. A minor in chemistry allows students the opportunity to gain understanding of chemical phenomena, become proficient in techniques, and develop their abilities applying fundamental chemistry concepts to more complex problems in fields from medicine to renewable energy to materials science. A chemistry minor can help prepare students for graduate school, medical school, or professional laboratory or research work.

The minor includes a required core of one year of general chemistry and one term of organic chemistry. Students must then choose 16 credits of chemistry electives to complete the minor. Of these electives, 12 must be upper-division and at least 8 must be CHE courses. A minimum of 16 credits applied towards the minor must be earned at Oregon Tech.

Students wishing to pursue the minor in chemistry should consult with both their primary academic advisor and a chemistry minor advisor.

Requirements of Minor

Required core courses (17 – 19 credits):

- CHE 201/204 or CHE 221 General Chemistry I
 CHE 202/205 or CHE 222 General Chemistry II
 CHE 223, CHE203/206 or General Chemistry III
 CHE 331 Organic Chemistry I

Elective courses (16 credits required; at least 12 must be upper division (300-level or higher) and at least 8 must be CHE courses) At least 6 elective credits must not be counted towards a major (or another minor or program) as required courses or technical electives.:

- CHE 260 Electrochemistry for Renewable Energy Applications
 CHE/ENGR/PHY 305 Nanotechnology
 CHE 315 Environmental Chemistry and Toxicology
 CHE 332 Organic Chemistry II
 CHE 333 Organic Chemistry III
 CHE 450 Biochemistry I
 CHE 451 Biochemistry II
 CHE 452 Biochemistry III
 CHE 465 Fate and Transport of Pollutants
 CLS 415 Clinical Chemistry I
 CLS 416 Clinical Chemistry II
 CLS 417 Clinical Chemistry III
 EE 343 Solid State Electronic Devices
 ENGR 355 Thermodynamics
 MECH 360 Engineering Materials II
 MET 160 Materials I
 PHY 311 Modern Physics
 REE 331 Fuel Cells
 REE 333 Batteries
 REE 335 Hydrogen
 REE 337 Materials for Renewable Energy Applications
 REE 346 Biofuel and Biomass
 Any other CHE course at the 200-level or higher, except for pharmacology courses (CHE 210, CHE 350, CHE 360)
 Other electives approved by the Natural Sciences department.

Sustainability Minor

For advising, see Michael Hughes, Environmental Science

The sustainability minor is available to all students in all majors and is recommended for any student who wants to develop sustainability literacy and gain credit for a breadth of study encompassing the three primary cores of sustainability education: natural sciences, humanities and social sciences, and engineering and technology. The minor in sustainability acknowledges the completion of 18 credits as outlined below. Introductory and capstone courses are included and at least one course must be taken in each of

the three core areas. At least 12 of the 18 credits must be upper division. Advising for the minor is performed by a primary advisor with support from secondary advisors representing each of the three core areas.

Requirements of Minor

Required core courses (7 credits):

- BIO 484 Sustainable Human Ecology
 SOC 235 Introduction to Sustainability

Elective Courses (At least 11 credits required with at least one course taken from each area: natural sciences, humanities and social sciences, and engineering and technology):

Natural Sciences

- BIO 111 Introduction to Environmental Sciences
 BIO 327 General Ecology
 BIO 337 Aquatic Ecology
 CHE 260 Electrochemistry for Renewable Energy Applications
 CHE 315 Environmental Chemistry and Toxicology
 CHE 465 Fate and Transport of Pollutants
 ENV 265 Field Methods in Environmental Sciences
 ENV 314 Environmental Management and Restoration
 ENV 325 Wetland and Riparian Ecology
 ENV 336 Environmental Hydrology
 ENV 365 Advanced Field Methods in Environmental Sciences
 ENV 427 Greenhouse Gas Accounting/Footprints
 ENV 469 Treatment Wetlands
 GEOG 105 Physical Geography
 GEOG 305 Geomorphology
 GEOG 315 Climatology
 GEOG 335 Soil Science
 Other courses as approved by the advisory team

Humanities and Social Sciences

- ANTH 335 The Built Environment
 ANTH 452 Globalization
 COM 205 Intercultural Communication
 COM 365 Electronic Communication and Society
 ECO 357 Energy Economics and Policy
 GEOG 106 Cultural Geography I
 GEOG 107 Cultural Geography II
 GEOG 108 Cultural Geography III
 HIST 225 The Industrial Revolution
 HIST 226 Technology and the Modern World
 HIST 356 A History of Energy
 HIST 357 History of the Electric Grid
 HUM 125 Introduction to Technology, Society and Values
 PHIL 331 Ethics in the Professions
 PHIL 342 Business Ethics
 PSY 334 Behavior Modification I
 Other courses as approved by advisory team

Engineering and Technology

- BUS 385 Ecotourism
 BUS 415 Environmental Regulation
 BUS 416 Environmental Management
 CE 405 Sustainability and Infrastructure
 CE 457 Transportation and Land Development
 CE 481 Environmental Engineering I

CE 489 Treatment Wetlands
CE 586 Environmental Engineering II
GIS 134 Geographic Information Systems
GIS 103 The Digital Earth
MET 416 Energy Systems
REE 201 Introduction to Renewable Energy
REE 253 Electromechanical Energy Conversion
REE 331 Fuel Cells
REE 346 Biofuels and Biomass
REE 427 Greenhouse Gas Accounting/Footprints
Other courses as approved by the advisory team

Environmental Sciences Program

Michael Hughes, *Program Director*
John Ritter, *GIS Emphasis Coordinator*

Degree Offered

Bachelor of Science in Environmental Sciences

Dual Major Options

Bachelor of Science in Civil Engineering and Environmental Sciences
Advising Coordinator: David Thmert

Bachelor of Science in Renewable Energy Engineering and Environmental Sciences
Advising Coordinator: James Zipay

The Bachelor of Science degree in Environmental Sciences emphasizes the application of scientific reasoning and methodology to problems concerning: (1) environmental processes and patterns, and/or (2) abiotic-biotic interactions in ecosystems. Methodological training focuses on techniques – and instrumentation – in conjunction with GIS and geospatial analysis.

The program rests on three cores: a core of six lower-division courses in introductory environmental science, a basic sciences core of nine courses (one year each of biology, chemistry and physics), and a mathematics core of five courses, including differential and integral calculus and statistics. The program is by definition interdisciplinary and utilizes the practical knowledge and skills of faculty from a broad range of backgrounds and expertise.

Students may choose to concentrate in one of four technical emphasis areas; Watershed Science, Sustainable Technologies, Geographic Information Systems (GIS) and Biological Resources. Under the direction of an advisor, students may forego any one area and instead blend offerings from all four areas to create a more individually focused curriculum. The emphasis in Watershed Science focuses on the structure, processes, patterns, ecology, management, and restoration of terrestrial, riparian and aquatic ecosystems. Special attention is granted to the flows of energy and materials through these ecosystems, as well as human impacts on ecosystem functions. The emphasis in Sustainable Technologies focuses on the characterization of environmental processes and patterns for application to the

management, planning, and development of renewable resources, with special attention to water and renewable energy. The emphasis in GIS builds on the GIS core curriculum to advance student knowledge and skills in the application of geospatial concepts and technologies to problems in environmental sciences and natural resource management.

The emphasis in Biological Resources...

The core curriculum and technical emphasis areas are supported by courses taught by faculty in the Natural Sciences Department and other departments and programs on campus, including Geomatics, Civil Engineering, Renewable Energy Engineering, Mathematics, Humanities and Social Sciences, and Communication Studies.

Objectives

The objectives of the Environmental Sciences Program are:

1. To provide students with knowledge and training in the practical application of scientific reasoning and methodology to problems in environmental science and natural resource management.
2. To present complex environmental problems from a systems perspective that demands rigorous data acquisition and analytical techniques.
3. To provide exercises that support critical thinking and problem-solving skills, encourage student collaboration, and employ multiple methodological approaches.
4. To prepare students for professional careers and/or graduate studies by nurturing meaningful undergraduate research projects as a fundamental curricular element.

Student Preparation

The Environmental Sciences curriculum is a demanding instructional program requiring the development and use of both qualitative and quantitative analytical perspectives and skills. Prospective students for this program are advised to complete two to three years of high school mathematics and science (biology, chemistry, and physics). Students should also be familiar with computer applications. Students transferring from other science or technical programs, including environmental programs at other institutions, are requested to contact the program director for information on program requirements.

Career Opportunities

Graduates can expect to find employment in, among other places, consulting firms, government agencies (regulatory and research), non-governmental organizations (NGOs), and education and research institutions. Students are also well prepared to enter graduate school. Environmental Sciences students at Oregon Tech have been actively recruited by the U.S. Geological Survey, U.S. Bureau of Reclamation, U.S. Bureau of Land Management, U.S. Fish and Wildlife Service, Oregon State Police Wildlife Enforcement, Klamath County Health Department, Klamath Irrigation District, Klamath County Soil and Water Conservation District, the Nature Conservancy, and JELD-WEN Windows and Doors. Vocational placement of recent graduates has been excellent and many Environmental Sciences majors find part-time or summer employment directly related to their studies and career interests.

Degree Requirements

Students must meet the general education requirements, as stated elsewhere in this catalog, and complete the courses listed in the curriculum to obtain a Bachelor of Science in Environmental Sciences. A total of 184 credits are required for the degree. Students are encouraged to develop a technical emphasis area based on their own interests. The sophomore project provides an opportunity for independent investigation early in the student's academic career. Students prepare the groundwork for their senior capstone project at the end of the junior year in BIO 473 - Senior Project Data Collection. The project culminates in BIO 474 Senior Project Data Analysis and Presentation – in fall of senior year.

Students are required to pass each science course with a grade of "C" or better. This requirement is based on the quantitative skills needed in later courses as well as the degree of integration in subject material that is present throughout the program.

The Environmental Sciences Curriculum

The Environmental Sciences curriculum integrates "hands-on" skills and knowledge. Field or laboratory work are important components of many ES courses. Several freshman

and sophomore courses allow a student to develop skills in computer applications, Geographic Information Systems (GIS), Global Positioning Systems (GPS), simulation modeling, and riparian assessment methods.

Bachelor of Science in Environmental Sciences

Curriculum

Required courses and recommended terms during which they should be taken:

Freshman Year		Fall
BIO 111	Introduction to Environmental Sciences	4
BIO 211	Principles of Biology	4
GEOG 105	Physical Geography	4
GIS 103	The Digital Earth	3
WRI 121	English Composition	3
Total		18

Freshman Year		Winter
BIO 212	Principles of Biology	4
MATH 111	College Algebra	4
	Humanities Elective	3
WRI 122	Argumentative Writing	3
Total		15

Freshman Year		Spring
BIO 213	Principles of Biology	4
GIS 134	Geographic Information Systems	3
MATH 112	Trigonometry	4
	Technical Emphasis Elective*	4
Total		15

Sophomore Year		Fall
CHE 221	General Chemistry I	5
ENV 214	Watershed Science & Technology	3
MATH 251	Differential Calculus	4
	Technical Emphasis Elective*	4
Total		16

Sophomore Year		Winter
CHE 222	General Chemistry II	5
ENV 224	Scientific Reasoning & Methodology	3
ENV 261	Sophomore Project Proposal	2
GIS 205	GIS Data Integration ³	2
MATH 252	Integral Calculus	4
Total		16

Sophomore Year		Spring
CHE 223	General Chemistry III	5
ENV 226	Environmental Data Analysis	3
ENV 262	Sophomore Project	3
SPE 111	Public Speaking	3
Total		14

Junior Year		Fall
CHE 331	Organic Chemistry I	4
PHY 221	General Physics with Calculus **	4
WRI 227	Technical Report Writing	3
	Humanities Elective	3
Total		14

Junior Year		Winter
ENV 472	Senior Project Proposal	2
MATH 361	Statistical Methods I	4
PHY 222	General Physics with Calculus **	4
	Social Science Elective	3
	Technical Emphasis Elective *	4
Total		17

Junior Year		Spring
BIO 327	General Ecology	4
BIO 434	Data Analysis Methods	4
Or		
MATH 362	Statistical Methods II	
ENV 473	Senior Project Data Collection	3
PHY 223	General Physics with Calculus **	4
Total		15

Senior Year		Fall
ENV 474	Senior Project Data Analysis and Presentation	3
SPE 321	Small Group and Team Communication	3
	Social Science Elective	3
	Technical Emphasis Elective *	4
	Writing Elective (327,328,350,410)	3
Total		16

Senior Year		Winter
ENV 314	Environmental Management and Restoration	3
	Social Science Elective	3
	Technical Emphasis Elective*	4
	Technical Emphasis Elective*	3
Total		13

Senior Year		Spring
BIO 484	Sustainable Human Ecology	4
ECO 201	Principles of Economics	3
	Humanities Elective	3
	Technical Emphasis Elective *	3
	Technical Emphasis Elective *	3
Total		16

* May be 3 or 4 credits; a total of 31 credits of "technical emphasis" courses are required. At least one technical emphasis elective must be an upper-division chemistry course.

** Algebra-based PHY 201, PHY 202, and PHY 203 or calculus-based PHY 221, PHY 222, and PHY 223 are acceptable.

Total credits required for B.S. in Environmental Science: 184

¹ Sustainable Technologies Emphasis students substitute MET 160 Engineering Materials I.

Select 31 credits from one of the following areas of emphasis:**Watershed Science Emphasis:**

BIO 313	Botany	4
BIO 337	Aquatic Ecology	4
CHE 315	Environmental Chemistry and Toxicology	3
CHE 325	Soil Science	4
CHE 332	Organic Chemistry II	4
CHE 333	Organic Chemistry III	4
CHE 341	Instrumental Methods/Data Acquisition I	4
CHE 342	Instrumental Methods/Data Acquisition II	4
CHE 455	Water Quality Technology	3
CHE 465	Fate and Transport of Pollutants	4
CE 374	Hydrology	4
CE 473	Groundwater	3
ENV 325	Environmental Microbiology	4
ENV 336	Environmental Hydrology	4
ENV 466	Integrated Watershed Analysis	4
ENV 469	Treatment Wetlands	3
ENV	ENV Elective *	varies
GME 161	Plane Surveying I	4

GIS Emphasis:

ENV	ENV Elective *	varies
ENV	ENV Elective *	varies
GIS 306	Geospatial Raster Analysis	4
GIS 316	Geospatial Vector Analysis I	4
GIS 332	Customizing the GIS Environment I	4
GIS 426	Geospatial Vector Analysis II	4
GIS 432	Customizing the GIS Environment II	4
GIS 446	GIS Database Development	4
GIS 456	GIS Management	3
MIS 115	Visual BASIC Programming	4

Sustainable Technologies Emphasis:

ANTH 335	The Built Environment	3
BUS 304	Engineering Management	3
BUS 416	Environmental Management	3
CHE 260	Electrochemistry for Renewable Energy Applications	4
CE 481	Environmental Engineering	3
CE 473	Groundwater	3
ENV	ENV Elective	varies
MET 160	Engineering Materials I	3
MET 360	Engineering Materials II	3
REE 201	Introduction to Renewable Energy	3
REE 331	Fuel Cells	3
REE 344	Nuclear Energy	3
REE 346	Biofuels and Biomass	3

Biological Resources Emphasis:

BIO 226	Intro to Wildlife Rehabilitation	3
BIO 313	Botany	4
BIO 337	Aquatic Ecology	4
BIO 342	Cell Biology	4
BIO 352	Developmental Biology	4
BIO 426	Evolutionary Biology	4
CHE 332	Organic Chemistry II	4
CHE 333	Organic Chemistry III	4
CHE 450	Biochemistry I	4
CHE 451	Biochemistry II	4
CHE 452	Biochemistry III	4
CIV 315	Principles of Environmental Engineering	4
ENV 469	Treatment Wetlands	3
ENV	Elective	varies
REE 346	Biofuels and Biomass	3

* ENV 207/307/407, ENV 265, ENV 365, ENV 435, advisor approved independent study, or an upper-division elective from another department with advisor approval. Different ENV 207/307/407 seminars may be taken multiple time for credit.

Nursing – Oregon Statewide Integrated Nursing Program

Susan Bakewell-Sachs Ph.D., R.N., P.N.P.-B.C., F.A.A.N School of Nursing Dean and Vice President for Nursing Affairs for OHSU

Tamara Rose, M.S.N., R.N. Campus Associate Dean

Instructors: M. Boham, M. Gran-Moravec, B. Hunter, T. Ross

This program is offered at Oregon Institute of Technology by the Oregon Health & Science University School of Nursing, in cooperation with Oregon Tech.

Degrees Offered

Bachelor of Science with a major in Nursing

The OHSU School of Nursing is a health professions leader in academic productivity and innovative educational programming. It is recognized as a model in educating students for careers in nursing at both the graduate and undergraduate levels. In July 1993, the Nursing Program at Oregon Tech became a member of the Statewide Integrated Nursing Education System for Oregon. Campuses are located in: Ashland, at Southern Oregon University; Klamath Falls, at Oregon Institute of Technology; La Grande, at Eastern Oregon University; Monmouth, at Western Oregon University; and Portland, at Oregon Health & Science University. In addition to a basic baccalaureate degree in nursing, the statewide program offers opportunities for RNs seeking B.S. degrees.

Non-nursing coursework may be taken at Oregon Institute of Technology, a community college, or other accredited institutions of higher learning. Pre-nursing majors must apply and be accepted by the OHSU School of Nursing in order to progress into the nursing major. Admission is dependent on a point system which includes academic performance and a proctored essay.

The baccalaureate in Nursing Program provides the essential foundation for professional nursing licensure and practice. The Nursing Program, as of fall 2006, includes one year (if courses are begun in summer term, or having transfer credits) or two years of pre-nursing courses and then, after acceptance into the program, three years of professional nursing

courses and general courses, as well. Selection into the professional program is competitive.

Nursing courses build upon and complement the liberal arts and science foundation required for professional practice. The graduate of the B.S. program is eligible to complete the registered nursing licensure examination and is prepared to assume responsibility for providing professional nursing care.

Options for Registered Nurses to Obtain a B.S.

There is a process in place for assisting RNs to complete coursework to obtain a B.S. This is an online degree and is not offered on the Oregon Tech campus. Please contact the School of Nursing for information at (866) 223-1811.

Approval and Accreditation

The Nursing Program is approved by the Oregon State Board of Nursing (OSBN) and accredited by the Commission on Collegiate Nursing Education (CCNE) through 2013.

Admission

To be considered for admission to the School of Nursing, a student must submit an online application and official transcripts (www.ohsu.edu/son).

The application process begins October 1 through February 15. The minimum criteria to apply are:

- have 30 credits completed by the end of fall term;
- have completed the Human Anatomy and Physiology I;
- be at the Intermediate Algebra math level;
- have a minimum 3.0 GPA for your prerequisite courses.

Transfer Credits

Transfer credits are accepted subject to review by OHSU Registrar's office for comparability and number of credits which may be granted.

Requirements for Major

Students with a baccalaureate degree in another discipline should see a nursing advisor for requirements with the nursing major.

Bachelor of Science with a Major in Nursing Curriculum

Courses and terms during which they may be taken.

Pre-Nursing

Freshman Year		Summer
SPE 111	Public Speaking†	3
WRI 121	English Composition	3
	Humanities Elective	3
	Social Science Elective	3
	Elective	3
Total		15

Freshman Year		Fall
BIO 231	Human Anatomy and Physiology I	4
CHE 101	Introduction to General Chemistry †	3
CHE 104	Introduction to General Chemistry Laboratory†	1
MATH 100	Intermediate Algebra*	
or		
MATH 243	Introductory Statistic **	4
PSY 201	Psychology	3
Total		15

Freshman Year		Winter
BIO 232	Human Anatomy and Physiology II	4
CHE 102	Introduction to Organic Chemistry •	3
CHE 105	Introduction to Organic Chemistry •	1
PSY 311	Human Growth and Development I	3
WRI 122	Argumentative Writing	3
Total		14

Freshman Year		Spring
BIO 205	Nutrition•	3
BIO 233	Human Anatomy and Physiology III	4
CHE 103	Introduction to Biochemistry•	3
CHE 106	Introduction to Biochemistry •	1
PSY 312	Human Growth and Development II	3
Total		14

* The math competency may be demonstrated by a math placement test or by successful completion of MATH 95/100 Intermediate Algebra or higher.

** Introductory Statistics is a nursing degree requirement.

• Chemistry/Lab is not a nursing prerequisite but it is a prerequisite to the nutrition course here on the Oregon Tech campus. It is highly recommended.

† SPE 111 is a prerequisite to the third writing (WRI 123 or WRI 227) course which is a degree requirement.

Professional Courses

Sophomore Year Fall

NRS 210A	Foundations of Nursing – Health Promotion	4
NRS 210B	Foundations: Practicum	5
WRI 123	Research Writing	
	or	
WRI 227	Technical Report Writing	3
Total		12

Sophomore Year Winter

BIO 105	Microbiology	4
NRS 211	Foundations of Nursing in Chronic Illness I	6
NRS 230	Pharmacology I	3
NRS 232	Pathophysiology I	3
Total		16

Sophomore Year Spring

NRS 212	Foundations of Nursing in Acute Care I	6
NRS 231	Pharmacology II	3
NRS 233	Pathophysiology II	3
Total		12

Junior Year Fall

BIO 235	Human Genetics	3
NRS 322	Nursing in Acute Care II and End-of-Life	9
Total		12

Junior Year Winter

MATH 243	Introductory Statistics*	4
NRS 321	Nursing in Chronic Illness II and End-of-Life	9
Total		13

* MATH 243 may be taken any term.

Junior Year Spring

NRS 410	Population-Based Chronic Illness and Health Promotion	9
NRS 411	Epidemiology	3
Total		12

Senior Year Fall

NRS 412	Leadership, Outcome Management in Nursing	10
	Elective	varies
Total		10+

Senior Year Winter

NRS 424	Integrative Practicum I	9
NRS 424	A-J	1
	Elective	varies
Total		10+

Senior Year Spring

NRS 425	Integrative Practicum II	9
NRS 425	A-J	1
	Elective	varies
Total		10+

Respiratory Care and Sleep Health

Jeff Pardy, *Department Chair*

David Panossian, *Medical Director*

Participating Faculty: P. Cabrera, K. Christensen, L. McLaughlin, K. Rabe, M. Schwartz, J. Shinn, A. Venes

Jeff Pardy, *Program Director, Respiratory Care*

Sarah Woodman, *Clinical Education Director*

Jane Perri, *Program Director, Sleep Health*

Polysomnographic Technology

Degree Offered

Associate of Applied Science in Sleep Health

Certificate Offered

Polysomnographic Technology

Students must successfully complete the core courses required to sit for a national exam. Computer and Internet access is required. Successful completion of the certificate curriculum leads to eligibility to sit for the national Registered Polysomnographic Technologists examination (RPSGT).

Associate of Applied Science in Sleep Health – Polysomnographic Technology Option

Students must successfully complete the courses in one of the certificate programs for Polysomnographic Technology or Clinical Sleep Health and other general education courses. The degree completion courses can be taken from Oregon Tech or transferred from another college. A minimum of 30 credit hours must be taken from Oregon Tech. Computer and Internet access are required.

Students who have completed the RPSGT or CCSH exams may pursue a Bachelor of Science in Health Care Management, Clinical Option. Students complete health management classes offered through the Oregon Tech Management Department either in the classroom or via the online education program while working in their hometown. See the Management Department section of this catalog for more information regarding this degree.

Accreditation

The Polysomnographic Technology Program

is fully accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP). The curriculum follows the guidelines suggested by the Board of Registered Polysomnographic Technologists. Inquiries regarding accreditation should be directed (CAAHEP). Commission on Accreditation of Allied Health Education Programs, (CoPSG) is a specialized accrediting body recognized by the Council for Higher Education Accreditation and/or the Secretary of the U.S., Department of Education. CAAHEP contact information: 1361 Park Street, Clearwater, FL 33756, Phone: 727-210-2350

Career Opportunities

Registered Polysomnographic technologists, under medical direction, conduct diagnostic testing and evaluation of sleep disorder patients. Their duties involve the use of highly advanced technology and compassionate patient care. Graduates are employed by hospitals, out-patient testing facilities and bio-medical equipment manufacturers. Currently, there is a severe nationwide shortage of Registered Polysomnographic Technologists.

Licensure

Students are eligible to sit for the national RPSGT exam administered by the Board of Registered Polysomnographic Technologists following the completion of the courses in the certificate program.

Student Preparation

A science background is beneficial to those entering any health sciences profession. It is recommended that the student considering a career in Polysomnography take a college bound course of study in high school that includes algebra, chemistry and biology or human anatomy and physiology. It is recommended that students take courses in Microsoft Word, Excel and PowerPoint in high school. Students are required to provide proof of completion either Cardio Pulmonary

Resuscitation (CPR) or Basic Cardiac Life Support (BCLS) prior to admission.

Computer Proficiency Requirement

Demonstrated computer proficiency is required by the Board of Registered Polysomnographic Technologists to be eligible to sit for the national exam. The PSG Program is an online education program requiring basic computer proficiency to be successful. Successful completion of the program therefore, indicates basic computer proficiency.

Degree Completion Program

The associate degree program offers a degree completion program for Registered Polysomnographic Technologists who lack a degree. The courses for this program can be taken through the Online Education Department or in the classroom. Two of the required courses are not available online and must be taken either in the Oregon Tech classroom or a local college and transferred. The communication courses are offered through the online education program of other colleges in the Oregon University System.

Upon receipt of the necessary documentation, specific college credits will be awarded to qualified applicants for having passed the Registered Polysomnographic Technologists examination.

Clinical Requirements

All applicants must meet the general admissions requirements to enroll in the Polysomnographic Technology Program. To be eligible for admission into the Polysomnographic Technology Program, applicants must meet the following criteria:

1. Applicants for the certificate program must be high school graduates. If a prospective candidate is not currently employed in a sleep facility, an appropri-

ate site must be found and a clinical agreement between Oregon Tech and that facility must be established prior to beginning classes.

- Candidates must provide proof of completion of either a Cardio Pulmonary Resuscitation (CPR) course or a Basic Cardiac Life Support (BCLS) course prior to enrollment.
- Candidates must submit immunization records prior to their clinical placement.
- Criminal background clearance is required prior to acceptance and some clinical sites may require drug screening.
- One full shift of job shadowing is required prior to applying to the program.
- All Prospective candidates must speak with the program director Dr. Jane Perri (937-750-5416) prior to submitting their application

Graduation Requirements

Minimum graduation requirements for the A.A.S are the successful completion of 43 credit hours of general education courses and 47 credit hours in the area of specialization with a GPA of 2.0 or better. In addition, a final grade of "C" or better must be earned in all professional courses (PSG, ECHO, and RCP), communication courses and science/mathematics course to continue in the program. This requirement also applies to the certificate program.

In order to prepare for the national registry exam, students are required to participate in a practical exam and a comprehensive written exam at the conclusion of the certificate program. Students are required to come either to Medford Oregon or to Dayton, Ohio for one day of residency. Passage of these exams is required to complete the certificate program. Associate degree students who have already obtained their national licensure are not required to complete this requirement.

Polysomnographic Technology Certificate Curriculum

A certificate will be awarded to students completing 47 credit hours of course work in Polysomnography. This program is fully accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP). Completion of the certificate will allow the graduate to sit for the national registry exam in Polysomnographic Technology.

Required courses:

Course #	Title	Credits
BIO 200	Medical Terminology	2
ECHO 227	Basic ECG Recognition and Testing	3
PSG 211	Fundamentals of PSG and Patient Care	3
PSG 221	Physiology of Sleep	3
PSG 231	Sleep Disorders Pathology	4
PSG 246	Sleep Disorders in Women	3
PSG 264	Pediatric/Neonatal Polysomnography	4
PSG 271A	Clinical Polysomnographic Technology Part C	6
PSG 271B	Clinical Polysomnographic Technology Part C	6
PSG 271C	Clinical Polysomnographic Technology Part C	6
OR		
PSG 272	Clinical Polysomnographic Technology I	9
PSG 273	Clinical Polysomnographic Technology II	9
PSG 291	Clinical Sleep Educator	3
RCP 120	Interventions in Gas Exchange	4
Total		47

Demonstrated computer proficiency is required by the Board of RPGST. After completion of the Web-based program, the student will have demonstrated computer proficiency.

The clinical Polysomnographic technology courses require placement in clinical sites. Students are responsible for selecting an accredited sleep disorder facility prior to admission into the program. Site agreements between Oregon Tech and the accredited facility must be in place for the student to begin these courses. On-site preceptors will work in conjunction with Oregon Tech faculty to ensure an excellent training experience.

Associate of Applied Science in Sleep Health, Polysomnographic Technology Option Curriculum

All courses in the Certificate Program and all courses listed below are required to earn the A.A.S. degree:

Course #	Title	Credits
BIO 231	Human Anatomy and Physiology I	4
BIO 232	Human Anatomy and Physiology II	4
BIO 233	Human Anatomy and Physiology III	4
MATH 243	Introductory Statistics	4
PSY	Psychology (PSY 201, PSY 202 or PSY 203)	3
SPE 111	Public Speaking	3
WRI 121	English Composition	3
WRI 122	Argumentative Writing	3
WRI 227	Technical Report Writing	3
	Math/Science/Social Science Elective	6
	Humanities Elective	3
	Electives	3
Total		43

Total Credit Hours for A.A.S. Degree Sleep Health Polysomnographic Technology Option

Polysomnographic Technology Certificate Courses	47
Additional Courses	43
Total Credit Hours	90

Clinical Sleep Health

Degree Offered

Associate of Applied Science in Sleep Health, Clinical Sleep Health Option

Certificate Offered in Clinical Sleep Health

Students must successfully complete the core courses required to sit for a national exam. Computer and internet access is required. Successful completion of the certificate curriculum leads to eligibility to sit for the national Certified Clinical Sleep Health examination (CCSH).

The program objectives and focus are to provide content knowledge in the following domains: Sleep Over the Lifespan, Clinical Evaluation and Management, Patient and Family Communication and Education; and Program Maintenance and Administration. Successful completion of the certificate curriculum leads to eligibility to sit for the national Clinical Sleep Health examination (CCSH).

Associate of Applied Science in Sleep Health – Clinical Sleep Health Options

Students must successfully complete the courses in the certificate program for Clinical Sleep Health and 46 other general education credits. The degree completion courses can be taken from Oregon Tech or transferred from another college, however at least 30 credits must be taken from Oregon Tech. Successful completion of the two year curriculum leads to eligibility to sit for the national Certified Clinical Sleep Health (CCSH) exam. Computer and Internet access is required.

Students who have completed the CCSH exam may pursue a Bachelor of Science in Health Care Management, Clinical Option. Students complete health management classes offered through the Oregon Tech Management Department either in the classroom or via the online education program while working in their hometown. See the Management Department section of this catalog for more information regarding this degree.

Accreditation

The Clinical Sleep Health Program is accredited under the university accreditation

by the Northwest Commission on Colleges and Universities (NWCCU), 8060 165th Avenue, N.E., Suite 100, Redmond, WA 98052-3981. NWCCU is an institutional accrediting body recognized by the Council for Higher Education and/or the Secretary of the U.S. Department of Education. As of this date, Commission on Accreditation of Allied Health Education Programs (CAAHEP) does not have an accrediting body for this degree.

Career Opportunities

Certified Clinical Sleep Health specialists, under medical direction, conduct diagnostic testing, evaluation of sleep disorder patients, patient/community education, compliance certification, status evaluations, and coordination of patient care plans. Their duties involve the use of highly advanced technology and compassionate patient care. Graduates are employed by hospitals, out-patient testing facilities and bio-medical equipment manufacturers.

Licensure

Students are eligible to sit for the national CCSH exam administered by the Board of Registered Polysomnographic Technologists following the completion of the courses in the certificate program.

Student Preparation

The Certificate in Clinical Sleep Health is designed for those who have an approved medical license and at least an associate degree. Applicants must have one of the following credentials to be eligible for admission into the certificate program.

Polysomnographic Technologist (RPSGT) or Sleep Technologist (RST)
Respiratory Therapist (RRT, CRT)
Neurodiagnostic Technologist (REETG, CLTM)
Health Educator (CHES)
Nurse (RN, LPN, MSN) or Nurse Practitioner (NP)
Physician (MD, DO)
Physician Assistant (PA)
Dentist (DDS)
Doctor of Philosophy (PhD) in health, counseling, science

The AAS degree is for those who hold a current license in any of the above areas, but do not have an associate (or higher) degree. Candidates for the national registry exam must

hold a minimum of an associate degree.

Computer Proficiency Requirement

The CSH Program is an online education program requiring basic computer proficiency to be successful.

Clinical Requirements

All applicants must meet the general admissions requirements to enroll in the Polysomnographic Technology Program. To be eligible for admission into the Polysomnographic Technology Program, applicants must meet the following criteria:

1. Applicants for the certificate program must be licensed in one of the medical fields listed above and hold at least an associate degree. **All prospective candidates must be currently employed in a facility that treats patients with sleep disorders, and the medical director or clinical manager must agree to allow the candidate to complete 400 hours of externship under his or her direction.**
2. Candidates must provide proof of completion of either a Cardio Pulmonary Resuscitation (CPR) course or a Basic Cardiac Life Support (BCLS) course prior to enrollment.

Graduation Requirements

Minimum graduation requirements for the A.A.S are the successful completion of 46 credit hours of general education courses and 45 credit hours in the area of specialization with a GPA of 2.0 or better. In addition, a final grade of "C" or better must be earned in all professional courses (CSH, BUS, and BIO), communication courses and science/mathematics course to continue in the program. This requirement also applies to the certificate program.

Clinical Sleep Health Certificate Curriculum

A certificate will be awarded to students completing 45 credit hours of course work in Clinical Sleep Health.

Required courses:

Course #	Title	Credits
BIO 200	Medical Terminology	2
BUS 337	Health Care Marketing	3
BUS 317	Health Care Management	3
CSH 201	Human Development and Behavioral Health Modules	3
CSH 220	Sleep Disorders and Co-Morbidities	3
CSH 225	Impact of Neurologic Disorders on Sleep	3
CSH 236	Pharmacology of Sleep	3
CSH 242	Evaluation and Measurement Tools	3
CSH 233	Sleep Therapies and Compliance	3
CSH 268	Learning, Health Literacy, and Community Education	3
CSH 276	Capstone Project	3
CSH 277	Clinical Sleep Health Externship (400 contact hours)	13
Total		45

Associate of Applied Science in Sleep Health, Option: Clinical Sleep Health Curriculum

All courses in the Certificate Program and all courses listed below are required to earn the A.A.S. degree:

Course #	Title	Credits
BIO 231	Human Anatomy and Physiology I	4
BIO 232	Human Anatomy and Physiology II	4
BIO 233	Human Anatomy and Physiology III	4
MATH 243	Introductory Statistics	4
PSY	Psychology (PSY 201, PSY 202 or PSY 203)	3
SPE 111	Public Speaking	3
WRI 121	English Composition	3
WRI 122	Argumentative Writing	3
WRI 227	Technical Report Writing	3
	Math/Science/Social Science Elective	6
	Humanities Elective	3
	Electives	6
Total		46

Total Credit Hours for A.A.S. Degree in Sleep Health, Option: Clinical Sleep Health

Clinical Sleep Health Certificate Courses	45
Additional Courses	46
Total Credit Hours	91

Respiratory Care Program

Degree Offered

Bachelor of Science in Respiratory Care

The Bachelor of Science degree program prepares the respiratory care student for entry into the respiratory care profession and eligibility for the National Board for Respiratory Care (NBRC) certificate examination (CRT) and registry examinations (RRT). Upon successful completion of the program, the graduate is eligible to apply for state licensure.

Accreditation

The Respiratory Care Program is fully accredited by the Commission on Accreditation for Respiratory Care (www.coarc.com), 1248 Harwood Rd., Bedford, TX 76021, (817) 283-2835.

Career Opportunities

Registered respiratory therapists are physician extenders who, under medical direction, administer cardiopulmonary care, evaluate and assess pulmonary patients, and administer medications and diagnostic tests when appropriate. Their duties involve the use of many of the latest advances in medical arts, sciences, and technology. Graduates are employed in hospitals, physician's offices, rehabilitation facilities, home-care agencies and health care promotion centers as caregivers, managers and educators.

Licensure

Students, when applying for licensure, will be asked if they have ever been convicted of a criminal offense, or if they have a history of drug or alcohol abuse. Students with a concern in this area should immediately contact the Oregon Respiratory Therapist Licensing Board (ORTLB) prior to applying to this program.

Program Objectives

Upon completion of the program, graduates will demonstrate:

1. Professional behavior consistent with employer expectations as advanced level respiratory therapists (affective domain).
2. The ability to comprehend, apply and evaluate clinical information relevant to their roles as advanced-level respiratory therapists (cognitive domain).
3. The technical proficiency in all the skills necessary to fulfill their roles as advanced level respiratory therapists (psychomotor domain).

Expected Program Learning Outcomes

Students in the program will demonstrate:

- The ability to communicate effectively in oral, written and visual forms.
- Knowledge of the respiratory care code of ethics and ethical and professional conduct.
- The ability to function effectively as a member of the healthcare team.
- Knowledge and application of mechanical ventilation and therapeutics.
- Knowledge and application of cardiopulmonary pharmacology and pathophysiology.
- Management of respiratory care plans for adult, neonatal and pediatric patients.

Pre-Respiratory Care Freshman Year

Enrollment is open to all students who meet the general entry requirements to Oregon Institute of Technology. Students will be listed as Pre-Respiratory Care students.

Students will be selected into the professional curriculum based on cumulative grade-point average, non-smoking status, performance on an anatomy and physiology test and submission of a technical paper. Alternatively, students may be admitted based upon successful completion of a CoARC accredited associate degree program in respiratory care.

Students are strongly advised to complete all the general education courses in the freshman year curriculum before making application to the professional program.

Selections will be made at the end of the spring and summer terms of the Pre-Respiratory Care year. The number of students selected each year will be determined by the availability of clinical sites and other resources, which means that the number of qualified applicants may exceed the number of spaces available. When that is the case, students with the highest cumulative GPA are the first to be offered a position in the program.

Degree Completion Program

The Respiratory Care Program offers a degree completion program for respiratory therapists who wish to pursue a bachelor's degree in their field. The program is offered online and requires collaborative learning. Admission is

based on successful completion of a CoARC accredited associate degree in respiratory care. When students have completed RCP 442 and have submitted documentation of the Registered Respiratory Therapist credential college credit is granted. Students must participate in an orientation. Each prospective student's academic credits will be individually evaluated to determine acceptability of the non-professional coursework and the sequencing of the professional courses. Every student must meet the Oregon Tech general education requirements for graduation. The Respiratory Care Degree Program includes the presentation of a senior project.

Graduation Requirements

All credits listed in the curriculum for the catalog year a student begins a program must be fulfilled. A minimum of 187 credits must be completed and students must maintain a 2.00 GPA to be eligible for graduation. In addition, a final grade of "C" or better must be earned in all professional courses (RCP), communication courses and science/mathematics courses to continue in the program. All curricular requirements must be met within five academic years once the student is admitted into the professional program as a sophomore.

Bachelor of Science in Respiratory Care Curriculum

Required courses and terms during which they may be taken.

Pre-Respiratory Care

Freshman Year		Fall
BIO 231	Human Anatomy and Physiology I	4
CHE 101	Introduction to General Chemistry	3
CHE 104	Introduction to General Chemistry Laboratory	1
MATH 111	College Algebra	
or		
MATH 243	Introductory Statistics	4
WRI 121	English Composition	3
Total		15

Freshman Year		Winter
BIO 232	Human Anatomy and Physiology II	4
PSY	Psychology (PSY 201, PSY 202 or PSY 203)	3
WRI 122	Argumentative Writing	3
	Humanities Elective	3
	Social Science Elective	3
Total		16

Freshman Year		Spring
BIO 200	Medical Terminology	2
BIO 233	Human Anatomy and Physiology III	4
SPE 111	Public Speaking	3
	Humanities Elective	3
	Social Science Elective	3
Total		15

Freshman Year		Summer
COM 205	Intercultural Communication	3
WRI 227	Technical Writing	3
	Humanities Elective	3
	Social Science Elective	3
	Math/Science/Social Science Elective	1
Total		13

Professional Courses

Sophomore Year		Fall
BIO 336	Essentials of Pathophysiology	3
CHE 360	Clinical Pharmacology for the Health Professions	3
RCP 100	Matriculation	2
RCP 231	Pulmonary Physiology	4
Total		12

Sophomore Year		Winter
BIO 105	Microbiology	4
RCP 235	Arterial Blood Gases	3
RCP 236	Cardiopulmonary Dynamics	3
RCP 241	Respiratory Gas Therapeutics	4
Total		14

Sophomore Year		Spring
RCP 221	Introduction to Patient Assessment	1
RCP 223	Emergent Chest Radiographic Interpretation	2
RCP 252	Cardiopulmonary Pharmacology	4
RCP 336	Hyperinflation Therapies	2
SPE 321	Small Group and Team Communication	3
Total		12

Junior Year		Fall
RCP 337	Pulmonary Pathology	4
RCP 351	Mechanical Ventilation I	4
RCP 388	Advanced Neonatal Respiratory Care	4
Total		12

Junior Year		Winter
RCP 352	Mechanical Ventilation II	4
RCP 386	Critical Care I	4
RCP 389	International Neonatology	4
Total		12

Junior Year		Spring
RCP 326	Disaster Preparedness	2
RCP 335	Exercise Physiology and Education	2
RCP 345	Cardiopulmonary Diagnosis and Monitoring	3
RCP 353	Mechanical Ventilation III	4
RCP 387	Critical Care II	2
Total		13

Senior Year		Summer
RCP 350	Introduction to Clinical	9
RCP 366	Clinical Simulation	3
RCP 440	Case Management I	3
Total		15

Senior Year		Fall
RCP 441	Case Management II	3
RCP 450	Clinical Care I	9
Total		12

Senior Year		Winter
RCP 442	Case Management III	3
RCP 451	Clinical Care II	9
Total		12

Senior Year		Spring
RCP 452	Clinical Care III	12
RCP 460	Advanced Life Support	2
Total		14

Total credits required for B.S. in Respiratory Care: 187

Bachelor's Degree Completion Respiratory Care

The Respiratory Care program offers a degree completion program for registered technologists in good standing, who wish to pursue a bachelor's degree in their field. The program is offered completely online. There is no on campus residency requirement.

Courses granted for Registered Respiratory Therapist (RRT)

RCP 100	Matriculation (waived)	0
RCP 221	Introduction to Patient Assessment	1
RCP 223	Emergent Chest Radiographic Interpretation	2
RCP 231	Pulmonary Physiology	4
RCP 235	Arterial Blood Gases	3
RCP 236	Cardiopulmonary Dynamics	3
RCP 241	Respiratory Gas Therapeutics	4
RCP 252	Cardiopulmonary Pharmacology	4
RCP 336	Hyperinflation Therapies	2
RCP 337	Pulmonary Pathology	4
RCP 350	Introduction to Clinical	9
RCP 351	Mechanical Ventilation I	4
RCP 352	Mechanical Ventilation II	4
RCP 386	Critical Care I	4
RCP 450	Clinical Care I	9
RCP 451	Clinical Care II	9
RCP 452	Clinical Care III	12

Oregon Tech Degree Completion Courses

BIO 336	Essentials of Pathophysiology	3
CHE 360	Clinical Pharmacology for the Health Professions	3
COM 205	Intercultural Communication	3
RCP 100	Introduction to Respiratory Care	2
RCP 326	Disaster Preparedness	2
RCP 335	Exercise Physiology and Education	2
RCP 345	Cardiopulmonary Diagnosis and Monitoring	3
RCP 353	Mechanical Ventilation III	4
RCP 366	Clinical Simulation	3
RCP 387	Critical Care II	2
RCP 388	Advanced Neonatal Respiratory Care	4
RCP 389	International Neonatology	4
RCP 440	Case Management I	3
RCP 441	Case Management II	3
RCP 442	Case Management III	3
RCP 460	Advanced Life Support	2
SPE 321	Small Group and Team Communication	3
WRI 227	Technical Report Writing	3
	Humanities Elective	6
	Social Science Elective	6

Prerequisite/Transfer Courses

BIO 105	Microbiology	4
BIO 200	Medical Terminology	2
BIO 231	Human Anatomy and Physiology I	4
BIO 232	Human Anatomy and Physiology II	4
BIO 233	Human Anatomy and Physiology III	4
CHE 101	Introduction to General Chemistry	3
CHE 104	Introduction to General Chemistry Laboratory	1
MATH 111	College Algebra or	
MATH 243	Introductory Statistics	4
PSY	Psychology 201, 202, or 203	3
SPE 111	Public Speaking	3
WRI 121	English Composition	3
WRI 122	Argumentative Writing	3
	Humanities Elective	3
	Social Science Elective	3
	Elective	2

Selected Courses in Physical Education and Health Education

Physical Education Philosophy and Courses

At Oregon Institute of Technology, the physical education philosophy is that every man and woman can achieve and maintain fitness through a sound program based on varied developmental, sport, and recreational activities. The physical education courses provide basic instruction in vigorous activities.

Course offerings include fitness training, weight lifting, aerobics activities, archery, ice skating, rugby, recreational basketball, tai chi, zumba, yoga, kick boxing, core strength & balance, pilates, rowing, belly dance, scuba, swim classes, relaxation & flexibility, varsity sports and major sports seminars, including weight loss and weight loss management. Other offerings include wilderness navigation, cross country skiing and snowshoeing.

Health Education Philosophy and Courses

Selected courses in health education are provided to assist students to prevent physical and mental health disorders and to promote well-being.

Course Policy

Physical education courses are currently offered as elective credits only. Some courses may require an additional course fee depending on facility and special equipment needs. There is no limit on the number of times a physical education course can be repeated.

Coaching Minor

The Coaching Minor offers Oregon Tech students the opportunity to gain knowledge and skills in coaching. The Coaching Minor features study in the basics of sports medicine, team communication and psychology, and coaching theory. It also includes an opportunity to apply that knowledge to coaching in practical ways. Students who obtain the minor will document their preparation to coach in any sport or situation. For advising or for more information contact the head of the Coaching Minor Committee, currently, Dr. Kevin Brown.

Career Opportunities

The Coaching Minor represents a credential that documents the student's academic and practical preparation to coach. For students interested in coaching, this should give them an advantage over others without documented training and experience.

Requirements of the Coaching Minor

HED 275 Introduction to Sports Medicine
 PSY 376 Sports Psychology
 SPE 321 Small Group and Team Communication
 PHED 255 Introduction to Coaching Theory
 PHED 355 Coaching in Application
 PHED 455 Coaching Practicum
 Six credits of PHED practice courses:
 3 credits of Athletic Conditioning courses (PHED 102, 110 -- 113, 120 -- 123, 125, 126, 146 or 188)
 3 credits of Sport Activity courses (PHED 100, 101, 125, 130 -- 132, 141 -- 145, 150, 151, 160 -- 163, 170 -- 175, 180 -- 187 or 201)

It is strongly recommended that students interested in obtaining this minor see a Coaching Minor advisor prior to taking courses.

Note that the requirements constitute 24 credits, of which 12 credits are upper division.

Graduate Programs

Admissions and Academic Policies

Graduate degree programs at Oregon Institute of Technology provide students with opportunities for advanced study in various disciplines. Graduates will develop the competence required for leadership roles in professional fields. Graduate education at Oregon Tech maintains an applied focus. Our mission is to integrate theory and practice.

Admission

The Office of Admissions, in conjunction with the appropriate academic department, maintains all pertinent information regarding the admission of graduate students.

Admission Requirements

To be considered for admission to a graduate program, an applicant must have a baccalaureate degree from a regionally accredited college or university, as well as a scholastic record that evidences the ability to perform satisfactory graduate work. Specifically, a student shall:

- Have completed a four-year college course of study and hold an acceptable baccalaureate degree from an institution accredited by a regional accrediting association.
- Be in good academic standing at the last college or university attended.
- Have attained a grade point average of at least 3.0 on a 4.0 scale for the last 90 term (60 semester) units attempted.
- Have attained a grade point average of at least 3.0 on a 4.0 scale for the last 45 term hours in the major.
- Satisfactorily meet the professional, personal, scholastic, and other standards for graduate study.
- Pass qualifying examinations required by specific programs.

Unusual circumstances may warrant exceptions to these criteria.

Application as a Degree-Seeking U.S. Resident Student

Degree-seeking students must submit the following items to the Office of Admissions before the deadlines specified in the Application Deadlines section:

- An official admissions application, along with a \$50 non-refundable application fee. The application fee is waived for applicants who are currently attending Oregon Tech or who graduated from Oregon Tech within the previous two years.
- Official transcripts from each postsecondary educational institution attended.

Individual programs may have additional requirements. Applicants must submit all required items before admission to the graduate program will be considered. Submitting the items, however, does not ensure admission. Applicants will receive official notification of admission after a review of the application by the Office of Admissions and the graduate program department.

Application as an International Degree-Seeking Graduate Student

Oregon Tech must assess the academic preparation of international students. For this purpose, international students, including those who hold U.S. visas as student exchange visitors or other non-immigrant classifications, should apply early. Official transcripts must be on file at least eight weeks before registration for the first term and, if not written in English, must be accompanied by a certified English translation.

All international applicants from countries in which English is not the native language must take the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System exam (IELTS). A minimum score of 520 paper-based TOEFL, 68 internet-based TOEFL or 6 IELTS is required for consideration. This requirement may be waived for some students

whose primary language is English. Since the results of this test constitute part of the material reviewed for admission to graduate studies at Oregon Tech, students should arrange to have their test scores sent directly from the testing agency to the Office of Admissions well before the application deadline.

The following is an application checklist for degree-seeking international students:

1. Submit the graduate application for admission with the \$50 (U.S.) application fee.
2. Submit the international graduate student supplement to the graduate application form (as well as the Statement of Financial Responsibility form), available from the Admissions Office.
3. Provide evidence of ability to meet educational expenses at Oregon Tech. The Statement of Financial Responsibility form must be completed and submitted with documentation such as official bank statements and tax returns.
4. Official academic transcripts of all university course work sent to Oregon Tech.
5. For university course work done outside the United States, transcripts must be reviewed by an evaluation service. There are several such services that are acceptable. A "course-by-course evaluation" or a "detail report" is necessary.
6. Proof of proficiency in the English language. Oregon Tech requires that international graduate students submit official test scores on the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System exam (IELTS). A minimum score of 520 paper-based TOEFL, 68 Internet-based TOEFL, or 6 IELTS is required for consideration. This requirement may be waived for some students whose primary language is English.
7. Students currently in the United States should submit a photocopy of the I-20 form and passport.

Individual programs may have additional requirements.

Application Deadlines

Oregon Tech encourages all prospective students to submit graduate application materials six to nine months in advance of the planned enrollment date. This recommendation is especially important for international students in order to allow sufficient time for visa processing. However, applications will be accepted any time before the deadlines listed below. The recommended entrance time is fall term.

- Fall Term: July 1
- Winter Term: October 1
- Spring Term: January 1

Residency Classification

See the residency section of this catalog.

Tuition and Fees

See the tuition and fees section of this catalog.

Graduate Assistantships

Oregon Institute of Technology offers graduate assistantships, awarded on a competitive basis, to qualified graduate students based on department needs. Compensation varies with the type of service, the amount of time required for performing the service, and the academic qualifications and experience of the appointee. An applicant for a graduate assistantship must be admitted to a graduate program. Graduate departments usually award appointments and assistantships by Summer term, effective at the beginning of the next academic year. A graduate assistant application form is available from the appropriate department.

Types of Assistantships

Graduate assistantships (GAs) at Oregon Tech are either research assistantships (RAs) or teaching assistantships (TAs). Research assistantships are awarded by the faculty member administering the research grant and involve providing assistance in fulfilling the goals and objectives of the grant. Depending upon the grant, research assistantships may include additional support for summer term. If you are interested in a research assistantship, contact the faculty members responsible for the grant.

Teaching assistantships are awarded by the department and involve classroom and laboratory instruction. If you are interested in a TA, contact the individual department to determine availability.

Assistantship Offer

Assistantship notices of appointment are awarded on a term-by-term basis and renewal is dependent upon competent performance of assistantship duties, adequate academic progress, departmental needs, and the availability of funds. Assistantships may include a tuition waiver as well as a monthly stipend based upon a percentage of a full-time equivalent (FTE) salary.

Assistantship Course Load

Graduate assistants are expected to maintain full-time enrollment (nine credits). Graduate assistants not enrolled in nine credits of formal courses must supplement the course load with thesis or project credits to maintain full-time enrollment status.

Satisfactory Progress

Graduate assistants must make satisfactory progress toward a graduate degree to retain a graduate assistantship. Satisfactory progress includes:

- Maintaining a 3.0 or higher grade point average.
- Maintaining full-time student enrollment.

Failure to maintain satisfactory academic progress will result in loss of an assistantship.

Academic Policies

The Graduate Council determines graduate academic policies at Oregon Tech. Other academic policies and procedures are described and/or defined in the general policies of Oregon Tech.

Student Rights and Responsibilities

Oregon Tech encourages students to perform at a high academic level, and students are responsible for knowing degree requirements and enrolling in courses that will enable them to complete the master's program. Oregon Tech expects students to conduct themselves in a manner compatible with the university's function as an institution of higher learning. Students should acquaint themselves with regulations for the standard of work required to continue in the graduate school. For additional information, students should consult their graduate advisor.

Academic Integrity

Oregon Tech's goal is to foster an atmosphere

that produces educated, literate graduates. Academic misconduct, such as cheating and plagiarism, will not be tolerated.

Cheating includes, but is not limited to, the following:

- Use of any unauthorized assistance in taking quizzes, tests or examinations.
- Dependence upon the aid of sources specifically prohibited by instructors in writing papers, preparing reports, solving problems or carrying out other assignments.
- The acquisition, without permission, of tests or other academic materials belonging to a faculty member of the school.

Plagiarism includes, but is not limited to, the use, by paraphrase or direct quotation, of the published or unpublished work of another person without acknowledging the source. Plagiarism occurs when a student either copies the work of another person and attempts to receive credit for that work or acquires and uses prepared material from someone who is selling academic materials. These examples are intended to provide general guidelines and are in no way comprehensive in describing academic dishonesty.

Faculty may assign specific penalties for cases of academic misconduct, including a failing grade for a test or assignment, a reduced grade for a test or assignment, or a failing grade in the course. Responding to academic dishonesty is the responsibility of the course instructor. If a student commits plagiarism or other academic dishonesty during the graduate project, the advisor, in consultation with the dean, determines the appropriate response.

All graduate students should acquaint themselves with the definitions and implications of academic misconduct as explained in Oregon Tech's student conduct code. Repercussions for a student guilty of academic conduct violations range from a warning to expulsion. Students may contest a charge of academic misconduct by following the grievance procedure outlined in the OIT catalog and the student handbook, available on the Oregon Tech Web site.

Student Records

The Registrar's Office maintains a permanent file for each graduate student. Faculty advisors will maintain a file of advising records, grade information and other correspondence

pertaining to each graduate student's academic progress. For more information on student records, contact the Registrar's Office.

Enrollment Status

Full and part time credit loads for graduate students are defined as follows:

- Full time: 9 or more credits
- 3/4 time: 7 - 8 credits
- Half time: 5 - 6 credits

Oregon Tech undergraduate seniors may enroll in 500-level graduate courses for graduate credit with the approval of the student's undergraduate advisor and the graduate program director.

Students who are not yet admitted to Oregon Tech may take up to one third of the graduate program credits as a non-admit student and apply them toward the graduate degree upon formal admission to the graduate program.

Oregon Tech offers some courses which are dual-listed at the 400- and 500-level. The 400-level courses apply only to an undergraduate degree, while 500-level courses apply to both undergraduate and graduate degrees. Students enrolled in a dual-listed 500-level course will be required to complete additional work to obtain graduate credit.

Academic Prerequisite Deficiencies

Students who have prerequisite deficiencies for graduate studies may be required to take additional course work prior to completing their graduate studies, as determined by the graduate program director. If there are deficiencies, the director will recommend substitute courses, and these are entered on the Graduate Program Form. When students pass these courses with a B or better, they become fully qualified graduate students. Prior to completion of the listed courses, the graduate student is considered "provisionally admitted."

Academic Performance Standards

Students must maintain a cumulative GPA of 3.0 or better in all graduate work specific to the program of study to remain in good academic standing. Grades below C do not meet requirements for a graduate degree.

Graduate students earning a cumulative GPA

of less than 3.0 will be placed on probation and, if no improvement is made, will be suspended from the graduate program. Conditions established for probation and suspension are listed below:

Academic Probation: Students having 9 or more attempted credit hours will be placed on academic probation for each term that their cumulative GPA falls below 3.0.

Academic Suspension: Students who have served one term on academic probation and have not raised their graduate cumulative GPA to 3.0 in the next term will be placed on academic suspension. Suspended students lose their institutional financial aid, including graduate research and teaching assistantships. A student may appeal academic suspension by following the process outlined in the Oregon Tech catalog. A successful appeal results in probation status.

Transfer Credits

Students may petition to transfer up to one third of the program graduate term hours earned at other accredited institutions and apply those credits toward an Oregon Tech graduate degree. However, each course must be consistent with the program of study planned by the student and the graduate advisor. Only grades of A and B are acceptable as transfer credit into the graduate program.

Grading Policy

Oregon Tech uses a 4.0 grading scale to evaluate student performance. Upon completion of a course or upon termination of attendance in the course, a student's performance will be graded by the instructor and reported to the Registrar's Office.

Requirements

Graduate degree academic requirements are specified by the program. The student, in conference with the graduate faculty advisor, will prepare a program of study for the graduate degree as a guide for planning an academic schedule.

Application for Graduation

To apply for graduation, the student must submit a petition for graduation to the Registrar's Office two terms in advance of the anticipated final term of work. The petition is a record of the approved program of study. To receive favorable action, candidates must meet the following requirements:

- Show that course requirements for the master's degree will be satisfied before or during the final term.
- Maintain an overall grade point average of at least 3.0.
- Provide evidence of passing any qualifying or comprehensive examinations, including defense of the master's project or thesis.
- Obtain approval of both the student's academic advisor and department chair, or by the program director or other faculty member in the event that the student's academic advisor is the department chair.

Right of Appeal

Students have the right to appeal academic policies or requirements. Grade appeals should be initiated through the instructor, graduate program coordinator, and the dean. For appeals regarding specific degree requirements, students should consult their graduate advisor, the graduate program coordinator, and the Graduate Council. Students should submit all other academic policy appeals in writing to the Graduate Council through the Office of the Vice President for Research.

Course Descriptions

Course descriptions in this section are reasonable summaries only and are neither completely inclusive nor completely exclusive of total course content for any given course.

Courses listed herein may or may not be offered each term.

Courses are listed alphabetically according to prefix.

Numbering Code

Courses are grouped into a three-digit number series which indicates the normal teaching levels. Some variations may occur.

1-99 Preparatory and Developmental Courses. Courses numbered below 100 are not applicable toward a degree even though units are assigned, grades are awarded and tuition is assessed.

Lower-Division Courses (freshman and sophomore)

100-199 First-Year Courses

200-299 Second-Year Courses

Upper-Division Courses (junior and senior)

300-399 Third-Year Courses

400-499 Fourth-Year Courses

Graduate Courses

500-599 Graduate Courses

Other Codes

Each Term:

Some courses in this section have a code following the course title. This code designates when the course will be offered. F indicates fall, W indicates winter, S indicates spring.

Lecture, Lab, Credit Hours:

The three numbers following the course title. For example:

CST 101 Introduction to Personal Computing

(3-3-4) = weekly lecture hours – lab hours – total credits

Special Terms

As Required: This term designates a course or series of courses which will be offered only as enrollment, student interest, or individual department needs demand and as staffing allows. A course so designated may be offered if special student needs, situations of extreme hardship, or other unusual circumstances deem it in the best interest of both the student(s) and the institution to do so.

Hours to be Arranged Each Term: Normally students negotiate individually with faculty members and/or departments and arrange to have courses so designated offered for the term most suitable to their unique situation.

Corequisite: A course that must be taken simultaneously with another course. Corequisites are noted at the end of each course description.

Prerequisite: A course that must be passed satisfactorily before another course may be taken. Prerequisites are noted at the end of each course description. Courses transferred in to Oregon Tech with a C- or better meet the prerequisite requirement of obtaining a C or better.

Quarter Credit: A credit hour is an amount of work represented in intended learning outcomes and verified by evidence of student achievement that is an institutionally established equivalency that reasonably approximates not less than:

1. One hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks for one semester or trimester hour of credit, or ten to twelve weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or
2. At least an equivalent amount of work as required in paragraph (1) of this definition for other academic activities as established by the institution, including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours.

A numerical credit value assigned to certain number of lecture or laboratory hours. A lecture class meeting for three 50-minute periods a week would be assigned three units of credit. Students have traditionally been expected to spend an additional six hours of

outside class work per week for each three units of lecture class credit. Generally, a lab class requires three hours per week for one unit of credit, or a total of nine in-lab hours with no additional outside class work expected for three units of lab class credit.

Reading and Conference: A course taken on an independent study basis with the supervision of an instructor, usually consisting of weekly conferences, assigned readings, research papers, etc.

Seminar: A class taught by a group discussion process rather than by means of formal lecture. Student research and reporting are usually expected.

Sequence: A series of classes in the same subject area that, taken as a whole, comprise a full year's work. Generally, course sequences are numbered consecutively, and often (though not always) should be taken in the numerical order listed (i.e., CHE 201 should be taken before CHE 202, etc.).

(ABA) Applied Behavior Analysis

ABA 511 Foundations of ABA I

(F)(3-0-3)

Basic principles, characteristics, and concepts of Applied Behavioral Analysis (ABA). Includes history of ABA, terminology, and applications.

ABA 512 Foundations of ABA II

(W)(3-0-3)

Basic principles, characteristics, and concepts of Applied Behavioral Analysis (ABA). Foundational knowledge for practice of ABA; introduction to measurement and data analysis.

Prerequisite: ABA 511

ABA 521 Ethics and Professional Issues I

(F)(3-0-3)

Introduction to ethical and professional issues in Applied Behavior Analysis (ABA). Professional identity, certification and licensure, code of conduct, confidentiality and privacy.

ABA 522 Ethics and Professional Issues II

(W)(3-0-3)

Examines ethical and professional issues in Applied Behavior Analysis (ABA) including ethical and professional conduct, ethical decision making, implementation, management and supervision, and professional practices.

Prerequisite: ABA 521

ABA 525 Research Methods in ABA

(W)(3-0-3)

Methods for conducting valid and reliable behavioral measurement and experimental evaluations of behavioral interventions, including data collection, data display, and data interpretation and designing and evaluating behavioral research designs.

ABA 526 Behavioral Assessment

(S)(3-0-3)

Behavioral assessment including descriptive assessments and functional analysis; methods of assessment, data collection and interpretation; assessment based selection of intervention; ethical and practical issues.

ABA 531 Behavioral Change I

(S)(3-0-3)

Fundamental elements of, and ethical and practical considerations related to behavior

change, behavioral interventions, behavior change systems, and specific behavior change procedures.

Prerequisite: ABA 512

ABA 532 Behavior Change II

(Su)(3-0-3)

Behavior analytic interventions. Fundamental elements of, and ethical and practical considerations related to behavior change, behavioral interventions, behavior change systems, and specific behavior change procedures.

Prerequisite: ABA 531

ABA 535 Special Topics in ABA

(Su)(3-0-3)

Examination of systems, interventions, current issues, and/or advances in Applied Behavior Analysis; includes focus on strategies for managing program implementation and supervision of behavior change agents. Topics vary.

Prerequisites: ABA 525 ABA 531

(ACAD) Academic Success

ACAD 101 Student Success Seminar

(F,W,S)(Variable Credit)

A course to facilitate the success of first year students at Oregon Tech. Emphasis on faculty-student and student-student interactions. Includes academic resources, campus services, the learning process, communication skills, health and wellness issues. May also include academic skills and career planning.

ACAD 105 Achieving Academic Success

(F,W,S)(2-0-2)

Course identifies attitudes, behaviors and specific strategies that will lead to academic success at the college level. Topics may include study habits, time management, strategies for memorization and test-taking and goal-setting.

ACAD 107, ACAD 207, ACAD 307, ACAD 407 Seminar

(Hours to be arranged each term.)

ACAD 115 Career Exploration

(F)(3-0-3)

Effective academic and career decision-making is facilitated by thorough self-assessment, exploration of the world of work and identification of appropriate academic majors. Course includes activities such as personal-

ity type testing, research, visits to academic departments and information interviews with professionals in various occupations.

ACAD 120 Stress Management

(F,S)(2-0-2)

Identifies signs and symptoms of stress as well as the ways in which they impact student academic success. Effective ways of dealing with stress, including relaxation techniques, will be identified, discussed and practiced.

ACAD 135 Reading Tutor

(2-0-2)

For "America Reads" tutors. Provides information about how children learn to read and write, strategies for teaching children and working in an elementary school.

(ACC) Accounting

ACC 101 Introduction to Accounting

(F, W,S)(3-0-3)

The principles of elementary accounting systems for small businesses.

ACC 107, ACC 207, ACC 307, ACC 407 Seminar

(Hours to be arranged each term.)

ACC 115 Basic Income Tax Preparation

(2-4-3)

Federal and state laws, ethics and regulations applicable to individual income tax returns. Prepares tax preparers for the qualifying examination and meets the personal needs of individuals preparing their own returns.

ACC 124 Business Math/Machines

(F)(3-0-3)

Business math such as decimals, percents, markups, proration and interest. Emphasis on operational techniques of electronic calculators for problem solving.

ACC 201 Principles of Accounting I

(F,W)(4-0-4)

Introduction to terminology, content and form of financial statements for sole proprietorships. Recording of data for use in preparing profit-and loss statements and balance sheets.

Prerequisite: MATH 100 or equivalent.

ACC 202 Principles of Accounting II

(W,S)(4-0-4)

A continuation of ACC 201 with emphasis on corporate accounting.

Prerequisite: ACC 201 with grade "C" or better.

ACC 203 Principles of Managerial Accounting

(F,W,S)(4-0-4)

Theory and procedure in gathering cost data and their use in analyzing and controlling operation costs: job-order and process-cost systems. Technique of standard costs, analysis of variance, managerial reports and specialized cost programs including activity based costing systems.

Prerequisite: ACC 201 with grade "C" or better.

ACC 205 Computerized Accounting

(W,S)(2-3-3)

Spreadsheet software used to solve accounting problems, model-building techniques. Integrated accounting software introduced. Prerequisite: ACC 201.

ACC 245 Payroll Accounting

(W)(3-0-3)

Covers federal and state laws pertaining to wages, payroll taxes, payroll tax forms and journal and general ledger transactions. Emphasis is placed on computing wages; calculating social security, income and unemployment taxes; preparing appropriate payroll tax forms; and journalizing/ posting transactions.

Prerequisite: ACC 101 or ACC 201.

ACC 295 Individual Studies

(Hours to be arranged each term.)

ACC 298 Reading and Conference

(Hours to be arranged each term.)

ACC 299 Laboratory Practice

(Hours to be arranged each term.)

ACC 320 Cost Accounting I

(W)(4-0-4)

Cost accumulation systems including job order costing, process costing and activity-based costing will be explored. Techniques to control and evaluate operations including variance analysis based on flexible budgets and standard costs.

Prerequisite: ACC 203 with grade "C" or better.

ACC 321 Cost Accounting II

(S)(4-0-4)

Continuation of Cost Accounting I. Strategic planning and financial budgeting. Cost

measurement, planning, control and performance evaluation and behavioral issues. The role of responsibility accounting for revenue, cost, contribution and profit centers will be investigated.

Prerequisite: ACC 320 with grade "C" or better.

ACC 325 Finance

(F,W,S)(4-0-4)

Emphasis on working capital management, long-term finance and capital structure.

Prerequisites: ACC 203, and MATH 105 or MATH 111.

ACC 331 Intermediate Accounting I

(F)(4-0-4)

Financial accounting concepts, theory and practices involving current asset accounts; practical application of theory to accounting problems.

Prerequisite: ACC 202 with grade "C" or better.

ACC 332 Intermediate Accounting II

(W)(4-0-4)

Accounting concepts, theory and practices involving ownership equities, interpretation, analysis of financial statements and correction of errors; practical application of theory to accounting problems.

Prerequisite: ACC 331 with grade "C" or better.

ACC 333 Intermediate Accounting III

(S)(4-0-4)

Accounting concepts, theory and practices involving plant assets, intangible assets and liabilities; practical application of theory to accounting problems.

Prerequisite: ACC 332 with grade "C" or better.

ACC 405 Accounting Information Systems

(S)(4-0-4)

Analysis of accounting cycles and the associated controls with emphasis on problem solving and critical thinking. Includes computerized accounting system implementation.

Prerequisites: ACC 332, MIS 275, MIS 312.

ACC 411 Income Tax Procedures

(F)(4-0-4)

Federal and state income tax laws and regulations applicable to individuals and their

businesses including computerized tax return preparation.

Prerequisite: ACC 333 with grade "C" or better.

ACC 412 Corporate Taxation

(W)(4-0-4)

Federal tax law applicable to corporations, partnerships and estates. Emphasis on tax research procedures and locating and evaluating various sources of tax law.

Prerequisite: ACC 411 with grade "C" or better.

ACC 421 Income Tax Procedures Laboratory

(0-6-2)

Lab accompanying class content in ACC 411.

ACC 431 Advanced Accounting I

(W)(4-0-4)

Comprehensive study of problems in partnership accounting, fund accounting, branch accounting and governmental accounting.

Prerequisite: ACC 333 with grade "C" or better.

ACC 432 Advanced Accounting II

(S)(4-0-4)

Analysis of problems facing small, medium and large companies, with emphasis upon an integrated and concurrent decision making methodology applying economics, finance, organizational theory, quantitative analysis and accounting and tax theory.

Prerequisite: ACC 431 with grade "C" or better.

ACC 435 Auditing

(F)(4-0-4)

Introduction to auditing concepts and practices. Topics include professional standards, audit planning and procedures, ethical considerations, internal controls, professional responsibilities, the acquisition and evaluation of audit evidence and report writing.

Prerequisites: ACC 333, ACC 405, both with grade "C" or better.

ACC 465 Case Studies in Accounting

(S)(4-0-4)

The use of accounting cases to develop problem solving/critical thinking skills. Application of the case methodology to all areas of accounting.

Prerequisites: ACC 431, ACC 435, ACC 496, all with grade "C" or better.

ACC 496, ACC 497 Senior Project

(F)(W)(3-0-3)

Development and implementation of an accounting related project for the benefit of an external entity and the student. Projects will include a proposal, analysis, design and implementation. An oral presentation and project documentation will be required at the completion of each course.

Prerequisites: ACC 320 and ACC 405, or instructor consent.

(AHED) Allied Health Education

AHED 107, AHED 207, AHED 307, AHED 407 Seminar

(Hours to be arranged each term.)

AHED 450 Instructional Methods

(F,W)(3-0-3)

Students develop instructional content and an instructional plan for teaching topics for adult learners. Teaching methods, learning styles, student and instructor evaluation and use of media will be discussed.

Prerequisite: DH 380 or admission to RCP or BDH degree completion program.

AHED 451 Instructional Experience

(F,S)(2-3-3)

Students create and structure their own instructional experience, participate in a clinical or laboratory setting as a supervising instructor, present a didactic unit using visual aids.

Prerequisite: AHED 450.

AHED 452 Instructional Practicum

(W,S)(0-9-3)

Student and faculty advisor design an individualized teaching experience. A learning contract is written and implemented.

Prerequisite: AHED 451 or AHED 460.

AHED 460 Fundamentals of Distance Education

(F,S)(3-0-3)

Students learn the fundamentals of online teaching and learning. Lesson plan developed in AHED 450 will be finalized as an online module. Synchronous vs. asynchronous learning, instructional design and course management as it relates to online instruction will be discussed.

Prerequisite: AHED 450.

(ANTH) Anthropology

ANTH 101 Introduction to Physical Anthropology

(W)(3-0-3) SS

An introduction to physical anthropology, emphasizing man's place in the animal kingdom, evolution of man, fossil hominid forms, Paleolithic cultures and principles of genetics. Satisfies either a science elective or a social science elective.

ANTH 102 Introduction to Archeology

(F,S)(3-0-3) SS

Survey of the science of archeology. Covers the biological and social evolution of the human species with emphasis on the growth of human populations and social complexity. Relates site-specific evidence to theories of social change. Discusses field and laboratory methods of archaeology.

ANTH 103 Introduction to Cultural Anthropology

(F,W)(3-0-3) SS

Culture, language, subsistence patterns, group formation, kinship, economic systems, political organizations, religion and cultural change.

ANTH 107, ANTH 207, ANTH 307, ANTH 407 Seminar

(Hours to be arranged each term.) SS

ANTH 335 The Built Environment

(W)(3-0-3) SS

An examination of the American built environment from historical to modern times and the role it plays in shaping American Society. The topics include city planning, architecture, transportation technologies, dam and bridge building and urban sprawl.

ANTH 452 Globalization

(F,W,S)(3-0-3) SS

Addresses what globalization is and how it developed and spread. Benefits and harms of globalization in the areas of work, culture, warfare, national sovereignty, health and food. Countervailing pressures from social movements will be examined.

Prerequisite: WRI 122.

(ART) Art

ART 107, ART 207, ART 307, ART 407 Seminar

(Hours to be arranged each term.) H or HP

ART 205: Introduction to Watercolors

(F,W,S)(3-0-3) HP

Introductory studio course in beginning watercolor painting. Students will learn a variety of watercolor techniques as well as elements of design and aesthetics.

ART 210 Beginning Sculpture

(F,S)(3-0-3) HP

Introductory studio course in beginning sculpture, emphasizing basic materials and techniques.

ART 220 Basic Drawing

(F,W,S)(3-0-3) HP

Designed for the student who has an interest in exploring the field of pictorial representation but has had, for a variety of reasons, little opportunity to do so.

ART 226 Digital Photography

(F,W,S)(3-0-3) HP

Studio course in digital photography, studying and producing photographs. Focus on digital exposures, color, location, Photo-shop techniques and issues in photography. Students must have the use of a digital SLR camera or a digital camera with a manual setting.

ART 280 Introductory Painting

(W)(3-0-3) HP

Offers an opportunity to study rendering in color by exposure to a study of color and color mixing, tones and values with an introduction to acrylics, watercolors and oils.

ART 282 Introduction to Acrylic Painting

(F,W,S)(3-0-3) HP

Introductory studio course with emphasis on basic materials and techniques in acrylic painting.

(BIO) Biology

BIO 101 Introduction to Cell Biology

(F)(3-3-4)

Introduction to cell biology, genetics, basic chemistry of living organisms, and the scientific method.

BIO 102 Introduction to Organismal Biology

(W)(3-3-4)

Evolution and phylogenetics among all major groups of living organisms, including bacteria, protists, fungi, plants and animals.

BIO 103 Introduction to Human Anatomy

(S)(3-3-4)

Basic human anatomy and physiology, including a survey of all major bodily systems. (Cannot be used for graduation credit by students who have taken BIO 231, BIO 232 and BIO 233)

BIO 105 Microbiology

(W)(3-3-4)

Classification, morphology, reproduction, transmission and control of micro-organisms causing disease in man. Laboratory practice in culturing methods, microscopic observation and physical and chemical control.

BIO 107, BIO 207, BIO 307, BIO 407 Seminar

(Hours to be arranged each term.)

BIO 109 Introduction to the Medical Sciences

(W,S)(1-2-2)

Survey of medical and health-related occupations, including biomedical sciences. Discussion of health care structure, private and public entities, the research community and trends in health education and practice.

BIO 111 Introduction to Environmental Sciences

(F)(3-3-4)

A topical overview of environmental sciences stressing the integration of the social, natural and physical sciences. Emphasis on active learning.

BIO 135 Preparation for Human Anatomy and Physiology

(F)(1-0-1)

Study techniques for a science course are explored using examples from Human Anatomy and Physiology.

Corequisite: BIO 231

BIO 200 Medical Terminology

(F,W,S)(2-0-2)

Basic structure of medical words including prefixes, suffixes, roots and combining forms. Correct spelling, pronunciation and meaning of terms are stressed.

BIO 205 Nutrition

(S)(3-0-3)

A study of the relationships of food and nutrition to health. An overview of the basic

nutrition principles including the nutrients and how they function in the body, nutrient requirements, diet planning and energy balance. Current topics and controversies are examined.

Pre- or corequisite: CHE 103 or BIO 213 or instructor consent.

BIO 209 Current Research Topics in Medical Sciences I

(F,W)(1-0-1)

Introduces students to topics in medicine focusing on global health issues, infectious and chronic diseases. Projects in medical literature research, understanding scientific paper format, preparing technical presentations and public speaking.

Prerequisite: Biology or Health Sciences major or instructor consent.

BIO 211 Principles of Biology

(F)(3-3-4)

Principles of modern biology emphasizing form and function of multicellular plants, major invertebrate phyla and general vertebrate morphology and physiology.

BIO 212 Principles of Biology

(W)(3-3-4)

Principles of modern biology emphasizing evolution, ecology, population genetics and behavior of organisms.

Prerequisite: BIO 211 with grade "C" or better, or with instructor consent.

BIO 213 Principles of Biology

(S)(3-3-4)

Principles of modern biology emphasizing the biochemical basis for life processes, cell structure and function. Molecular genetics, cell reproduction, metabolism and form and function of microorganisms.

Prerequisite: BIO 212 with grade "C" or better, or with instructor consent.

BIO 216 Introduction to Veterinary Medicine

(S)(3-3-4)

Covers many aspects of animal health and their impact on society. Discussions of husbandry, anatomy, preventive medicine, common diseases and behavioral problems of dogs, cats, horses and exotics. Some hands-on work with dogs, horses and wildlife is included.

BIO 220 Cardiovascular Physiology

(F)(3-3-4)

Application of principles of fluid dynam-

ics to the human vascular system. Detailed considerations of cardiac function and its regulation, analysis of flow in arterial, venous and capillary systems and integration of cardiovascular regulation.

Prerequisite: BIO 233.

BIO 226 Introduction to Wildlife Rehabilitation

(S)(3-0-3)

Principles of wildlife rehabilitation including state and federal laws, medical terminology, basic anatomy, natural history and diet, form and function and euthanasia. Field captures, basic restraint, first aid, minimum housing requirements and zoonotic diseases are also included.

BIO 227 Introduction to Forensic Science

(W,S)(3-3-4)

An entry-level course exploring the methodologies and procedures utilized by crime scene investigators and forensic laboratories. Emphasis on crime scene investigation, recognition, documentation and collecting of physical evidence. Laboratory exercises provide hands-on opportunities supplementing lecture topics.

BIO 231 Human Anatomy and Physiology I

(F)(3-3-4)

Introduction to the systematic studies of human anatomy and physiology. Introduction to cytology and histology followed by the integumentary, skeletal, muscular and endocrine systems and the physiology of excitable tissues. The laboratory sessions emphasize human anatomy using models and human cadavers.

BIO 232 Human Anatomy and Physiology II

(W)(3-3-4)

A continuation of the systematic study of human anatomy and physiology. The nervous, cardiovascular and immune systems are studied. The laboratory sessions emphasize human anatomy using models and human cadavers. Dissections and physiological experiments are conducted.

Prerequisite: BIO 231 with grade "C" or better.

BIO 233 Human Anatomy and Physiology III

(S)(3-3-4)

Conclusion of the sequence in human

anatomy and physiology. Digestive, respiratory, renal and reproductive systems are examined. Metabolism, human genetics and development are also studied. Laboratory sessions emphasize physiological experiments and human anatomy using models and human cadavers.

Prerequisite: BIO 232 with grade "C" or better.

BIO 235 Human Genetics

(F)(3-0-3)

Genetic concepts using human examples, including the molecular and cellular basis of inheritance, patterns of inheritance, basic pedigree analysis, mutation, single-gene and polygenic diseases and an introduction to genetic biotechnology.

Prerequisite: BIO 233.

BIO 247 Forensic Anthropology

(S)(3-3-4)

The morphological characteristics unique to the human skeleton that are used in establishing population demographics will be discussed and demonstrated. The laboratories are designed as a hands-on experience applying the methodologies as presented in the lecture section.

BIO 313 Botany

(S)(2-6-4)

Field study and identification of the flora of the Pacific Northwest. Vascular plants will be emphasized; algae, fungi and bryophytes will be considered. Principles of plant classification and common plant families are taught. A plant collection is prepared.

Prerequisite: BIO 211 or instructor consent.

BIO 317 Invertebrate Biology

(S)(3-3-4)

Survey of invertebrate animals, including morphology, physiology, ecology and phylogeny; comparative anatomy of typical metazoan forms. Laboratory exercises focus on parasites and other economically important species. Intended for biology and pre-professional health majors.

Prerequisite: BIO 213 or equivalent.

BIO 325 Applied Aquatic Botany

(2-3-3)

Ecology, taxonomy and economic significance of aquatic plants, including algae. Emphasis placed on determination of contaminants in the physical or biological environment.

Prerequisite: BIO 211.

BIO 327 General Ecology

(S)(3-3-4)

An examination of ecological principles applied to microhabitats, habitats and ecosystems. Includes community ecology, population ecology and resource analysis, supplemented by regional and local field exercises with training in measurement and collection of ecological components.

Corequisites: GEOG 105, BIO 111 and BIO 213.

BIO 331 Human Anatomy and Physiology I

(F)(3-6-5)

An in-depth systematic study of human anatomy and physiology of the integumentary, skeletal and muscular systems. Laboratories include histology, examination of human bones, cadaver dissection, computer-aided physiology studies and other hands-on activities.

Pre-or corequisite: BIO 200 or instructor consent.

Prerequisites: BIO 213 and CHE 223, both with grade "C" or better.

BIO 332 Human Anatomy and Physiology II

(W)(3-6-5)

An in-depth systematic study of human anatomy and physiology of nervous, endocrine and cardiovascular systems. Laboratories will include histology, cadaver dissection, computer-aided physiology studies and other hands-on activities.

Prerequisite: BIO 331 with grade "C" or better, or instructor consent.

BIO 333 Human Anatomy and Physiology III

(S)(3-6-5)

An in-depth systematic study of human anatomy and physiology of the lymphatic, respiratory, digestive, urinary and reproductive systems and an overview of embryology. Laboratories will include histology, cadaver dissection, computer-aided physiology studies and other hands-on activities.

Prerequisite: BIO 332 with grade "C" or better, or instructor consent.

BIO 335 Cross-Sectional Anatomy

(F,W,S)(3-0-3)

Cross-sectional anatomy correlated with computer tomography, ultrasonography and magnetic resonance imaging.

Prerequisite: BIO 233.

BIO 336 Essentials of Pathophysiology

(F,S)(3-0-3)

Study of dynamic aspects of disease process with emphasis on abnormal physiology.

Detailed discussion of cellular alterations, normal immunology, neoplasia, inflammation and alterations of the respiratory and skeletal systems and Diabetes Mellitus.

Prerequisites: BIO 200 and BIO 233.

BIO 337 Aquatic Ecology

(S)(2-6-4)

Aquatic ecosystems, patterns of development, population dynamics, diversity and energy cycles in marine and freshwater communities. Local and extended one- or two-day field trips to study different ecosystems off-campus. Procedures for sampling, data collection, numerical modeling and simulation studies of aquatic pollutants.

Prerequisites: BIO 212, BIO 327.

BIO 341 Medical Genetics

(F,W)(3-0-3)

Principles of heredity, chromosome mechanisms and molecular genetics applied to disease processes in humans. Review of case histories of selected inherited disorders. Discussion of genetic intervention therapies.

Prerequisite: BIO 213 or BIO 233 or instructor consent.

BIO 342 Cell Biology

(S)(3-3-4)

Organelle organization, protein sorting, cell signaling, cytoskeletal functions, cell division mechanics and cell interactions in development and aging.

Prerequisite: BIO 213 or instructor consent.

BIO 345 Medical Microbiology

(F)(4-3-5)

Mechanisms of pathogenicity and virulence relating to disease-causing viruses, bacteria, fungi and other microorganisms. Host-parasite relationships and immunology, microbial physiology and genetics. Laboratory procedures and identification of selected bacteria and parasites.

Prerequisite: BIO 213 or BIO 233 or instructor consent.

BIO 346 Pathophysiology I

(W)(3-0-3)

Study of the dynamic aspects of the disease process with emphasis on abnormal physiology. Detailed discussion of cellular alterations, normal and abnormal immunology,

neoplasia, inflammation, atherosclerosis, hypertension, cardiac and vascular diseases.

Prerequisites: BIO 200, and BIO 233 or BIO 333 with grade "C" or better, or instructor consent.

BIO 347 Pathophysiology II

(S)(3-0-3)

Study of the dynamic aspects of the disease process with emphasis on abnormal physiology. Detailed discussion of alterations of respiratory function, liver and digestive system, neurologic, urinary, musculoskeletal disorders and Diabetes Mellitus.

Prerequisite: BIO 346 with grade "C" or better, or instructor consent.

BIO 351 Vertebrate Biology

(F)(3-3-4)

This course will explore both diversity and evolutionary history of the vertebrates. Emphasis placed on functional morphology and adaptive physiology as related to the evolutionary history of each vertebrate class. The laboratory will introduce basic vertebrate structure and morphological adaptation.

Prerequisite: BIO 213.

BIO 352 Developmental Biology

(W)(3-3-4)

This course will explore the developmental processes of selected invertebrate and vertebrate groups. The events of gametogenesis, fertilization, gastrulation, neurulation and post-embryonic development will be discussed. The role of differential gene expression in developmental pathways will be covered.

Prerequisite: BIO 213.

BIO 357 Introduction to Neuroscience

(W)(3-0-3)

This is an introductory course covering the organization and function of the human nervous system to build a foundation of general knowledge in neurobiology of such topics as sensory/motor systems, the brain and behaviors, the biological basis of brain development and learning and memory.

Prerequisite: BIO 232 or BIO 332 or PSY 339 or instructor consent.

BIO 409 Current Research Topics in Medical Sciences II

(W)(2-0-2)

A continuation of BIO 209 covering topics in medicine focusing on global health issues, infectious and chronic diseases. Projects in

medical literature research, understanding scientific paper format, preparing technical papers and presentations, and public speaking.

Prerequisite: BIO 209 or instructor consent.

BIO 426 Evolutionary Biology

(F)(3-0-3)

Principles of evolutionary science, including speciation, biogeography, biodiversity, population genetics, natural selection and coevolution.

Prerequisite: BIO 213 or instructor consent.

BIO 428 Animal Behavior

(S)(3-0-3)

The biological foundations of animal behavior are presented from an ethological and comparative psychology perspective. Emphasizes the evolution, development and physiological basis of behavior patterns and presents topics on learning, perception, orientation, communication and social behavior. (Cannot be taken for graduation credit by students who have taken PSY 428.)

Prerequisite: PSY 202 or BIO 213.

BIO 434 Data Analysis Methods

(W)(3-3-4)

Fundamental principles of data analysis from field projects, data archives and other sources. Analysis of variance, hypothesis testing, random processes. Regression and times series analysis. Discussion and practice of data visualization and presentation techniques.

Prerequisite: MATH 243 or MATH 361.

BIO 436 Immunology

(S)(3-3-4)

Cellular and humoral immunology including innate immunity, acquired immunity, antibodies, anatomy of immune response, production of effectors, adversarial strategies during infection, immunodeficiency and transplantation.

Prerequisite: BIO 213 or BIO 233 or instructor consent.

BIO 461, BIO 462 Human Cadaver Dissection

(S)(0-3-1)

Study of human anatomy utilizing cadaver dissection. Attention will be given to three-dimensional relationships of structures, appreciation of textural differences and development of palpation skills. Recognition of pathologic abnormalities and individual variations will be investigated.

Prerequisites: BIO 233 or BIO 333 and

consent of instructor.

BIO 484 Sustainable Human Ecology

(F)(2-6-4)

Investigation of global interconnections between humans and natural systems through the study and application of ecological principles. Ethical and ecological considerations are used to solve complex environmental problems. Laboratories involve field work with local experts.

Prerequisite: BIO 327 or CE 481 or instructor consent.

BIO 485 Klamath Bioregional Studies

(W)(3-0-3)

The Klamath River Bioregion from an integrated ecological perspective. Team project in assessing current socioeconomic, cultural and ecological conditions in the bioregion and developing management strategies for sustainable resource use.

Prerequisites: ENV 225 and BIO 327, or instructor consent.

(BUS) Business

BUS 101 Introduction to Business

(F,W,S)(3-0-3)

Introduction to the basic aspects of business, marketing, management, production, accounting, and finance; various forms of business ownership; role of business in the economy, and society. Discussion of cultural, ethical, current events, and trends affecting business. Exposure to career opportunities.

BUS 107, BUS 207, BUS 307, BUS 407 Seminar

(Hours to be arranged each term.)

BUS 215 Principles of Management

(F,W,S)(3-0-3)

Introduction to the history of management. Emphasis on the management functions of planning, organizing, directing, and controlling; existing and emerging managing theories, social responsibilities and business ethics. (Cannot be taken for graduation credit by students who have taken BUS 304 or BUS 317.)

BUS 223 Marketing I

(F,W,S)(3-0-3)

Principles that drive the integration of the marketing mix (product, price, place,

promotion) to meet the needs and wants of consumer and business markets. Function of market research and the study of market opportunities to grow and sustain organizations.

BUS 226 Business Law

(F,W,S)(3-0-3)

The fundamentals of business law: the structure of federal and state courts and agencies, their decision processes; the legal structure of modern business organizations including closely and publicly held corporations, partnerships, limited partnerships, nonprofit corporations, sole proprietorships and limited liability companies; contract law; Uniform Commercial Code; tort law and its implications for business; administrative law; and criminal law as it applies to business and industry.

BUS 256 Business Communication

(S)(2-3-3)

Emphasis on effective content, structure, tone, and visual format for both internal and external communication. Students will compose various commonly occurring business documents achieving effectiveness in design, organization, content, and style, applying current graphic design and visual-design principles.

Prerequisites: BUS 101, or BUS 215, or BUS 223, and WRI 122.

BUS 304 Engineering Management

(F,W)(3-0-3)

The engineering management process. The unique aspects of managing "knowledge workers." The manager's role in planning, organizing, leading and controlling. Managing design and new products development, materials and inventory. Organizational styles, structures and policies. Human resource management for individuals and groups. (Cannot be taken for graduation credit by students who have taken BUS 215 or BUS 317.)

Prerequisite: Junior standing or instructor consent.

BUS 308 Principles of International Business

(F,W)(3-0-3)

Introduction to international business fundamentals in the areas of cultural, ethical, legal and economic environments, international finance tools and instruments, international trade theory, manufacturing strategies, international supply chain management, country selection, exchange rate mechanics and inter-

national human resource management.
Prerequisite: WRI 121.

BUS 309 Introduction to Tourism

(F,W,S)(3-0-3)

Introduction to tourism industry. Topics include major components of tourism, service suppliers, travel, transportation, accommodations, food and beverage, attractions, entertainment, destinations and impacts of tourism on society.

BUS 313 Health Care Systems and Policy

(3-0-3)

This course will explore the U.S. Health System focusing on its historical development, current configuration and possible future direction. Included will be the study of health system development, key influencers, accessibility, financing, changing components and the effects the system has on patients, providers, financiers, employers, government and insurers. Particular attention will be paid to the future direction of healthcare and what parts of the system are likely to change.
Prerequisite: WRI 227.

BUS 314 Entrepreneurship I

(F)(3-0-3)

Start-up concepts and models. Identification and assessment of the critical factors that lead to a successful start-up. Focus on small business idea generation and the analysis of market opportunities in B2C and B2B markets. Conduct a market and financial feasibility study.

Prerequisites: BUS 215, or BUS 304, or BUS 317; ACC 203 and BUS 223 or instructor consent.

BUS 316 Total Quality in Health Care

(F,W,S)(3-0-3)

The health care quality management process, contemporary issues and trends involved with quality control, organization structures, policies, human factors and teamwork.

Prerequisite: Junior standing.

BUS 317 Health Care Management

(F,W,S)(3-0-3)

The health care manager's role in planning, organizing, leading and controlling. Special emphasis on the unique and complex issues involved in health care management. Organizational structures. Strategic and operational planning. Health care finance and budgeting. The future of management. (Cannot be taken

for graduation credit by students who have taken BUS 215 or BUS 304.)

Prerequisite: WRI 121

BUS 318 Marketing II

(W)(3-0-3)

Advanced study of markets with a focus on the motivational and behavioral characteristics of consumers. Study and apply analytics, technology and data-driven decision making in the formation of a customer centered marketing and marketing communication strategy.

Prerequisites: BUS 223, PSY 201.

BUS 319 Integrated Marketing Communication

(F,S)(3-0-3)

Integrated marketing communication promotion mixes and strategies, tactics and media to influence buyer behavior and brand equity with various markets. Application of marketing communication tools through the development of a promotional campaign with goals, core themes, designs, budgets and specifications.

Prerequisite: BUS 223 or BUS 337.

BUS 325 Finance Management

(W,S)(3-0-3)

Basic issues and methodology of financial management. Emphasis placed on working capital management, sources of short-term and long-term funds and optimal capitalization of the firm.

Prerequisites: BUS 215; ACC 203.

BUS 326 Sales and Sales Management

(F,S)(3-0-3)

Fundamentals of selling products and services and sales management in various markets, buying behavior and processes, adaptive selling skills, establishing and selling the value proposition, role playing and sales simulations, after sale considerations and review of current customer relationship management systems.

Prerequisite: BUS 223.

BUS 328 Health Care Accounting and Finance

(F)(3-0-3)

General principles and application of managerial accounting in health care organizations. Theory and procedure in gathering cost data and their use in analyzing and controlling operation costs: job-order and process-cost systems. Revenue cycle, sources and systems

analysis of variance, cost effectiveness and managerial reporting are examined.

Prerequisite: ACC 201.

BUS 331 Personal Finance

(F,W,S)(3-0-3)

Introduction to the basic principles of personal financial planning and budgeting. Includes banking services, consumer credit, asset purchases, insurance and the fundamentals of investments and retirement planning.

BUS 335 Entrepreneurship II

(S)(3-0-3)

Complete a full marketing, financial and operational business plan for a new business venture. Students will learn and apply fundamental strategic decisions for small business entrepreneurs in all facets of starting, operating and growing a business.

Prerequisite: BUS 314 or instructor consent.

BUS 337 Principles of Health Care Marketing

(F,W,S)(3-0-3)

Fundamentals of health care marketing covering strategy, planning process, assessment, marketing actions, branding and evaluation.

BUS 345 Fraud Examination

(S)(3-0-3)

Study of fraud and fraud investigative techniques. Topics include nature of fraud, types of fraud, fraud prevention, detection and investigation methods and legal follow-up procedures.

BUS 347 Geography of Travel and Tourism

(F,S)(3-0-3)

Study of those destinations around the world that are most important to travelers including the World Heritage sites. Topics include fundamentals of geography, both physical and cultural, and major tourism destinations.

BUS 349 Human Resource Management I

(W,S)(3-0-3)

Principles, theories and applications of HR management in the areas of strategy, workforce planning, employment law, job analysis, recruitment, selection, training, performance management and international HRM.

Prerequisite: BUS 215 or BUS 304 or BUS 317 or instructor consent.

BUS 350 Hospitality Management

(S)(3-0-3)

Study of management principles in the tourism and hospitality industry. Topics include managing growth and change in the hospitality industry, major functional areas in hotels and restaurants and the economic aspects of the industry.

BUS 356 Business Presentations

(F,W,S)(3-3-4)

Design, preparation and delivery of effective business presentations. Emphasis on integration of skills in speech and digital communication software to deliver effective, informative and persuasive presentations in any business or organization.
Prerequisites: SPE 111, WRI 122.

BUS 358 Marketing for Hospitality and Tourism

(S)(3-0-3)

Study of marketing principles as they apply to the tourism and hospitality industry. Topics include marketing in strategic planning, the marketing environment, marketing information systems and marketing research, consumer buying behavior, market segmentation, product pricing, distribution channels and internet marketing. (Cannot be taken for graduation credit by students who have taken BUS 399 Special Topics: Marketing Tourism.)

BUS 385 Ecotourism

(S)(3-0-3)

Study of sustainability principles as they apply to the tourism and hospitality industry. Topics include the ecotourism environment, the economic, sociological and cultural impacts of ecotourism, ecotourism as a business and a world survey of ecotourism sites.
Prerequisite: WRI 121.

BUS 387 International Human Resource Management

(F)(3-0-3)

In-depth review of human resource selection, training for international assignments, managing the expatriate manager, compensation packages, repatriation training, women and dual-career couples, conflicting interests of parent company and host country and managing joint ventures.
Prerequisite: BUS 308.

BUS 397 Human Resource Management II

(S)(3-0-3)

Principles, theories, and applications of HR management in the areas of compensation, benefits, safety, labor relations, employee rights and engagement.
Prerequisite: BUS 349.

BUS 399 Marketing Special Topics

(3-0-3)

Concentrated areas of marketing will be taught on a rotating basis: business to business, hospitality and travel, entertainment and sports, high tech, direct marketing and public relations.
Prerequisite: BUS 223.

BUS 405 Reading and Conference

(Hours to be arranged each term.)

BUS 415 Environmental Regulation

(F,W)(3-0-3)

Legislation and enforcement activities involving natural and industrial environments. Conservation laws, land use and planning, responsibilities of regulatory agencies, review of current legislative actions and judicial decisions.
Prerequisite: BIO 112 or BUS 226.

BUS 416 Environmental Management

(W)(3-0-3)

Review of contemporary management issues and business practices related to land use management and planning, ecological planning, environmental quality engineering and control and natural resource economics.
Prerequisites: BUS 415 and ECO 201 or BIO 112.

BUS 420 Applied Management Internship

(F)(0-9-3)

This course provides credit for an approved internship related to the student's program. Students work in a supervised setting where they receive training to develop career related skills while applying college learned theory. This course can substitute for BUS 496.
Prerequisites: ACC 325, WRI 227, Senior standing and approval from senior project advisor.

BUS 434 Global Marketing

(S)(3-0-3)

Comprehensive study of global business issues that develop strategic visions for market entry in emerging and developed countries, analyzing financial and pricing considerations, evaluating strategies of export versus

local manufacturing, developing a marketing program that demonstrates implementation of global business principles.
Prerequisites: BUS 223, BUS 308.

BUS 435 Marketing III

(S)(3-0-3)

Marketing management strategies within a marketing centric business or organization, including the development of new products and services in response to market demands. Development of collaborative strategies in distribution, pricing and product/service mixes for new projects, services and line extensions.
Prerequisite: BUS 318.

BUS 441 Leadership I

(F,W)(3-0-3)

Role of managers and leaders within an organization. Recognizing styles, competencies and traits of a leader and strategic application within a working environment through case analysis and discussion, introduction and development of personal leadership skills.
Prerequisite: BUS 349 or instructor consent.

BUS 442 Leadership II

(3-0-3)

Leadership in developing and communicating vision/mission, values, setting ethical standards. Leading and developing multi-levels of managers. Mentoring high potential managers and transformational leaders. Leadership during conflict, change and diversity. The role of the leader in organizational development.
Prerequisite: BUS 441.

BUS 447 Controversial Issues in Management

(W,S)(3-0-3)

Examination of the many controversial issues in management such as social responsibility, whistle blowing, outsourcing, drug testing, Affirmative Action and so on. Students will study opposing views and arguments from a variety of viewpoints. Discussion and debate develops critical thinking skills.
Prerequisites: BUS 215, BUS 304 or BUS 317; PSY 347, WRI 122, and junior standing.

BUS 456 Business Research Methods

(F,W,S)(3-0-3)

Research design, exploration and proposals. Hypotheses formulation and testing. Data sources, collection and analysis. Survey de-

sign, sampling and census techniques. Library and online information retrieval sources. Effective search strategies. Research reporting. Prerequisites: MATH 361, WRI 227.

BUS 457 Business Research Methods II

(F,S)(3-0-3)

Emphasizes quantitative elements of research methods including presenting and describing information, drawing conclusions about populations using sample information; and improving business processes.

Prerequisites: BUS 215 or BUS 304 or BUS 317 and MATH 361 or MATH 243.

BUS 467 Service Management

(F,W,S)(3-0-3)

The nature of service and service encounters, strategy and competitiveness. Design of service systems. Facilities location, design and layout. Service quality and continuous improvement.

Prerequisite: BUS 215 or BUS 317.

BUS 473 Marketing Plan Development

(W,S)(3-0-3)

Development of an in-depth marketing plan for a local community business. All aspects of the plan will be covered in detail.

Prerequisites: BUS 223, BUS 319.

BUS 478 Strategic Management

(F,S)(3-0-3)

Comprehensive study and analysis of businesses and/or case studies. Evaluation of strategic and operational decision making. Performance analysis in areas of finance, marketing and social performance.

Prerequisites: ACC 203, WRI 227, senior standing.

BUS 495 Senior Project Proposal

(S)(1-0-1)

Examination of senior internship and/or project process and requirements. Definitions of a suitable senior internship or project topic and preparation of a formal proposal. Topics dealing with client contact, task definition, privacy and confidentiality, initial research, presentation of results.

Pre- or Co-requisites: MGT 335 and BUS 456.

BUS 496 Senior Project

(F,S)(1-3-2)

Students finalize project plan and complete data gathering and analysis portion of a proj-

ect for a client or an independent research project. Topics include completing research, data gathering and analysis.

Interim project report is written.

Prerequisite: BUS 495.

BUS 497 Senior Project

(F,W)(1-6-3)

Students complete project started in BUS 496 including preparing a detailed project report and delivering a final PowerPoint presentation. Periodic progress reports required. Instructor functions as a consultant.

Prerequisite: BUS 420 or BUS 496 with a grade of "C" or better. Pre or corequisite: BUS 356.

BUS 525 Marketing Management

(F)(3-0-3)

Topics include concepts related to the marketing management function of segmentation, brand equity, customer value analysis, integrated marketing, internal marketing and various organizational roles in moving a firms' products or services to end-users profitability and with value to the customers.

(CE) Civil Engineering

CE 107, CE 207, CE 307, CE 407 Seminar

(Hours to be arranged each term.)

CE 203 Engineering Graphics

(W,S)(1-6-3)

Graphical communication in civil engineering using computer-aided drafting and design software. Includes development of drawings related to civil engineering projects such as roads, subdivisions and buildings, development of scaled plots and reading of engineering drawings.

CE 205 Computational Methods

(W)(2-0-2)

Solve applied problems involving formulas, functions, summation and iteration using Excel and VBA. Use built-in functions and graphing capabilities.

Prerequisite: MATH 112 with grade "C" or better.

CE 208 Principles of Professional Practice

(S)(4-0-4)

Civil engineering professional practice topics

including project acquisition, development, management and delivery. Business in civil engineering including ethics, economics, leadership, communication and legal matters. Current and emerging trends in practice.

Prerequisites: ENGR 102 and MATH 111, each with grade "C" or better.

CE 212 Civil Engineering Materials

(F,S)(3-3-4)

Study of the engineering properties of soil as well as portland cement and asphaltic concretes. Field and laboratory testing methods for classifying soil. Mix design of concretes.

Prerequisites: ENGR 102 and MATH 111, each with grade "C" or better.

CE 299 Independent Studies

(Hours to be arranged each term.)

CE 311 Introduction to Geotechnical Engineering

(F,W)(4-3-5)

Soil permeability, seepage, filters, effective stress, consolidation, settlement, shear strength, slope stability, stresses in soils, and stresses under loaded areas. Includes laboratory testing.

Prerequisites: CE 212, ENGR 213, MATH 254N, and PHY 222, each with grade "C" or better.

CE 312 Earth Pressures and Foundations

(S)(3-0-3)

Analysis and design of shallow footings, deep foundations including piles, caissons and earth retaining structures design. Use of computer applications for design of these structures.

Prerequisite: CE 311 with grade "C" or better.

CE 331 Structural Analysis

(F)(3-3-4)

Structural loads according to ASCE 7. Analysis of statically determinate trusses and frames. Shear and moment diagrams, deflections, and influence lines for statically determinate structures. Analysis of statically indeterminate structures by force and displacement methods. Software applications emphasized in labs.

Prerequisites: ENGR 213, MATH 254N and PHY 222 each with grade "C" or better.

CE 341 Elementary Structural Design

(W)(4-3-5)

Fundamentals of structural element design: emphasis on structural steel, reinforced concrete, and timber beams and short columns as well as reinforced masonry lintels and walls due to gravity loads. Labs include construction, material and destructive testing, and software applications.

Prerequisite: CE 331 with grade "C" or better.

CE 351 Introduction to Transportation Engineering

(W)(3-3-4)

Introduction to the design, planning, operation, management and maintenance of transportation systems. Principles for planning multi-modal transportation systems, layout of roadways, traffic flow modeling and capacity analysis.

Prerequisites: CE 203, ENGR 211, GME 161, MATH 254N and PHY 222, each with grade "C" or better.

CE 354 Traffic Engineering

(F,S)(2-3-3)

Principles of traffic engineering and operation, traffic engineering studies, signalized intersection design, traffic analysis software. Prerequisites: CE 351 and MATH 361, each with grade "C" or better.

CE 371 Closed Conduit Design

(W)(3-3-4)

Population and factors influencing water supply demands, fire flows, peaking factors and storage requirements. Flows in pressure pipe systems, pipe networks analysis and design techniques. Estimation of wastewater flows including I/I considerations. Gravity-fed collection system design, construction and maintenance.

Prerequisites: ENGR 318, CE 205, MATH 254N and PHY 222, each with grade "C" or better.

CE 374 Hydrology

(S)(3-3-4)

Study of the hydrologic cycle, measurement of rainfall, runoff and streamflow. Curve fitting, hydrographic analysis, statistical analyses of extreme flows, flood routing and storage capacity. Runoff modeling and design of hydrologic structures and systems.

Prerequisites: CE 371 and MATH 361, each with grade "C" or better.

CE 401 /COM 401 Civil Engineering Project I

(F)(3-6-5)

First term of a two-term sequence integrating civil engineering design, group dynamics and technical communications. Students receive two credit hours in civil engineering (CE 401) and three credit hours in communication for general education (COM 401).

Prerequisites: WRI 227; advisor consent.

CE 402/COM 402 Civil Engineering Project II

(W)5-6-7)

Second term of a two-term sequence integrating civil engineering design, group dynamics and technical communications. Students receive four credit hours in civil engineering (CE 401) and three credit hours in communication for general education (COM 401). Prerequisites: CE 401 and COM 401, each with grade "C" or better.

CE 405 Sustainability and Infrastructure

(F)(3-0-3)

Integrating sustainability concepts and key social, economic and environmental issues and processes relevant to civil engineering. Sustainable design practices in each civil engineering sub-discipline will be studied and existing and proposed infrastructure projects will be evaluated.

Corequisite: CE 401.

CE 408 Workshop

(Hours to be arranged each term.)

CE 411 Engineering Geology

(W)(3-0-3)

A study of the interaction of geology, including structure, geologic processes (current and historic), lithology and mineralogy with civil engineering structures.

Pre-requisites: GEOL 201 and CE 311, each with grade "C" or better.

CE 413 Advanced Soils

(W)(2-3-3)

Advanced laboratory and in situ techniques for characterizing soils for use in civil engineering applications.

Pre-requisites: GEOL 201 and CE 311, each with grade "C" or better.

CE 421 Seepage and Earth Structures

(W)(3-0-3)

Covers material related to analyzing steady state and transient seepage conditions, erosion and piping, and the stability of earth slopes and embankments.

Prerequisites: GEOL 201, CE 311, CE 312, all with grade "C" or better.

CE 422 Advanced Shear Strength of Soils

(W)(3-0-3)

This course is designed to give students an advanced understanding of the shear strength of soils including drained and undrained strength of fine and coarse grained soils.

Prerequisites: GEOL 201, CE 311, each with grade of "C" or better.

CE 423 Deep Foundations

(W)(3-0-3)

This course covers the design of deep foundation systems including driven piles and drilled shafts. These systems are designed for both axial and lateral loading.

Prerequisites: GEOL 201, CE 311, CE 312, all with grade "C" or better.

CE 432 Structural Loading and Lateral Forces

(F)(4-0-4)

Gravity loads (dead, live, roof live, and snow) and lateral loads (wind and seismic) according to ASCE 7 and Oregon Structural Specialty Code. Introduction and design of basic lateral force resisting systems.

CE 433 Structural Matrix Analysis

(W)(3-0-3)

Static analysis of determinate and indeterminate structures using the direct stiffness method with heavy emphasis on computer models and solutions. Students will design and develop their own structural analysis program.

Prerequisites: CE 331 and MATH 341, each with grade "C" or better.

CE 439 Highway Bridge Rating

(F)(2-3-3)

Introduction to bridge types, bridge design philosophies and bridge rating procedures. Load rating of short-span highway bridges using AASHTO provisions and ODOT procedures. Software applications.

Prerequisites: CE 341 with grade "C" or better.

CE 442 Advanced Reinforced Concrete Design

(W)(4-0-4)

Design, analysis, and detailing of reinforced concrete elements, including: T-beams, doubly-reinforced beams, continuous beams, shear walls, slender columns, slabs, footings,

and moment frames. Seismic resistance and the development, anchorage, and splicing of steel reinforcement are introduced.

Pre-requisite: CE 341.

CE 444 Intermediate Steel Design

(S)(4-0-4)

Design of structural steel tension members, frameworks, composite beams, and bolted and welded connections. Application of the AISC Steel Construction Manual structural stability provisions and software applications. Pre-requisite: CE 341 with grade "C" or better.

CE 447 Masonry Design

(S)(3-0-3)

Analysis and design of masonry beams, walls and columns using computer solutions with emphasis on lateral design considerations. Pre-requisite: CE 341 with grade "C" or better and gravity elements with software applications as appropriate.

CE 448 Timber Design

(W,S)(3-0-3)

Analysis and design of simple (determinate) timber beams, columns, trusses and connections using dimensioned lumber, plywood and laminated members, with an emphasis on lateral force design. Computer solutions introduced.

Pre-requisite: CE 341 with grade "C" or better.

CE 449 Bridge Design

(W)(3-3-4)

Design and analysis of short and medium-span highway bridge superstructures including reinforced concrete, slab bridges, steel deck girder bridges, and prestressed concrete bridges. Software applications.

Pre-requisites: CE 341 with grade "C" or better.

CE 450 Transportation Structures

(S)(2-3-3)

Design and analysis of common transportation structures including culverts, sign structures, light poles, and railings according to current AASHTO provisions and ODOT procedures. Software applications.

Pre-requisites: CE 341 with grade "C" or better.

CE 456 Pavement Engineering

(S)(2-3-3)

Hot mixed asphalt materials testing and mixture design. Methods of manufacture,

transport and placement of rigid and flexible pavements. Structural design of rigid and flexible pavements. Pavement rehabilitation and management.

Pre-requisites: CE 212, ENGR 213 and CE 351, each with grade "C" or better.

CE 457 Transportation and Land Development

(W)(2-3-3)

Study of interactions between land development activity and the transportation network. Application of planning and engineering design techniques to manage the impacts of development upon the transportation system. Pre-requisite: CE 354 with grade "C" or better.

CE 458 Transportation Safety

(W)(4-0-4)

Safety concepts in highway engineering including highway design, operation, and maintenance, as well as human factors, statistical analysis, traffic control and public policy. Design concepts of intersections, interchanges, signals, signs and pavement markings. Pre-requisite: CE 354 with grade "C" or better.

CE 468 Travel Demand Modeling

(W)(3-3-4)

Introduction to travel demand analysis and forecasting. Models studied from a theoretical, applied and practical perspective. Students will become familiar with the traditional four-step travel forecasting process, including model development, application and interpretation of outputs.

Pre-requisites: CE 351 with grade "C" or better.

CE 472 Hydrometry

(F)(2-3-3)

Measurement of variables in the hydrologic cycle. Principles, methods, instruments, and equipment for obtaining surface and ground water quantity and quality data in nature to support design and water management efforts.

Pre-requisite: CE 374 with grade "C" or better.

CE 473 Groundwater

(W)(3-0-3)

Offers an introduction to the physical properties and principles of groundwater. Topics include groundwater and the hydrologic cycle, fundamental fluid flow laws, groundwater resource evaluation, and groundwater

contamination.

Prerequisite: CE 311 with grade "C" or better.

CE 476 Applied Hydraulic Design

(W)(2-3-3)

Flow analysis for constructed channels; principles of hydraulic design of culverts, bridge waterway openings, highway inlets, rundowns, and appurtenant water control structures. Computer modeling of bridge and culvert hydraulics. Design of appropriate Best Management Practices (BMPs) for storm-water quality and erosion control. Design project.

Prerequisite: CE 374 with grade "C" or better.

CE 481 Environmental Engineering I

(F,W)(3-0-3)

Introduction to environmental engineering principles, fundamental concepts and supporting calculations. Physical, chemical and biological elements of the natural environment. Environmental impacts of anthropogenic activities. Control and pollution prevention technologies. Legal and regulatory framework governing environmental management.

Pre-requisites: CHE 221 and ENGR 318, each with grade "C" or better.

CE 489 Treatment Wetlands

(W)(3-0-3)

Treatment wetland features; biological, chemical and physical properties. Planning, design and performance assessment principles for municipal, agricultural and stormwater treatment wetlands. Considers vegetation and microbiology, aerobic and anaerobic biogeochemistry, hydraulics and treatment efficiencies. Local case studies.

Pre-requisites: CHE 221 and ENGR 318, each with a grade "C" or better.

CE 499 Independent Studies

(Hours to be arranged each term.)

CE 501 Civil Engineering Graduate Seminar

(S)(1-0-1)

Civil Engineering graduate students will meet regularly with faculty members to share progress on their graduate project selection and report writing.

Prerequisite: Advisor Consent

CE 511 Seepage and Earth Structures

(W)(3-0-3)

Covers material related to analyzing steady state and transient seepage conditions, erosion and piping, and the stability of earth slopes and embankments.

Prerequisites: GEOL 201, CE 311, CE 312, all with grade "C" or better.

CE 512 Earthquake Engineering

(W)(3-0-3)

This course describes basic earthquake engineering in terms of regional seismicity, predicted ground motions, probabilistic methods for seismic analysis, liquefaction and steady-state shear strength analysis.

Prerequisites: GEOL 201, CE 311, both with grade "C" or better.

CE 513 Deep Foundations

(W)(3-0-3)

This course covers the design of deep foundation systems including driven piles and drilled shafts. These systems are designed for both axial and lateral loading.

Prerequisites: GEOL 201, CE 311, CE 312, all with grade "C" or better.

CE 522 Advanced Shear Strength of Soils

(W)(3-0-3)

This course is designed to give students an advanced understanding of the shear strength of soils including drained and undrained strength of fine and coarse grained soils.

Prerequisites: GEOL 201, CE 311, each with grade of "C" or better.

CE 533 Structural Matrix Analysis

(3-0-3)

Static analysis of determinate and indeterminate structures using the direct stiffness method with heavy emphasis on computer models and solutions. Students will design and develop their own structural analysis program.

Prerequisites: CE 331 and MATH 341, each with grade "C" or better.

CE 534 Advanced Solid Mechanics

(3-0-3)

Three-dimensional stress and strain, failure theories, elasticity and plasticity, curved beams, beams on elastic foundations, unsymmetric bending and shear centers.

Prerequisites: CE 442 or CE 444 with grade "C" or better

CE 535 Structural Dynamics

(2-3-3)

Analysis of single degree of freedom structural systems to harmonic and general dynamic loading. Free vibrating and forced vibration of multiple degree of freedom systems, modal superposition, earthquake engineering, current IBC methods.

Prerequisites: CE 331 with grade "C" or better

CE 539 Highway Bridge Rating

(2-3-3)

Introduction to bridge types, bridge design philosophies and bridge rating procedures. Load rating of short-span highway bridges using AASHTO provisions and ODOT procedures. Software applications.

Prerequisites: CE 341 with grade "C" or better.

CE 542 Prestressed Concrete Design

(3-0-3)

Analysis, behavior, and design of prestressed concrete structures and elements including beams, composite beams, box-girders and flanged beams, continuous beams and indeterminate frames, slabs, and compression members. Precast member design and behavior also introduced.

Prerequisites: CE 442 with grade "C" or better

CE 544 Advanced Steel Design

(3-0-3)

Torsion members, plate girders, and lateral force resisting systems. AISC Seismic Provisions for Structural Steel Buildings. Advanced topics in structural stability and connection design.

Prerequisites: CE 444 with grade "C" or better.

CE 549 Bridge Design

(3-3-4)

Design and analysis of short and medium-span highway bridge superstructures including reinforced concrete slab bridges, steel deck girder bridges, and prestressed concrete girder bridges. Software applications.

Prerequisites: CE 539 with grade of "C" or better

CE 550 Transportation Structures

(2-3-3)

Design and analysis of common transportation structures including culverts, sign structures, light poles, and railings according

to current AASHTO provisions and ODOT procedures. Software applications.

Prerequisites: CE 442 and CE 444, each with grade of "C" or better.

CE 551 Geometric Design of Roadways

(W)(2-3-3)

This course will provide students with an understanding of the principles and techniques of highway design. Topics include laying out potential routes, design of the alignment and intersections, evaluation of earthwork requirements, and safety considerations.

Prerequisites: CE 354 with grade "C" or better.

CE 554 Advanced Traffic Engineering

(W)(2-3-3)

Traffic studies including volume, speed, travel time and delay. Freeway and rural highway facility design, signing and marking. Urban unsignalized and signalized intersection design. Arterial planning and design.

Pre-requisite: CE 354 with grade "C" or better.

CE 556 Advanced Pavement Design

(S)(2-3-3)

This course covers advanced topics in the design and analysis of pavement materials and structures.

Prerequisite: CE 456 with a grade of "C" or better.

CE 558 Transportation Safety

(W)(4-0-4)

Safety concepts in highway engineering including highway design, operation, and maintenance, as well as human factors, statistical analysis, traffic control and public policy. Design concepts of intersections, interchanges, signals, signs and pavement markings.

Prerequisite: CE 354 with grade "C" or better.

CE 568 Travel Demand Modeling

(W)(3-3-4)

Introduction to travel demand analysis and forecasting. Models studied from a theoretical, applied and practical perspective. Students will become familiar with the traditional four-step travel forecasting process, including model development, application and interpretation of output.

Prerequisites: CE 351 with grade "C" or better.

CE 571 Open-Channel Hydraulics

(S)(3-3-4)

Application of basic principles of hydraulics to open channel flow. Theory and analysis of critical, uniform, unsteady, and gradually and rapidly varied flow. Flow characteristics in natural and constructed channels. Computer modeling of open-channel flow systems. Floodplain delineation methods.

Prerequisites: CE 371 with grade "C" or better.

CE 572 Hydrometry

(F)(2-3-3)

Measurement of variables in the hydrologic cycle. Principles, methods, instruments, and equipment for obtaining surface and ground water quantity and quality data in nature to support design and water management efforts.

Prerequisite: CE 374 with grade "C" or better.

CE 574 Environmental River Mechanics

(2-3-3)

River response to watershed modification and infrastructure, including introduction to fluvial geomorphology, sediment transport and stream restoration. Management of waterways and floodplains.

Prerequisite: CE 374 with grade "C" or better.

CE 576 Applied Hydraulic Design

(2-3-3)

Flow analysis for constructed channels; principles of hydraulic design of culverts, bridge waterway openings, highway inlets, rundowns, and appurtenant water control structures. Computer modeling of bridge and culvert hydraulics. Design of appropriate Best Management Practices (BMPs) for storm-water quality and erosion control. Design project.

Prerequisite: CE 374 with grade "C" or better.

CE 586 Water and Wastewater Treatment

(4-0-4)

Water and wastewater characteristics, chemistry, quality and supply. Engineering design and water demand projection. Theory of individual treatment processes, design guidelines for components for water/wastewater treatment.

Prerequisites: CHE 221 and CE 371, each with grade "C" or better.

CE 587 Environmental Remediation Technologies

(3-0-3)

Potential human activity effects on natural systems (air, soil, water). Physical, chemical, and biological processes in contaminant fate and transport. Regulatory aspects of environmental assessment, monitoring, and prioritization. Remediation/restoration technologies and strategies.

Prerequisite: CE 481 with grade "C" or better.

CE 590 Civil Engineering Graduate Project

(F,W,S)(Vary 1-9)

Research and preparation pertaining to the master's project.

Prerequisite: Advisor consent.

(CHE) Chemistry**CHE 101 Introduction to General Chemistry**

(F,W,S)(3-0-3)

A brief presentation of introductory chemical concepts including atomic structure, the chemical equation, the behavior of gases, the chemistry of solution and acid-base chemistry. For students with good knowledge of algebra.

Pre- or corequisite: MATH 100.

Corequisite: CHE 104 (lab).

CHE 102 Introduction to Organic Chemistry

(W)(3-0-3)

A continuation of CHE 101 with emphasis on organic chemistry. The role of organic chemistry in life and industrial processes is discussed.

Prerequisite: CHE 101 with grade "C" or better or instructor consent.

Corequisite: CHE 105 (lab).

CHE 103 Introduction to Biochemistry

(S)(3-0-3)

A continuation of CHE 102 with emphasis on biochemistry. The organic chemistry of biochemicals including proteins, carbohydrates and fats, as well as nucleic acids is discussed. Basic elements of metabolism are also explored.

Prerequisite: CHE 102 with grade "C" or better or instructor consent.

Corequisite: CHE 106 (lab).

CHE 104 Introduction to General Chemistry Laboratory

(F,W,S)(0-3-1)

Lab accompanying class content in CHE 101.

Corequisite: CHE 101.

CHE 105 Introduction to Organic Chemistry Laboratory

(W)(0-3-1)

Lab accompanying class content in CHE 102.

Corequisite: CHE 102.

CHE 106 Introduction to Biochemistry Laboratory

(S)(0-3-1)

Lab accompanying class content in CHE 103.

Corequisite: CHE 103.

CHE 107, CHE 207, CHE 307, CHE 407 Seminar

(Hours to be arranged each term.)

CHE 201 General Chemistry I

(F)(3-0-3)

Atomic structure, chemical compounds, chemical equations and reaction stoichiometry, reactions in aqueous solution (including acid/base, redox, and precipitation reactions) gas laws and kinetic-molecular theory, and thermochemistry. Emphasis on engineering applications.

Prerequisite: CHE 101 and 104, or high school chemistry or equivalent.

Pre- or co-requisite: MATH 111.

Corequisite: CHE 204 (lab)

CHE 202 General Chemistry II

(W)(3-0-3)

Electronic structure of atoms, periodic trends, chemical bonding, molecular geometry, intermolecular forces, phase transitions, and properties of solutions. Emphasis on engineering applications.

Prerequisite: CHE 201 and CHE 204, or CHE 221

Corequisite: CHE 205 (lab)

CHE 203 General Chemistry III

(S)(3-0-3)

Chemical kinetics and equilibrium, applications of aqueous equilibria (including acid-base reactions, buffers, solubility, and complexation reactions), thermodynamics, entropy and free energy, electrochemistry, and nuclear chemistry.

Prerequisite: CHE 202 and CHE 205, or

CHE 222

Corequisite: CHE 206 (lab)

CHE 204 General Chemistry I Laboratory

(F)(0-3-1)

Laboratory experiments to accompany CHE 201.

Corequisite: CHE 201

CHE 205 General Chemistry II Laboratory

(W)(0-3-1)

Laboratory experiments to accompany CHE 202.

Corequisite: CHE 202

CHE 206 General Chemistry Laboratory

(S)(0-3-1)

Laboratory experiments to accompany CHE 203.

Corequisite: CHE 203

CHE 210 Clinical Pharmacology

(F)(3-0-3)

The drug action of selected pharmaceutical. Emphasis is placed on drug interactions, routes of administration and effects on body systems.

Prerequisites: BIO 231, BIO 232.

CHE 221 General Chemistry I

(F)(4-3-5)

Atomic structure, chemical compounds, chemical equations and reaction stoichiometry, reactions in aqueous solution (including acid/base, redox, and precipitation reactions) gas laws and kinetic-molecular theory, and thermochemistry. Includes lab component.

Prerequisite: CHE 101 and CHE 104, or high school chemistry or equivalent.

Pre- or Corequisite: MATH 111

CHE 222 General Chemistry II

(W)(4-3-5)

Electronic structure of atoms, periodic trends, chemical bonding, molecular geometry, intermolecular forces, phase transitions, and properties of solutions. Includes lab component.

Prerequisite: CHE 221, or CHE 201 and CHE 204

CHE 223 General Chemistry III

(S)(4-3-5)

Chemical kinetics and equilibrium, applications of aqueous equilibria (including acid-base reactions, buffers, solubility, and

complexation reactions), thermodynamics, entropy and free energy, electrochemistry, and nuclear chemistry. Includes lab component.

Prerequisite: CHE 222, or CHE 202 and CHE 205

CHE 260 Electrochemistry for Renewable Energy Applications

(S)(3-3-4)

Development of electrochemistry concepts, including thermodynamics, reaction kinetics, charge transport and mass transport. Topics are presented in the context of fuel cells, electrolysis, electroplating and batteries. Also discussed, the chemistry of hydrogen; its properties, production, storage and transportation.

Prerequisite: CHE 202 or CHE 222.

CHE 305 Nanoscience and Nanotechnology

(F)(4-0-4)

Survey of chemical and physical phenomena as applied to nanoscale materials, including metal and semiconductor nanoparticles and carbon nanostructures. Discussion of major synthesis and characterization techniques. Biological and engineering applications of nanoscale materials.

Prerequisites: PHY222 or PHY223, and CHE202 or CHE222

CHE 315 Environmental Chemistry and Toxicology

(S)(3-0-3)

Mechanisms and toxicological effects of chemical reactions in water, soil and air. Global and regional concerns about atmospheric and marine contaminants, thermal pollution, pesticide and heavy metal disposal, radioisotope properties and effects of pollutants on living organisms. Organic nomenclature and selected biochemistry principles.

Prerequisite: CHE 331 or instructor consent.

CHE 325 Soil Science

(S)(3-3-4)

Nature, properties and distribution of soils and their relationship to the influence of vegetation, climate, landforms and human activity. Understanding how soils form and how and why they vary horizontally across the landscape and vertically with depth. Emphasis upon North American patterns. Required field trips and labs.

Prerequisite: CHE 202 or instructor consent.

CHE 331 Organic Chemistry I

(F)(3-3-4)

The structures and reactions of carbon compounds with emphasis on thermodynamics, reaction pathways and spectroscopy.

Prerequisite: CHE 223 or CHE 203 and CHE 206.

CHE 332 Organic Chemistry II

(W)(3-3-4)

Organic stereochemistry with emphasis on biologically important molecules.

Prerequisite: CHE 331.

CHE 333 Organic Chemistry III

(S)(3-3-4)

Free radical chemistry, pharmaceutical chemistry and the mechanistic aspects of enzymatic catalysis.

Prerequisite: CHE 332.

CHE 341 Instrumental Methods/ Data Acquisition I

(3-3-4)

An introduction to the theory and practical applications of computer/instrument interfacing and data acquisition techniques and software. Includes a survey of optical measurement techniques.

Prerequisite: CHE 235.

Corequisite: MIS 115 or CST 116 or instructor consent.

CHE 342 Instrumental Methods/ Data Acquisition II

(3-3-4)

Principles and techniques of instrumental methods and data analysis. Methods appropriate for chemical analysis including spectroscopy, gas chromatography, potentiometric and flame photometric methods. Emphasis on sample preparation, instrumental response, sensitivity and accuracy.

Prerequisite: CHE 341.

CHE 345 Corrosion Chemistry

(S)(3-0-3)

A survey of the chemical kinetics and thermodynamics of corrosion, the various types of corrosion, inhibition of corrosion and industrial applications.

Prerequisites: CHE 101, CHE 201 or CHE 221, and PHY 202 or instructor consent.

CHE 346 Corrosion Chemistry Laboratory

(S)(0-3-1)

Laboratory accompanying CHE 345. Providing practical experience with electrochemi-

cal equipment used to measure corrosion processes.

Corequisite: CHE 345.

CHE 350 Clinical Pharmacology for Nuclear Medicine

(F)(3-0-3)

Principles of pharmacokinetics, pharmacodynamics and a survey of the major drug families developing familiarity with commonly prescribed drugs, their clinical application, mechanism of action and side effects. Emphasis is on drugs of importance to nuclear medicine and the common radiopharmaceuticals.

Prerequisite: BIO 233 or BIO 333 or instructor consent.

CHE 360 Clinical Pharmacology for the Health Professions

(F,W,S)(3-0-3)

Principles of pharmacokinetics, pharmacodynamics and a survey of the major drug families developing familiarity with the most commonly prescribed drugs, their clinical application, mechanism of action and side effects.

Prerequisite: BIO 233 or BIO 333 or instructor consent.

CHE 450 Biochemistry I

(F)(3-3-4)

Molecular and cellular biochemistry with emphasis on DNA structure, replication, the process and cellular regulation of RNA transcription, and analyzing and constructing DNA.

Prerequisites: BIO 213, CHE 332.

CHE 451 Biochemistry II

(W)(3-3-4)

Molecular biochemistry with emphasis on protein conformation and function, mechanisms of enzyme action and control, and energy production via glycolysis.

Prerequisite: CHE 450.

CHE 452 Biochemistry III

(S)(3-3-4)

Molecular and cellular biochemistry with emphasis on cell membranes, lipid metabolism, aerobic energy metabolism, anabolism and the role of biochemistry in cellular signaling processes.

Prerequisite: CHE 451.

CHE 455 Water Quality Technology

(2-3-3)

Examination of water quality relative to

surface, groundwater and industrial sources. Focus on laboratory and field procedures for detection, surveillance and abatement of water pollution.

Prerequisites: ENV 325 and CHE 342, or instructor consent.

CHE 465 Fate and Transport of Pollutants

(S)(3-3-4)

Mass balance. The use of equilibrium and chemical kinetics in the modeling of pollutant transport in water, soil and air. Mixing zone analysis, the use of Darcy's law, flow nets and the Gaussian Plume approximation. Discussion, development and use of selected modeling scenarios.

Prerequisites: MATH 252, CHE 223 or CHE 203 and CHE 206.

(CLS) Clinical Laboratory Science

CLS 100 Introduction to Clinical Laboratory Science

(S)(1-3-2)

Orientation to the theory and practice of all aspects of the clinical laboratory science profession. The history of clinical laboratory science, professional organizations and career opportunities are discussed.

CLS 107, CLS 207, CLS 307, CLS 407 Seminar

(Hours to be arranged each term.)

CLS 415 Clinical Chemistry I

(F)(5-3-6)

Fundamentals of chemical analysis of body fluids. Laboratory practice in chemical formats, data evaluation, laboratory utilization, and quality control theory. Laboratory exercises linked to lectures: amino acids, proteins, carbohydrates, lipids, blood gases, enzymes, trace elements, electrochemistry, osmometry, electrophoresis, and spectroscopy.

Co-requisite: CLS 432

CLS 416 Clinical Chemistry II

(W)(5-3-6)

Fundamentals of chemical analysis of body fluids. Laboratory practice in chemical formats, data evaluation, laboratory utilization, and quality control theory. Laboratory exercises linked to lectures: renal and liver function, porphyrins, hormones, pregnancy, fetal development, bone metabolism, nutri-

tion, and geriatrics.

Pre-requisite: CLS 415

CLS 417 Clinical Chemistry III

(Su) (2-0-2)

The theory, practical application and technical performance of chemical analysis. Emphasis on theory of therapeutic drug monitoring, toxicology, proteomics, individualized screening, and method validation.

Pre-requisite: CLS 416

CLS 420 Clinical Immunology and Infectious Serology

(F)(4-3-5)

Lecture/laboratory coverage of human immunity, including innate and adaptive immunity, immune system organs, tissues, and activation. Immunological methods used in the clinical lab to assess human immune response in health and in various disease states are studied.

Co-requisite: CLS 432

CLS 422 Molecular Diagnostic Methods

(S)(2-3-3)

Coverage of molecular techniques used in the clinical laboratory to diagnose disease. Topics covered include principles of molecular biology, nucleic acid isolation, purification, amplification, quantitation, and discrimination. Specimen collection/handling, ethical issues and molecular lab operations are also covered.

Prerequisites: CLS 415, CLS 416, CLS 420

CLS 424 Hemostasis

(Su)(2-3-3)

Lecture and laboratory coverage of the mechanisms of hemostasis and basic pathophysiology of hemostatic disorders. Students perform laboratory procedures pertaining to hemostasis, interpret results and correlate with other laboratory data to identify disease states.

CLS 432 Foundations of Clinical Laboratory Science I

(F)(3-3-4)

The first of three courses covering essential professional practice issues related to the pre-analytical, analytical, and post-analytical components of laboratory services. Lecture and lab emphasis on application of theories and concepts underlying professional practice in the contemporary clinical laboratory.

Prerequisite: MATH 361 or permission of the instructor or admission to the CLS program

CLS 442 Hematology I

(W)(4-6-6)

Lecture and lab coverage of normal development and function of blood cells. Students learn to evaluate normal and abnormal blood cell morphology through microscopic examination of blood smears. Students perform laboratory procedures pertaining to hematology.

CLS 443 Immunohematology I

(S)(3-3-4)

Lecture and lab coverage of immunohematology with practical application in the contemporary blood bank laboratory. Topics covered include blood groups biochemistry, genetics, and immunology, test methods and transfusion practices including donor selection, component preparation, quality management and compliance issues.

Prerequisites: CLS 420, CLS 442

CLS 444 Microbiology I

(W)(4-6-6)

Lecture/lab coverage of human bacterial pathogens seen in the clinical laboratory including gram positive and gram negative cocci, and gram positive and gram negative bacilli. Principles and methods of clinical microbiology laboratory diagnosis of bacterial diseases are studied.

CLS 445 Microbiology II

(S)(2-6-4)

Lecture/lab coverage of diseases caused by, and clinical laboratory identification of, human microbial organisms including anaerobes, spirochetes, mycobacteria, chlamydia, and rickettsia. Interpretation of clinical specimens, identification of pathogens, and the recognition of normal flora is also studied.

Prerequisite: CLS 444, CLS 464, CLS 474

CLS 446 Microbiology III

(S)(2-6-4)

Lecture and laboratory coverage of normal and pathogenic parasitic organisms of man with emphasis on organisms seen in a clinical laboratory. Principles and methods of clinical laboratory diagnosis of infections and diseases caused by these organisms are studied.

CLS 447 Clinical Chemistry Laboratory

(W)(4-6-6)

Principles of chemical analysis, quality control, laboratory utilization, and safety. Hands-

on exercises, demonstrations, and computer tutorials illustrating chemical analysis and data evaluation in a clinical chemistry laboratory. Discussion of case studies using problem-solving methods to analyze and interpret relevant chemical analysis data.

Corequisite: CLS 415

CLS 448 Infectious Serology

(Su)(0-3-1)

Clinical laboratory diagnosis of infectious disease by serological test methods is studied.

Prerequisites: CLS 420, CLS 432.

CLS 449 Principles of Urinalysis

(Su)(2-3-3)

Lecture and laboratory coverage of renal function, urine formation, and methods used to analyze urine in the medical laboratory. Students perform physical, chemical, and microscopic analyses on clinical samples and correlate results with states of health and disease in man.

CLS 452 Hematology II

(S)(4-3-5)

Comprehensive study of the pathophysiology of hematological disorders. Students perform microscopic examination of blood films, interpret results and correlate with other laboratory data to identify disease states.

Prerequisite: CLS 442.

CLS 453 Immunohematology II

(Su)(1-3-2)

Continued study of immunohematology emphasizing clinical decision-making and problem-solving related to blood banking and transfusion therapy practices.

Prerequisite: CLS 443.

CLS 457 Advanced Chemistry/ Immunology Concepts

(Su)(2-0-2)

Directed study, review, and class discussion of clinical laboratory assay methodology and data interpretation, and medical research methods including data analysis, regulatory requirements, and ethical issues. Relevant medical case studies and contemporary scientific research papers are presented and critiqued by students. Prerequisites: CLS 415, CLS 416, CLS 420, and CLS 447

CLS 462 Foundations of Clinical Laboratory Science II

(W)(1-3-2)

The second of three courses covering essential professional practice issues related to the

pre-analytical, analytical, and post-analytical components of laboratory services. Lecture and lab emphasis on application of theories and concepts underlying professional practice in the contemporary clinical laboratory.

Prerequisite: CLS 432

CLS 463 Foundations of Clinical Laboratory Science III

(F)(0-3-1)

Third of three courses covering essential professional practice issues related to the pre-analytical, analytical, and post-analytical components of laboratory services. Emphasis on practical experience through the application of theories and concepts of professional development, administration and supervision at an approved off-campus clinical site.

Prerequisite: CLS 432 and CLS 462

CLS 464 Medical Mycology and Virology

(F)(1-3-2)

Lecture and laboratory coverage of pathogenic fungal and viral organisms with emphasis on those seen in a clinical laboratory. Principles and methods of clinical laboratory diagnosis of infections and diseases caused by these organisms are studied.

Prerequisites: Admittance to CLS Program

CLS 470 Chemistry and Immunology Externship

(F)(0-12-4)

Four weeks full-time practical experience at an approved off-campus clinical site emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary clinical chemistry/immunology laboratory and further develop discipline-specific competency.

Prerequisite: successful completion of all didactic, pre-clinical coursework in the CLS program.

CLS 471 Hematology Externship

(F)(0-12-4)

Four weeks full-time practical experience at an approved off-campus clinical site emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary clinical hematology laboratory and further develop discipline-specific competency.

Prerequisite: successful completion of all didactic, pre-clinical coursework in the CLS program.

CLS 472 Microbiology Externship

(F)(0-12-4)

Four weeks full-time practical experience at an approved off-campus clinical site emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary clinical Microbiology laboratory and further develop discipline-specific competency.

Prerequisite: successful completion of all didactic, pre-clinical coursework in the CLS program.

CLS 473 Immunoematology Externship

(F)(0-9-3)

Practical experience at an approved off-campus clinical site emphasizing application of knowledge and skills to perform a wide variety of testing in a contemporary blood bank laboratory and further develop discipline-specific competency.

Prerequisite: successful completion of all didactic, pre-clinical coursework in the CLS program.

CLS 474 Medical Parasitology

(W)(1-3-2)

Lecture and laboratory coverage of normal and pathogenic parasitic organisms of humans with emphasis on organisms seen in a clinical laboratory. Principles and methods of clinical laboratory diagnosis of infections and diseases caused by these organisms are studied.

Prerequisites: Admittance to CLS Program

(COM) Communication**COM 104 Introduction to Communication**

(F)(3-0-3)

Introduces Communication Studies. Principles and applications developed in context of career exploration, interpersonal, group, organizational and technical communication. Includes history and structure of communication field, career paths, research skills and role of technology. Required for majors.

COM 105 Introduction to Communication Theory

(W)(3-0-3)

Introduces basic theories and concepts in the Communication discipline. Acquaints students with major theories fundamental to communication research and to communica-

tion interactions including interpersonal, organizational, media and intercultural.

Prerequisite: COM 104.

Pre- or corequisite: WRI 122.

COM 106 Introduction to Communication Research

(S)(3-0-3)

Introduces research in the communication discipline. Students find and analyze quantitative, qualitative and critical research. Introduces communication research as a process composed of methods, data-gathering, analysis, conclusions.

Prerequisite: COM 105.

COM 107, COM 207, COM 307, COM 407 Seminar

(Hours to be arranged each term.)

COM 109 Introduction to Communication Technology

(S)(2-3-3)

Introduction to the use of communication technology. Emphasis on the use of various communication technologies including social media, instant messaging, and visual communication technologies.

Features projects using technology to effectively communicate to various audiences.

COM 115 Introduction to Mass Communication

(F)(3-0-3)

Provides an introduction to mass media. Focuses on understanding how media operate with emphasis on contemporary social, economic, political, cultural and ethical issues.

COM 205 Intercultural Communication

(F,W,S)(3-0-3) C

Introduces basic theories and concepts of intercultural communication. Builds understanding and skills enabling students to analyze intercultural interactions and develop and practice effective communication strategies.

COM 215 Creativity in Communication

(F,W,S)(3-0-3)

Define and learn how personal and group creativity can be enhanced. Study the lives of creative individuals in the arts, sciences, and industry. Individual and group exercises designed to enhance the creative process.

COM 216 Essentials of Grammar and Punctuation

(W)(3-0-3)

Involves learning basic and advanced grammar and punctuation to provide a firm foundation for any type of writing.

Prerequisite: WRI 121 with grade "C" or better.

COM 225 Interpersonal Communication

(F,W,S)(3-0-3) C

Introduces interpersonal communication theory and practice. Students apply course concepts to analyze and practice dyadic communication to develop more effective work and personal relationships.

COM 226 Nonverbal Communication

(W)(3-0-3)

Nonlinguistic aspects of human communication. Examines the relationships between nonverbal and verbal communication behavior and nonverbal communication skill. Topics include space, distance, environment, touch, gesture, facial expression and gaze as communication.

Prerequisites: COM 225, SPE 111.

COM 237 Introduction to Visual Communication

(S)(3-0-3)

Introduces theory and rhetoric through several perspectives: personal, historical, technical, ethical, cultural, and critical. Emphasizes relationships between form/content, word/image, and societal role of visual communication.

Prerequisite: WRI 122.

COM 248 Digital Media Production

(S)(2-3-3)

Study of the technical aspects of digital media design and production. Hands-on experience in creating and editing video and audio. Production of video and audio for specific contexts.

COM 255 Communication Ethics

(S)(3-0-3)

Examines typical communication situations involving ethics. Provides methodologies for critically evaluating ethical situations. Uses case approach with emphasis on application.

Prerequisite: WRI 122.

COM 256 Public Relations

(F)(3-0-3)

Introduces history and practice of public

relations; emphasizes practical accomplishment of public relations campaigns. Topics: internal/external audiences, brochures, press releases, internal documents, pitches, issue management, and project design, execution. Service learning course.
Prerequisite: WRI 122.

COM 276 Democracy and Media

(W)(3-0-3)

Provides introduction to ownership/structure of media, politics, objectives, and links to the corporate and national economy. Introduces project analysis through ownership, sourcing, flak, advertising, ideology filters.
Prerequisites: COM 115, WRI 122.

COM 301 Rhetorical Theory and Application

(F)(3-0-3)

Introduces rhetorical theories and applications to personal, business and industrial settings. Focuses on evolution of rhetoric. Examines rhetorical effects on individual, group and mass communication.
Prerequisites: SPE 111, WRI 227.

COM 309 Communication Technology in Use

(S)(2-3-3)

Advanced use of communication technology. Emphasis on the use of communication technology to achieve specific communication goals. Features a large project using multiple communication technologies to reach specific audiences.

Prerequisites: COM 109, MIS 101, MIS 102, MIS 103

COM 320 Advanced Intercultural Communication

(W,S)(3-0-3) C

Builds on theories from COM 205. Focuses on analyzing intercultural interactions in specific work contexts, for example health care, education, social services, business and technology.

Prerequisite: COM 205.

COM 325: Gender and Communication

(F)(3-0-3)

Introduces basic theories and concepts of culturally-derived gendered communication patterns and behaviors. Builds understanding and skills enabling students to analyze those patterns and behaviors in order to develop and practice effective communication strategies.

Pre-Requisite: COM 205

COM 326 Communication Research

(F)(3-0-3)

Introduction to research methods and design. Design of both quantitative and qualitative research. Emphasis on communication based methodologies: focus groups, directed interviews, and ethnomethodologies. Includes a research project and written and oral research reports.

Pre- or corequisite: WRI 227.

COM 345 Organizational Communication I

(W)(3-0-3)

Studies communication in organizations, including message movement, exchange and interpretation, identification of variables, roles and patterns influencing communication in organizations.

COM 346 Health Communication

(S)(3-0-3)

Overview of interpersonal, social and cultural issues in health communication, including family interaction, roles of patients and caregivers, communication in health organizations and the role of media.

Prerequisites: WRI 122 with "C" or better; COM 205 or equivalent.

COM 347 Negotiation and Conflict Resolution

(F,S)(3-0-3) C

Examines theories and strategies for conduct of conflict and negotiation across contexts. Topics: destructive conflict cycles, confronting/managing conflict, social/psychological aspects, conflict analysis, causes and promoting constructive conflict.

Prerequisite: SPE 321 or instructor consent.

COM 348 Facilitation

(S)(3-0-3)

Provides experience leading small groups through deliberative processes including participatory decision making and conflict resolution. Provides theoretical and practical understanding of facilitation focusing on building skills in group leadership.

Prerequisite: SPE 321.

COM 358 Communication and the Law

(S)(3-0-3)

Issues involved in establishing legal parameters within which professional communicators work. Evolving interpretations of the

first amendment, balancing conflicting first amendment claims, libel, limits of a free press, prior restraint, licensing and regulation.
Prerequisites: SPE 111, WRI 227.

COM 365 Electronic Communication and Society

(S)(3-0-3)

Explores the Internet as a mediator of human communication and its effect on society.

Topics include social media, informatics, entertainment/workplace contexts, and the convergence of technology as a global village.

Prerequisite: WRI 227.

COM 401/CE 401 Civil Engineering Project I

(F)(4-6-6) C

First term of a two-term sequence integrating civil engineering design, group dynamics and technical communications. Students receive three credit hours in civil engineering design (CE 401) and three credit hours in communication for general education (COM 401). Students will be introduced to a major civil engineering project, prepare a professional engineering proposal and function effectively in engineering design teams. Formal written proposal and oral presentation of the proposal are required.

Prerequisite: Civil Engineering advisor consent.

COM 402/CE 402 Civil Engineering Project II

(W)(4-6-6) C

Second term of a two-term sequence. Students receive three credit hours in civil engineering design (CE 402) and three credit hours in communication for general education (COM 402). Student teams will perform work as defined in the fall term proposal. Consultations with faculty, students and clients ensure work progresses toward stated goals. Term culminates with final design recommendations presented in a written report and oral presentation. Plans and specifications and a construction cost estimate will also be completed.

Prerequisite: COM 401/CE 401 both with grade "C" or better.

COM 415 Developing Effective Multimedia-based Presentations

(W,S)(3-0-3)

Interdisciplinary course introducing students to the tools and skills associated with designing, developing, presenting and disseminating state-of-the-art multimedia presentations.

Hands-on experience with graphics, digital/ audio video, animation and text.

Prerequisites: CST 101 or equivalent, SPE 111 and WRI 227.

COM 420 Externship

(F,W,S)(Variable to a total of 15 credits)
Students work in applied settings in their emphasis under the supervision of an on-site mentor. Regular contact with extern advisor. Written externship reports required.
Prerequisite: Senior standing.

COM 421 Senior Project I

(F,W)(3-0-3)
Allows students to initiate research on a significant capstone project in the communication field. Focuses on development of a proposal and presentation.
Prerequisite: Senior standing.

COM 422 Senior Project II

(W,S)(3-0-3)
Continues work of COM 421, focusing on project research methodologies.
Prerequisite: COM 421.

COM 423 Senior Project III

(F,S)(3-0-3)
Focuses on completion of project, including final documentation and presentation.
Prerequisite: COM 422.

COM 424 Capstone Course

(F)(3-0-3)
Communication Studies majors complete a significant research project that bridges education with future profession or graduate school. Students collaboratively produce a project or portfolio reflecting strong critical thinking and application of communication theory and practice. Project topics vary by instructor.
Prerequisites: Senior standing in the major, WRI 227

COM 425 Mediation

(W)(3-0-3)
Prepares students to mediate in public and private settings. Covers conflict management strategies, processes and issues including gender and cultural awareness.
Prerequisite: COM 225 or instructor consent.

COM 426 Mediation Practicum

(S)(Variable Credit 1-3)
Mediation practice and observation with experienced mediators through the Klamath

Mediation Center. Students will progress from observation, to co-mediation, and finally, mediation of real disputes. Builds on the theoretical insights and practice of COM 425.

Co- or prerequisite: COM 425.

COM 437 Communication Training and Development

(S)(3-0-3)
Prepares students to facilitate communication skills workshops and differentiate between organizational structure and communication training needs. Topics include audience analysis, learning theory, curriculum design, presentation skills, classroom dynamics and assessment.

Prerequisite: SPE 321 .

COM 445 Organizational Communication II

(S)(3-0-3)
Examines organizational communication systems and the design of communication audit procedures. Synoptic reports of findings and recommendations.

Prerequisite: COM 345 or instructor consent.

COM 446 Communication and Leadership

(W)(3-0-3)
Explores the relationship between communication and leadership within organizations and the development and application of communication competencies associated with effective leadership.

Prerequisite: SPE 321 or instructor permission.

(CSH) Clinical Sleep Health

CSH 201 Human Development and Behavioral Health (F,W,S)(3-0-3)

Normal sleep architecture over the lifespan. Behavioral, physiological, and environmental patterns that contribute to healthy sleep.

CSH 220 Sleep Disorders and Co-Morbidities (F,W,S) (3-0-3)

Pathophysiology, epidemiology, and clinical presentation of abnormal sleep. Understanding and recognition of major co-morbidities associated with sleep disorders.

CSH 225 Impact of Neurologic Disorders on Sleep (F,W,S)(3-0-3)

Effect and management of chronic neurological disorders on sleep quality and therapy outcomes.

CSH 231 Pharmacology of Sleep (F,W,S)(3-0-3)

Different classes of medication, dependency, addiction, long term effect on sleep, and prognosis for other sleep therapies.

CSH 233 Sleep Therapies and Compliance (F,W,S)(3-0-3)

Non prescription sleep therapies, PAP, CBT, Light Therapy, Chronotherapy and other treatment modalities. Patient compliance issues, predictors of outcomes, and psychological theories.

CSH 242 Evaluation and Measurement Tools (F,W,S)(3-0-3)

Physiological, psychological, and psychomotor evaluation and measurement tools to assess severity of sleep disorders and patient response to therapy.

CSH 268 Learning, Health Literacy, and Community Education (F,W,S)(3-0-3)

Adult education theories, appropriate communication strategies for health literacy, development of programming for patients, families, allied health providers, and community groups.

CSH 276 Capstone Project (F,W,S)(3-0-3)

Students develop, plan and implement a project for community sleep education. Instructor functions as a consultant.
Prerequisites: CSH 268

CSH 277 Clinical Sleep Health Externship (F,W,S)(0-40-13)

Clinical skills essential for the practice of sleep case management. Patient assessment, creation of individualized care plans, long term compliance monitoring, and identification of changes in the status of other chronic diseases. Students must be employed in a clinical facility that treats sleep disordered patients. (400 contact hours).
Prerequisite: CSH 268

(CST) Computer Systems Engineering Technology

CST 102 Introduction to Computer Systems

(F)(2-3-3)

Concepts, terms, and trends related to the computer engineering technology (hardware) and software engineering technology (software) curriculums. Includes discussions on fundamental aspects of the computer field. Laboratory component will introduce students to micro-computers, programming concepts and various computer/engineering related software.

Prerequisite: CSET major or instructor consent.

CST 107, CST 207, CST 307, CST 407 Seminar

(Hours to be arranged each term.)

CST 116 C++ Programming I

(F,W,S)(3-3-4)

Computer concepts and problem solving methods using C++ programming language. Topics include: algorithms, simple data types, conditional and iterative structures, function definition, structured programming and documentation. Cannot be taken for graduation credit if student has completed MIS 116. Pre- or Corequisite: MATH 111.

CST 120 Embedded C

(S)(3-3-4)

C programming concepts for embedded platforms such as cross-compilation, storage classes, dynamic memory allocation, bitwise operations and masking. Embedded systems topics such as I/O ports, interrupts, timers and hardware interfacing will also be explored.

Pre- or Corequisite: CST 126

CST 126 C++ Programming II

(F,W,S)(3-3-4)

Solving complex problems using advanced features of the C++ language. Topics include function usage, pointer data type, dynamic memory allocation, string manipulation, and structure and union data types. Emphasis is on structured program design techniques. Cannot be taken for graduation credit if student has completed MIS 126.

Prerequisite: CST 116, with grade "C" or better.

CST 130 Computer Organization

(W,S)(3-0-3)

Introduces computer elements, organization, and instruction sets, computer arithmetic, ALU, Registers, Datapath, memory and Control unit functions.

Prerequisite: CST 162 with grade "C" or better.

CST 131 Computer Architecture

(F,S)3-0-3)

Continuation of CST 130. Topics include main memory, cache, virtual memory, memory management, secondary storage, networks, operating system functions, and pipelining.

Prerequisite: CST 130 with grade "C" or better.

CST 133 Digital Logic II

(F,W)(3-3-4)

Introduction to sequential logic, latches, flip-flops, registers, counters, timers, finite state machines. Implementation in programmable logic devices using HDL. DC and AC parameters, timing analysis. Laboratory is integral to class.

Prerequisite: EE 131 or CST 162, both with grade "C" or better

CST 134 Instrumentation

(F,W)(0-3-1)

Lecture/laboratory course that provides students experience in measuring, calibrating, and testing digital and analog systems. Uses various test equipment for test and measurement of digital and analog components.

Pre- or Co-requisite: CST 133.

CST 136 Object-Oriented Programming with C++

(F,W,S)(3-3-4)

A study of object oriented programming with C++. Beginning and intermediate concepts are covered including classes, objects, member functions, overloading, inheritance, polymorphism, templates, and virtual functions.

This course prepares students with a strong C background for upper-division coursework using C++. Cannot be taken for graduation credit if student has completed MIS 136.

Prerequisite: CST 126, with grade "C" or better.

CST 162 Digital Logic I

(F,W)(3-3-4)

Introduction to combinational logic. Includes introduction to number systems, Boolean algebra, logic gates, Muxes, Decoders, Adders, Subtracters.

Logic design using a hardware description language.

Laboratory integral to the class.

Pre- or corequisite: MATH 100.

CST 204 Introduction to Microcontrollers

(W,S)(3-3-4)

An introduction to microcontrollers (uC). Signals and data flow within simple systems. Introduction to instruction set, software development tools and I/O techniques, both programmed and interrupt-driven. Experiments using uC plus external circuits in applications.

Prerequisites: CST 131, CST 250, each with grade "C" or better, or instructor consent.

CST 211 Data Structures

(F,W,S)(3-3-4)

Discussion of efficient methods of data representation such as stacks, queues, linked-lists, binary trees, B-trees. Emphasis is on data representation and algorithm analysis.

Prerequisite: CST 136 with grade "C" or better.

CST 223 Concepts of Programming Languages

(S)(2-3-3)

Study of principles and fundamental concepts characterizing high-level programming languages, including history and survey of programming paradigms, syntax and semantic rules, data types, control flow and data abstraction.

Prerequisite: CST 126 with grade "C" or better.

CST 229 Introduction to Grammars

(F)(3-0-3)

The concepts involving alphabet words and languages will be discussed. Related topics in automata and regular expression will be explored. Emphasis is on context free grammars, parse tree and parsing techniques.

Prerequisites: CST 211, and CST 223 or CST 231.

CST 231 Digital Systems Design I

(W)(3-3-4)

Concepts, terminology and techniques in design and implementation of digital system components. Synchronous sequential logic design with emphasis on state machines.

System design process including synthesis using Verilog HDL and implementation in programmable logic devices. Lab integral to course.

Prerequisite: CST 133 with grade “C” or better.

CST 236 Software Systems Testing (W,S)(3-3-4)

Focus on software testing and reliably monitoring the health of software development. Topics include test driven development, story driven tests, unit tests, Web tests, load tests, static code analysis and dynamic code analysis.

Prerequisite: CST 136 with grade “C” or better.

CST 238 Graphical User Interface Programming

(S)(3-3-4)

Introduction to HCI and GUI design in a rapid application development environment. Prerequisite material in delegation, events, and multithreaded programming included. Topics: forms, containers, components, controls, modal/modelless windows, fixed/dynamic layouts, SDI/MDI applications, application internationalization, and data binding.

Prerequisites: CST 211 with grade “C” or better and SPE 111.

CST 240 UNIX

(W,S)(3-3-4)

Students will study the structure of the UNIX/ Linux Operating System, including: file structure, input/output processing, commands and utilities, shell configuration, communications, and script programming languages. Emphasis will be placed on lab work done within the UNIX/Linux environment.

Prerequisite: CST 126 with grade “C” or better.

CST 250 Computer Assembly Language

(F,W)(3-3-4)

Concepts of assembly language programming applied to a modern computer; data and instruction formats, address generation; data definition, storage allocation and program control statements; sub-routine library; CPU instruction set; control records; and writing of sub-routines.

Prerequisites: CST 126 and CST 130 with grade “C” or better.

CST 262 Digital Design Using HDL

(F,W)(3-3-4)

Advanced digital circuit design. HDL is used in designing sequential logic circuits such as

registers, counters, and synchronous finite state machines. Basic digital circuit design and analysis with semiconductor devices is also covered. Laboratory is integral to the class.

Prerequisites: CST 162 with grade “C” or better, EET 101, EET 102.

CST 276 Software Design Patterns (F)(3-3-4)

Design patterns establish a common terminology allowing developers to use a common vocabulary and share a common viewpoint of the problem. Design patterns provide a common point of reference during the analysis and design phase of a project.

Prerequisite: CST 136 with grade “C” or better.

CST 315 Embedded Sensor Interfacing and I/O

(F)(3-3-4)

Introduction to Data Acquisition Systems. Sampling Theory, ADC, DAC, Signal Conditioning, Filters, Amplifiers, Noise. Transducers and sensors, including Bio-sensors. Sensor Interfacing, Smart Sensors, and Busses. Lab integral to course.

Prerequisites: CST 204; EE 221

CST 316, CST 326, CST 336 Junior Team-Based Project Development I, II, III

(F)(W)(S)(3-3-4)

In this three-term sequence, students will work in teams to gather requirements, model, analyze, develop and integrate an n-tiered architecture software product. Students will learn about project management, software development lifecycle tools and processes, and quality assurance processes.

CST 316 Prerequisites: CST 211 with grade “C” or better.

CST 316 Pre- or corequisites: CST 324 with grade “C” or better.

CST 326 Prerequisites: CST 316 with grade “C” or better.

CST 326 Pre- or corequisites: CST 276 with grade “C” or better.

CST 336 Prerequisites: CST 326 with grade “C” or better.

CST 336 Pre- or corequisites: CST 236, CST 238 both with grade “C” or better.

CST 320 Compiler Methods

(W)(3-3-4)

Basic concepts of compiler design and operation. Topics include lexical and syntactical analysis, parsing, translation, data flow analy-

sis and code generation, and implementation of a small compiler.

Prerequisite: CST 229.

CST 321 Introduction to Microprocessors

(F)(3-6-5)

Hardware and assembly level software needed to interface a microprocessor to I/O ports, memory and interrupt sources. Topics include bus controller design, timing analysis, programmed I/O and interrupts. Extensive lab provides experience with system design, test and debugging using the 80386DX microprocessor.

Prerequisites: CST 204 and CST 231, with grade “C” or better, or instructor consent.

CST 324 Database Systems and Design

(F)(3-3-4)

An overview of Data Base Management Systems including requirements analysis methodology for data base design, conceptual DB design methodology including formulation of entity-relationship models, review of query language characteristics, and a comparison of commonly available DBMS.

Prerequisite: CST 211 with grade “C” or better.

CST 328 Graphics, Games, and Simulations Programming

(S)(2-3-3)

Introduction to games and simulations programming using a high end game development engine. Graphics topics: geometric transformations, physics simulation, collision detection/handling, and ray tracing/casting. Artificial intelligence topics: game theory, probability, steering behaviors, flocking behaviors, path-finding, and behavior trees.

Prerequisite: CST 238 or instructor consent.

CST 331 Microprocessor Peripheral Interfacing

(W)(3-6-5)

Expansion of processor based systems through off chip parallel bus interfacing. Adding off chip I/O ports, memory and parallel I/O devices. I/O port expansion through serial interface. In depth interface timing analysis. Extensive lab provides continued experience with system design, test and debugging techniques.

Prerequisite: CST 337 or CST 321; CST 231 with grade “C” or better.

CST 334 Project Proposal

(S)(1-0-1)

Description of senior project; time management techniques; task assignment; development of in-depth senior project proposal and preparation of formal senior project. Includes use of PC-based planning.

Pre- or Corequisite: CST 336 or CST 373.

CST 335 I/O Device Interfacing Techniques

(F)(3-3-4)

Application of opto-couplers, peripheral drivers, A-D converters, and operational amplifiers to microprocessor/microcontroller based applications. Survey of transducer theory and available devices. An embedded system is used as a development platform in laboratory experiments.

Prerequisites: CST 204; EE 223, or EET 237 and 238 or instructor consent.

CST 337 Embedded System Architecture

(F)(3-6-5)

Configuration, programming, testing, debugging of embedded systems. Serial interfaces including RS232, I2C and SPI. I/O methods including programmed I/O, interrupts and DMA. Interfacing issues related to timing and protocol. Impact of processor architecture and I/O methods on system performance.

Prerequisite: CST 204 with grade "C" or better.

CST 340 Advanced UNIX

(S)(2-3-3)

Advanced facets of the UNIX operating system will be explored. Topics of study will include: interprocess communication, programming, system administration. Students will use Oregon Tech computers operating under UNIX.

Prerequisite: CST 240.

CST 344 Intermediate Computer Architecture

(F)(3-0-3)

Register level design of a computer system, including the processor and memory structures. Cache and virtual memory. Includes analysis of both CISC (Complex Instruction Set Computer) and RISC (Reduced Instruction Set Computer) architectures.

Prerequisite: CST 204.

CST 346 .NET Programming in C#

(F)(2-3-3)

Essentials of programming using the C# language. It emphasizes C# programming structure, syntax, design, and implementation essentials, as well as a brief overview of the .NET framework. Creating Windows Forms and accessing ADO.NET are also examined.

Prerequisite: CST 211 or CST 313.

CST 347 Real-Time Embedded Operating Systems

(W)(3-3-4)

OS Kernel Constructs and Problem Scaling, Small Scale Environment Specification, Process, Threads, Fibers, Synchronization Primitives, Small Scale Memory Management, Scheduling Paradigms, Real-Time Scheduling, I/O and Debugging. Lab integral to course.

Prerequisites: CST 211, CST 240, both with grade "C" or better.

CST 350 Introduction to VLSI Design

(S)(2-3-3)

An introduction to the various aspects of Very Large Scale Integration circuits. Includes modern design techniques using CAD/CAE software tools, Design using Standard Cell techniques, discussion of full custom design and VLSI testing concepts. Demonstrations are included to supplement lectures. The course will include laboratory experience.

Prerequisites: CST 231, CST 232, EE 321 or instructor consent.

CST 351 Digital Systems Design II

(S)(2-3-3)

Continuation of Digital Systems Design I. Focus on timing, test benches, testing, and security in programmable logic devices. Laboratory includes analysis, design, synthesis, simulation and testing of complete digital systems.

Prerequisites: CST 231, CST 232.

CST 352 Operating Systems

(F,S)(3-3-4)

Issues in Operating Systems Design. Topics include: processes, threads and fibers, privilege modes, preemptive multitasking, process state machine, scheduling paradigms, system calls/ traps, shared resources and synchronization primitives, memory management schemes/virtual memory, deadlock detection, handling, and avoidance, I/O management.

Prerequisites: CST 211, CST 240 both with grade "C" or better.

CST 356 Web Design and Development

(F)(2-3-3)

Basic components of Web development which include aspects of design as well as current development technologies. Development technologies include, but are not limited to, HTML/XHTML, JavaScript, and CSS. Other technologies discussed may include Java Applets, CGI programming, ASP.NET and PHP.

Prerequisite: CST 211 or CST 313.

CST 371, CST 372, CST 373 Embedded Systems Development I, II, III

371(F)(3-3-4), 372(W)(2-3-3), 373(S)(1-3-2)

A three-term sequence covering design, implementation, test and documentation techniques used for embedded computer systems. Each student is required to work on and complete a project as a member of a team. The entire sequence must be completed in three consecutive terms.

Prerequisite: CST 204 for CST 371, CST 371 for CST 372, CST 372 for CST 373. Corequisite: CST 315 or CST 335 for CST 371.

CST 490 Co-op Field Practice

(F,W,S)(Variable Credit)

An approved work program related to the student's field of specialization for a continuous three-month or six-month period. The employer and the type, level, and difficulty of the particular job must be approved by the student's engineering technology department prior to the employment period. A written comprehensive report of each season's activity must be submitted during the following term of residence.

Prerequisites: Associate degree and two terms of residence.

CST 405 Directed Study

(F,W)(3-0-3)

Advanced study under the guidance of faculty. Topics and learning objectives arranged between students and instructor. Students will meet with instructor weekly to discuss progress and provide evidence of their performance.

Prerequisite: Junior standing in CSET and instructor consent.

CST 412, CST 422, CST 432 Senior Development Project

412(F) and 422(W)(2-5-3), 432(S)(1-3-2)

A three-term sequence giving the student major responsibility for planning and carrying out a computer-oriented project. Individual creativity will be encouraged by allowing the student to select an appropriate project.

Prerequisite: CST 334; CST 336 or CST 373.

CST 415 Computer Networks

(F,W)(3-3-4)

Current issues in computer networks and distributed systems. Topics include network protocols, interface standards, and transmissions mode. Network layers detailing Internet Protocol Suite and correlations with 7 layer abstract communication model. Routing and WAN Architectures.

Prerequisite: CST 336 or CST 373 with grade "C" or better.

CST 417 Embedded Networking

(S)(3-3-4)

Network Protocol in a Small Scale embedded environment, Physical characteristic specification, Network Interface Controller interface, TCP/IP, Application interface, Packet Routing, Network Architecture. Lab integral to course.

Prerequisite: CST 336 or CST 373 with grade "C" or better.

CST 418 Data Communications and Networks

(W)(3-0-3)

Provides students with an introduction to data communications and computer networks. Students acquire knowledge of communications components and their use in implementing a network. Emphasis is on the practical aspects of network configuration, operations, and detection, isolation and correction of problems.

Prerequisites: CST 204; EET 237 or EE 223.

CST 420 Effective C++ and STL

(2-3-3)

Emphasis is on techniques to apply the C++ language and library effectively toward the implementation of object-oriented systems. Specific ways to improve design and program will be covered as well as purpose and use of the C++ Standard Library.

Prerequisite: CST 320 or instructor consent.

CST 426 Introduction to Artificial Intelligence

(W)(3-0-3)

Concepts and techniques of AI with consid-

erable use of the LISP interpreter. Includes discussion of "search" methods, knowledge representation, natural language processing, models of cognition, vision, and "The Blocks World."

CST 435 Microprogramming

(S)(3-0-3)

The concepts and methods involved in programming the computer's control unit. Coverage includes a review of computer organization, microprogram operations such as floating point arithmetic, translator/simulator development, and emulation techniques.

Prerequisite: Software Engineering Technology senior standing, or instructor consent.

CST 441 Logic Synthesis with VHDL

(F)(2-3-3)

This course will show students how to use the hardware description language, VHDL, with hierarchical design techniques to manage a complex design. In this process, students will create a design using the VHDL modeling tools, simulate the design using advanced simulation techniques, synthesize and test the design. Laboratory integral with the course.

Prerequisite: CST 351 or instructor consent.

CST 442 Advanced Computer Architecture

(W)(3-0-3)

Advanced concepts in computer architectures including pipelined, superpipelined, super-scalar, and dynamically pipelined processor architectures, Parallel processors, Multiprocessors, Cache and Cache coherency.

Prerequisite: CST 344 or instructor consent.

CST 445 Advanced Microprocessors and Applications

(F)(3-3-4)

This class examines the architecture of the Motorola 680X0 microprocessor family. The course investigates advanced design techniques used in developing interfaces to the 680X0 microprocessor family, along with the use of coprocessors and special device controllers. Advanced design concepts in both software and hardware will be examined.

Prerequisite: CST 331 or instructor consent.

CST 451 ASIC Design using FPGAs

(W)(3-3-4)

FPGA senior project design specifications; presentation of the project in a design review to peers; application of formal hardware/software design techniques when designing with

FPGAs; and verification of FPGAs.

Prerequisite: CST 441 or instructor consent.

CST 455 System On a Chip Design

(F)(3-3-4)

System level design representations and modeling languages. Target architecture models. Intra-chip communication. Partitioning algorithms. Task time measurement. Back annotation of timing. Synthesis of SoC components.

Prerequisites: CST 345, CST 373.

CST 456 Embedded System Testing

(W)(3-3-4)

Testing of complete embedded systems including hardware and software. Topics include unit testing for both hardware and software, UVM testing framework for hardware and test driven design practices as they apply to both hardware and software

Prerequisites: CST 136, CST 204, CST 231.

CST 461 Advanced Topics in VLSI Design

(S)(2-3-3)

Conclusion of a three-course sequence in Very Large Scale Integration design. This course focuses on testing methodology, especially boundary scan. In addition, an alternative synthesis tool is introduced. Current issues in VLSI design are discussed. Laboratory experiments form an essential part of the course.

Prerequisite: CST 441.

CST 464 RISC-Based Microprocessor Systems

(S)(3-3-4)

RISC architecture and applications. Includes i960 microprocessor features, instruction set, and i960 support software. Laboratory focus on applications.

Prerequisites: CST 331, CST 344.

CST 465 Web Development with ASP.NET

(W,S)(2-3-3)

Dynamic Web site creation and development strategies using ASP.NET are discussed and practiced. Focus on the importance of databases in the creation of a dynamic Web site is heavily emphasized.

Pre- or corequisites: CST 324 and CST 365 or instructor consent.

CST 466 Embedded System Security

(S)(3-0-3)

Fundamental theories and applications of

cryptography relevant to computer and embedded system security.

Prerequisites: CST 126, MATH 112.

(DH) Dental Hygiene

DH 100 Introduction to Dental Hygiene

(F)(1-3-2)

Orientation to the theory and practice of all aspects of the dental hygiene profession. The history of dental hygiene, professional organization and career opportunities are discussed. Hands-on activities involving basic dental hygiene skills. Opportunities to experience normal oral anatomy.

DH 101 Introduction to Dental Hygiene II

(W)(0-3-1)

Hands-on activities involving the procedures and skills learned in DH 100. Students will practice basic dental hygiene skills. Opportunities to experience normal oral anatomy. Prerequisite: DH 100.

DH 107, DH 207, DH 307, DH 407 Seminar

(Hours to be arranged each term.)

Review, discussion, evaluation, and problem solving of the students' clinical experience.

DH 221, DH 222, DH 223 Dental Hygiene Clinical Practice and Seminar I, II, III

(221-F)(2-6-4)(222-W)(2-6-4)(223-S)(1-6-3)

Sequential courses designed to provide clinical skills essential for the practice of dental hygiene. Skill development of patient appraisal, basic instrumentation, and individualized preventive care emphasized. Special emphasis on children up to 12 years old.

Prerequisite: For DH 221—Admission to Dental Hygiene Program.

Prerequisite: For DH 222—DH 221.

Prerequisite: For DH 223—DH 222, CHE 360 and DH 252.

DH 225 Head and Neck Anatomy, Histology and Embryology

(F)(2-3-3)

Anatomy of head and neck integrated with histology and embryology of head neck structures, and oral and dental tissues.

DH 240 Prevention I

(F)(3-0-3)

Cariology, remineralization, fluorides, xerostomia, oral physiotherapy aids, plaque and calculus. Begin discussions about healthcare for the provider as a part of holistic healthcare.

Prerequisite: Admission to the Dental Hygiene Program.

Corequisite: DH 221.

DH 241 Prevention II

(W)(3-0-3)

Psychological theories pertaining to patient care, including motivational interviewing and patient communication techniques. Healthcare for the provider is continued to include but not be limited to computerized dietary analysis and dietary counseling techniques and wellness goals for the provider.

Prerequisite: DH 240.

DH 242 Prevention III

(S)(3-0-3)

Preventive needs of infants through sixth grade. Sealants, early childhood caries, occlusion and nutrition, and management of this age group are considered. Healthcare for the provider is continued.

Prerequisite: DH 241.

DH 244 General and Oral Pathology

(W)(3-0-3)

Introduction to general pathology and common oral pathologies. Basic pathology, inflammation, immune system, and neoplasia. Etiology and recognition of benign and malignant oral and skin lesions. Descriptive terminology and differential diagnosis introduced.

DH 252 Oral Radiology I

(W)(2-3-3)

Theoretical background and practical application of dental radiography. Exposure techniques, processing, mounting, and evaluation of dental radiographs; physical principles of production; clinical use of X-radiation; and radiation safety procedures.

DH 253 Oral Radiology II

(S)(2-0-2)

Specialized techniques for children, special needs patients, extra-oral procedures, occlusal projections, localization techniques, radiographic detection and interpretation of potential pathology.

Prerequisite: DH 244 and DH 252.

DH 254 Introduction to Periodontology

(S)(1-0-1)

Introduction to periodontology with emphasis on etiology and pathogenesis of periodontal disease, disease classification, and assessment procedures.

Prerequisite: DH 244.

DH 267 Emergency Procedures

(S)(2-3-3)

Prevention, preparation, and management of emergency situations common in the dental environment. Individual and team practice in carrying out emergency procedures.

Prerequisite: DH 244.

DH 275 Dental Ethics

(F)(2-0-2)

Professional ethics and legal requirements of the dental profession.

DH 299 Laboratory Practice

(Hours to be arranged each term.)

DH 321, DH 322, DH 323 Dental Hygiene Clinical Practice and Seminar IV, V, VI

(321-F)(2-6-4)(322-W)(1-6-3)(323-S)(1-12-5)

Continued development of dental hygiene skills, ultrasonic and advanced instrumentation, expanded functions and observation in specialty practices.

Prerequisite: For DH 321—DH 223.

Prerequisite: For DH 322—DH 321.

Prerequisite: For DH 323—DH 322.

DH 340 Prevention IV

(F)(3-0-3)

Recognition and promotion of positive oral health habits for adolescents. Eating disorders, orthodontics, tobacco cessation, and drug/alcohol concerns and their effect on the oral cavity. Sports guard use and fabrication. Mental and physical healthcare for the provider.

Prerequisite: DH 242.

DH 341 Prevention V

(W)(3-0-3)

Dental care for oral cancer patients. Examination of different antimicrobials and their use. The needs of geriatric patients and special needs patients. Healthcare for the provider.

Prerequisite: DH 340.

DH 344 Advanced General and Oral Pathology

(S)(3-0-3)

Further study of general and oral pathology. Developmental, hereditary, and congenital disorders. Endocrine, cardiovascular, hematopoietic, respiratory, gastrointestinal, neurological, and skeletal disorders. Tooth abnormalities, radiographic lesions, and oral tissue enlargements. Systemic and oral complications of HIV and AIDS. Lesion description emphasized.

Prerequisite: DH 244.

DH 351 Pain Management I

(W)(1-3-2)

Coordinated lecture and laboratory practice in the techniques of local anesthesia. Factors in selection of local anesthetic.

Prerequisite: CHE 360 and DH 267.

DH 352 Pain Management II

(S)(2-3-3)

Recognition of dental anxiety; behavioral management; nitrous oxide sedation techniques are practiced. Health history evaluation and case analysis.

Prerequisite: DH 351.

DH 354 Periodontology

(F)(3-0-3)

Evidence-based approach for treatment of periodontal disease including nonsurgical and surgical treatment. Root anatomy relating to effective instrument adaptation. Treatment planning for patients with all types of classifications of periodontal disease.

Prerequisite: DH 254.

DH 363 Dental Materials

(S)(2-6-4)

General properties, composition and manipulation of common dental and restorative materials. Expanded functions including denture relines and amalgam polishing are practiced.

DH 366 Dental Anatomy

(W)(2-0-2)

In-depth study of crown and root morphology of primary and permanent dentitions with tooth restoration considerations. The temporomandibular joint and occlusion will also be studied.

DH 370, DH 371, DH 372**International Externship**

(S)(1-0-1)(Su)(1-0-1)(F)(0-3-1)

Sequential courses preparing for and

providing dental hygiene care at an international site using portable dental equipment. Cultural issues, teamwork, financing, needs assessment, goal setting and delivery of program.

Prerequisites: For DH 370–DH 321 and DH 381.

Prerequisite: For DH 371–DH 370.

Prerequisite: For DH 372–DH 371.

DH 380 Community Dental Health I

(S)(1-3-2)

Childhood education techniques provided and implemented within the community. Systemic fluoride and its controversial effects debated. Teamwork skills.

Prerequisite: DH 241.

Corequisite: DH 242.

DH 381 Community Dental Health II

(F)(1-3-2)

Needs assessments and budget developed along with a project plan for a community oral health project. Educating and working with adolescents. Projects will be conducted in local schools. Teamwork techniques practiced.

Prerequisite: DH 380.

DH 382 Community Dental Health III

(W)(1-3-2)

The ongoing community oral health project will be implemented. Formative and summative evaluations compared and utilized in project. The dental hygienist's role in managed care. The various structures, ethics, and alternatives of public health.

Prerequisite: DH 381.

DH 383 Community Dental Health IV

(S)(0-3-1)

Conclusion, evaluation and future recommendations of community oral health project. Formal written presentation of project. In-depth look at geriatric clients and their needs. Students will experience different settings in the local geriatric community.

Prerequisite: DH 382.

DH 399 Laboratory Practice

(Hours to be arranged each term.)

DH 401 Overview of Advanced Dental Hygiene

(F,W,S)(3-0-3)

Introduction to the online degree completion program. Career opportunities, roles of the dental hygienist, and the different emphases within the program are explored.

Prerequisite: Admission to BDHO program.

DH 421, DH 422, DH 423 Dental Hygiene Clinical Practice and Seminar VII, VIII, IX

(421-SU)(2-6-4)(422-F)(1-12-5)(423-W)(1-12-5)

Further refinement of clinical instrumentation and assessment skills. Emphasis on individualized care for patients with special needs. Variety of off campus clinical practice settings experienced.

Prerequisite: For DH 421–DH 323.

Prerequisite: For DH 422–DH 421.

Prerequisite: For DH 423–DH 422.

DH 430 Dental Hygiene Board Review

(F)(2-0-2)

Designed to help students prepare for their national board exam. Multiple-choice test-taking skills are practiced. Mock tests simulating the real exam are used.

DH 453 Current Issues in Dental Hygiene

(S)(3-0-3)

Current topics and issues related to dental hygiene practice are explored.

Prerequisite: Admission to BDHO program.

DH 454 Dental Practice Management

(F,W)(3-0-3)

Profitability of the Dental Hygiene Department; practice models, office design; patient satisfaction; financing options for the patient. Technology's impact on practice management.

Prerequisite: DH 323.

DH 455 Dental Hygiene Research

(F,W,S)(3-0-3)

Students choose a topic, conduct library and clinical research and document results.

Prerequisites: DH 453, MATH 243 and admission to BDHO program.

DH 461, DH 462, DH 463**Restorative Dentistry I, II, III**

(461-Su)(1-3-2)(462-F)(1-3-2)(463-W)(0-12-4)

Emphasis on restoration placement techniques. Practical experience using restorative dental materials.

Placement and finishing of amalgam and composite restoration on typodonts in Restorative Dentistry I and on patients in Restorative Dentistry II and III

Prerequisite: for DH 461-DH 363.

Prerequisite: for DH 462-DH461.

Prerequisite: for DH 463-DH 462.

DH 467 Restorative Functions Endorsement

(2-2-4)

This course fulfills the Oregon Board of Dentistry (OBD) requirements for the restorative endorsement for dental assistants and dental hygienists. Lecture, lab practice on typodonts and clinical practice with patients. Additional testing is required by the OBD following course completion.

Prerequisite: AS or BS in Dental Hygiene or EFDA (Expanded Function Dental Assistant).

DH 470 Community Program Planning I

(W)(2-3-3)

First in a two course sequence. Students identify a target population and work with the community to assess, analyze, plan and budget for a community health project. Requires communication skills, networking, critical thinking and research.

Prerequisite: AHED 450 and admission to BDHO program.

DH 471 Community Program Planning II

(F,S)(1-6-3)

Second course in Community Program Planning sequence. Community projects planned in DH 470 are implemented and evaluated.

Prerequisite: DH 470 and admission to BDHO program.

DH 475 Dental Hygiene Research Methods I

(F)(3-0-3)

First in a two-course sequence. Course emphasizes evidence-based decision making, identifying clinical treatment questions, describing types of research designs and sources of evidence, discussing importance of statistics, and conducting computerized searches. Critical appraisal of research introduced.

Prerequisite: DH 323

DH 476 Dental Hygiene Research Methods II

(W)(3-0-3)

Second in a two-course sequence. Emphasis on analysis of research studies for validity, reliability, statistical and clinical significance, and bias. Given clinical questions, students will conduct searches, critically analyze, and

write summaries/reflections using EBDM guidelines.

Prerequisite: DH 475

DH 477 Dental Hygiene Research Methods III

(W)(2-0-2)

Third in a series of three courses focusing on evidence-based decision making and critical analysis of current literature. In small groups, students will research a clinical question in PICO format, conduct and analyze research, and write a Systematic Review.

Prerequisite: DH 476.

DH 480 Community Health Practicum

(S)(0-9-3)

Students gain practical experience in public health by working in a public health setting. Individual goals and objectives are set by the student in consultation with the instructor.

Prerequisite: AHED 450, DH 471, and admission to BDHO program.

DH 495 Individual Studies

(Hours to be arranged each term.)

DH 499 Laboratory Practice

(Hours to be arranged each term.)

(DHE) Dental Hygiene, (Extended)

DHE 100 Introduction to Dental Hygiene I

(F,W,S)(2-0-2)

Orientation to the theory and practice of all aspects of the dental hygiene profession. The history of dental hygiene, professional organization and career opportunities are discussed.

DHE 107, DHE 207, DHE 307 Seminar

(Hours to be arranged each term.)

DHE 211 Principles of Dental Hygiene I

(F)(2-0-2)

Sequential course providing theoretical background for the clinical practice of dental hygiene. Problem solving and critical thinking related to patient assessment and management. Communication skills emphasized.

DHE 212 Principles of Dental Hygiene II

(W)(3-0-3)

Sequential course providing theoretical background for the clinical practice of dental hygiene. Problem solving and critical thinking related to patient assessment and management. Communication skills emphasized.

Prerequisite: DHE 211.

DHE 213 Principles of Dental Hygiene III

(S)(3-0-3)

Sequential course providing theoretical background for the clinical practice of dental hygiene. Problem solving and critical thinking related to patient assessment and management. Communication skills emphasized.

Prerequisite: DHE 212.

DHE 221 Dental Hygiene Clinical Practice I

(F)(0-9-3)

Sequential course designed to provide clinical skills essential for the practice of dental hygiene. Skill development in the areas of patient appraisal, basic instrumentation, and individualized preventive care emphasized.

DHE 222 Dental Hygiene Clinical Practice II

(W)(0-12-4)

Sequential course providing theoretical background for the clinical practice of dental hygiene. Problem solving and critical thinking related to patient assessment and management. Communication skills emphasized.

Prerequisite: DHE 221 and CHE 360

DHE 223 Dental Hygiene Clinical Practice III

(S)(0-12-4)

Sequential course providing theoretical background for the clinical practice of dental hygiene. Problem solving and critical thinking related to patient assessment and management. Communication skills emphasized.

Prerequisite: DHE 222.

DHE 225 Head and Neck Anatomy, Histology and Embryology

(W)(2-3-3)

Anatomy of head and neck integrated with histology and embryology of head neck structures, and oral and dental tissues.

DHE 233 Periodontology

(S)(3-0-3)

First of a two-course sequence emphasizing periodontal diseases, their classifications, and the etiological factors involved. Preventive

measures within the scope and responsibility of the dental hygienist are correlated with basic sciences and clinical aspects of periodontal diseases.

DHE 244 General and Oral Pathology

(W)(3-0-3)

Introduction to general pathology and common oral pathologies. Basic pathology, inflammation, immune system, and neoplasia. Etiology and recognition of benign and malignant oral and skin lesions. Descriptive terminology and differential diagnosis introduced.

DHE 252 Oral Radiology I

(F)(2-3-3)

Theoretical background and practical application for dental radiography. Exposure techniques, processing, mounting and evaluation of dental radiographs; physical principles of production; clinical use of X-radiation and radiation safety procedures.

DHE 253 Oral Radiology II

(W)(2-0-2)

Techniques for patients with special needs, extra-oral procedures, occlusal projections, radiographic detection and interpretation of potential pathology. Introduction to panoramic exposure techniques and images and refinement of techniques in exposure, processing and radiographic evaluation. Prerequisite: DHE 252.

DHE 261 Dental Health Education

(S)(3-0-3)

An application of the concepts of preventive dentistry. Course includes oral health instruction for the individual patient based on an understanding of the causes and means to control dental disease. Selection and evaluation of oral physiotherapy aids, patient education, and other materials will be investigated. Concept of effective patient communication and motivation will be emphasized.

DHE 275 Dental Ethics

(W)(2-0-2)

Professional ethics and legal requirements of the dental profession.

DHE 282 Medical and Dental Emergency Procedures

(W)(2-3-3)

Equipment, drugs, signs, symptoms and treatment of medical emergencies that may occur in dental offices. Individual and team

practice in carrying out emergency procedures (pulse, respiration, blood pressure, IV setup, oxygen, cardiopulmonary resuscitation, etc.) in timed simulations.

DHE 299 Laboratory Practice

(Hours to be arranged each term.)

DHE 311 Principles of Dental Hygiene IV

(Su)(3-0-3)

Sequential course providing advanced theoretical background for the clinical practice of dental hygiene. Students will learn how to promote patient adherence to disease prevention and health maintenance using evidence-based strategies.

Prerequisite: DHE 213.

DHE 312 Principles of Dental Hygiene V

(F)(3-0-3)

Sequential course providing advanced theoretical background for the clinical practice of dental hygiene. Problem solving and critical thinking related to clinical cases. Care of special needs populations emphasized.

Prerequisite: DHE 311.

DHE 313 Principles of Dental Hygiene VI

(W)(4-0-4)

Sequential course providing advanced theoretical background for the clinical practice of dental hygiene. Problem solving and critical thinking related to clinical cases. Interviewing skills, career opportunities and alternative practice settings discussed. Community health programs evaluated.

Prerequisite: DHE 312.

DHE 320 Dental Materials

(S)(2-6-4)

General properties, composition and manipulation of common dental and restorative materials. Expanded functions including denture relines and amalgam polishing are practiced.

Prerequisite: DHE 282

DHE 321 Dental Hygiene Clinical Practice IV

(Su)(0-12-4)

Sequential course designed for the development of skills necessary for entry into professional clinical practice. Expanded dental hygiene functions practiced. Variety of off-campus clinical practice settings experienced.

Prerequisite: DHE 223.

DHE 322 Dental Hygiene Clinical Practice V

(F)(0-12-4)

Sequential course designed for the development of skills necessary for entry into professional clinical practice. Expanded dental hygiene functions practiced. Variety of off-campus clinical practice settings experienced.

Prerequisite: DHE 321.

DHE 323 Dental Hygiene Clinical Practice VI

(W)(0-15-5)

Sequential course designed for the development of skills necessary for entry into professional clinical practice. Expanded dental hygiene functions practiced. Variety of off-campus clinical practice settings experienced.

Prerequisite: DHE 322.

DHE 333 Periodontal Therapy

(Su)(3-0-3)

Philosophy and theoretical background of advanced periodontal issues of all supportive structures are explored. Various periodontal surgery techniques are studied. Prerequisite: DHE 233.

DHE 344 Advanced General and Oral Pathology

(3-0-3)

Further study of general and oral pathology. Developmental, hereditary, and congenital disorders. Endocrine, cardiovascular, hematopoietic, respiratory, gastrointestinal, neurologic, and skeletal disorders. Tooth abnormalities, radiographic lesions, and oral tissue enlargements. Systemic and oral complications of HIV and AIDS. Lesion description emphasized.

Prerequisite: DHE 244.

DHE 351 Dental Analgesia

(Su)(2-3-3)

This course explores pain control methods, including local anesthesia and nitrous oxide/oxygen analgesia. Health information evaluation, local and systemic complications, anesthetic solutions, and vasoconstrictors and drug interactions are discussed. Techniques of local anesthesia, including block and infiltration injections are practiced. Administration of nitrous oxide is also practiced.

Prerequisites: DHE 225, DHE 282

DHE 366 Dental Anatomy

(F)(2-0-2)

In-depth study of crown and root morphology of primary and permanent dentitions

with tooth restoration considerations. The temporomandibular joint and occlusion will also be studied.

DHE 380 Oral Health Planning and Care I

(Su)(2-3-3)

Major concepts of public health including epidemiology, prevention and financing are covered. A systematic approach to planning group oral health projects begins.

DHE 381 Oral Health Planning and Care II

(F)(2-6-4)

Biostatistics and careers in public health are explored. Community oral health projects are implemented and evaluated. Table clinics and portfolios that document components of projects are presented.

Prerequisite: DHE 380.

DHE 399 Laboratory Practice

(Hours to be arranged each term.)

DHE 461 Restorative Dentistry I

(Su)(1-3-2)

Emphasis on restoration placement techniques. Practical experience using restorative dental materials.

Placement and finishing of amalgam and composite restorations on typodonts.

Prerequisite: DHE 366

DHE 462 Restorative Dentistry II

(F)(1-3-2)

Emphasis on restoration placement techniques. Practical experience using restorative dental materials.

Placement and finishing of amalgam and composite restorations on typodonts and patients.

Prerequisite: DHE 461

DHE 463 Restorative Dentistry III

(W)(0-12-4)

Emphasis on restoration placement techniques. Practical experience using restorative dental materials.

Placement and finishing of amalgam and composite restorations on patients.

Prerequisite: DHE 462

(DMS) Diagnostic Medical Sonography

DMS 107, DMS 207, DMS 307, DMS 407 Seminar

(Hours to be arranged each term.)

DMS 223 Applications of Abdominal Sonography I

(F)(3-0-3)

History of sonography. Orientation to patient history, abdominal cross-sectional anatomy, scanning and normal sonographic presentation.

Prerequisite: MIT 103 with grade "C" or better.

DMS 224 Applications of Abdominal Sonography II

(W)(3-0-3)

Orientation to cross-sectional abdominal anatomy and pathology of organs and vessels. Procedures and techniques, including scanning.

Prerequisite: DMS 223 with grade "C" or better.

DMS 225 Applications of Abdominal Sonography III

(S)(3-0-3)

Advanced abdominal scanning procedures and techniques. Emphasis on superficial structures invasive procedures and Doppler correlation, including scanning.

Prerequisites: DMS 224 and DMS 253 with grade "C" or better.

DMS 234 Pelvic Sonography

(S)(3-0-3)

Orientation to male and female pelvic cross-sectional anatomy and pathology, differentiating between normal variations and abnormalities to include first trimester obstetrics and trans-vaginal scanning.

Prerequisites: DMS 224 and DMS 253 with grade "C" or better.

DMS 235 Diagnostic Medical Sonography Patient Care

(W)(3-0-3)

Sonographic management and applications of cognitive, psychomotor, and interpersonal skills as they relate to the health care consumer. Patient assessment and communication, body mechanics, medical and surgical asepsis, medical emergencies, pharmacology and analysis of ethical and legal issues.

Prerequisite: DMS 223 with grade "C" or better.

DMS 252 Sophomore Laboratory I

(F)(0-3-1)

Applied scanning of right upper quadrant anatomy stressing imaging planes. Gray scale instrumentation, system-optimization, preventive maintenance, and quality hard copy imaging.

Prerequisite: Sophomore standing in the DMS program.

Corequisite: DMS 223.

DMS 253 Sophomore Laboratory II

(W)(0-3-1)

Applied scanning of the remainder of the abdominal cavity stressing anatomy, standard imaging planes, Doppler correlation and hard copy quality. Imaging review of prior anatomical areas.

Prerequisites: BIO 335, DMS 223, DMS 252 with grade "C" or better.

Corequisites: DMS 224, MIT 231.

DMS 254 Sophomore Laboratory III

(S)(0-3-1)

DMS orientation to cross-sectional pelvic anatomy and pathology of the male and female pelvis. Procedures and techniques, including scanning.

Prerequisites: DMS 224 and DMS 253 both with grade "C" or better.

Corequisite: DMS 225.

DMS 316 Survey of Vascular Technology

(W,S)(3-0-3)

Orientation to vascular physics, equipment, and colorflow imaging. Explanation of Doppler imaging in relation to vascular anatomy.

Prerequisite: DMS 234, DMS 235, and DMS 352 with grade "C" or better.

DMS 337 Breast Sonography

(F)(3-0-3)

Breast sonographic scanning procedures with an emphasis on sonographic applications. Correlation with other imaging modalities.

Prerequisite: DMS 225 with grade "C" or better.

DMS 342 Survey of Adult Echocardiography

(W)(3-0-3)

Survey of adult echocardiographic imaging applications with emphasis on parasternal, apical, subcostal and suprasternal 2-D views. Standard M-Mode measurements, Doppler and color Doppler. Common cardiac pathology.

Prerequisite: DMS 352 with grade "C" or better.

DMS 343 Fetal Echo, Neonatal, and Pediatric Sonography

(S)(3-0-3)

Fetal cardiac development and normal anatomy. Fetal echocardiographic 2D views, M-Mode, Doppler and Color Doppler. Common fetal cardiac pathology and anomalies. Neonatal topics include hip, abdominal and neurological sonographic applications. General sonographic pediatric pathologies and anomalies will be discussed.

Prerequisites: DMS 342 and DMS 372 both with grade "C" or better.

DMS 346 Musculoskeletal Sonography

(F)(3-0-3)

Survey of sonographic musculoskeletal imaging with emphasis on normal and abnormal findings.

Prerequisite: DMS 225 with grade "C" or better.

DMS 352 Junior Laboratory I

(F)(0-3-1)

Topics to include the male/female pelvis, first trimester, musculoskeletal, and breast stressing sonographic anatomy, standard imaging planes, and image quality.

Prerequisite: DMS 254 with grade "C" or better.

DMS 353 Junior Laboratory II

(W)(0-3-1)

Topics to include normal first, second, third trimester, and cardiovascular stressing anatomy, standard imaging planes, and image quality.

Prerequisite: DMS 352 with grade "C" or better.

DMS 354 Junior Laboratory III

(S)(0-3-1)

Applied sonographic laboratory procedures and techniques. Emphasis on protocols and case reviews.

Prerequisite: DMS 353 with grade "C" or better.

DMS 365 Sonographic Pathology

(F)(3-0-3)

Differential diagnosis and concepts of disease processes as applied to sonographic examination.

Prerequisite: Junior standing in DMS.

DMS 370 Obstetrical Sonography

(W)(3-0-3)

Orientation to obstetrical scanning proce-

dures and techniques. Emphasis on normal obstetrical anatomy and fetal development.

Prerequisites: DMS 224, DMS 225 and DMS 234 with grade "C" or better.

DMS 373 Obstetrical Pathology

(S)(3-0-3)

Advanced obstetrical scanning of second and third trimester obstetrical patients with emphasis on pathology.

Prerequisite: DMS 372 with grade "C" or better.

DMS 388 Externship Preparation

(W)(2-0-2)

Presentation of key concepts related to Diagnostic Medical Sonography externship and required in-services. Focus is on patient care and interpersonal scenarios the externship student will likely face while in the clinical environment. Review and discussion of the DMS Externship Handbook.

Prerequisites: DMS 316, DMS 353 and DMS 371 with grade "C" or better.

Corequisites: DMS 365, DMS 373,

DMS 430 Diagnostic Medical Sonography Externship

(F,W,S)(0-40-15)

All B.S. students must complete four terms (12 months) of clinical experience in sonography at an Oregon Tech approved clinical site. Students will work under the direct supervision of registered sonographers.

Prerequisites: All academic coursework in the Diagnostic Medical Sonography curriculum.

DMS 430A, DMS 430B Diagnostic Medical Sonography Externship

(430A-F,S, 0-22-8)(430B-W,S, 0-18-7)

This two-term special externship is designed for the degree completion student. Students working in a clinical ultrasound setting will prepare clinical case studies.

Prerequisites: Be an ARDMS Sonographer in good standing and have completed all academic coursework in the Medical Imaging curriculum with grade "C" or better.

**(ECHO)
Echocardiography****ECHO 107, ECHO 207, ECHO 307,
ECHO 407 Seminar**

(Hours to be arranged each term.)

ECHO 225 Cardiopulmonary Patient Management Practices

(S)(2-3-3)

Current issues in the practice of echocardiography with emphasis on the technologist's responsibilities to the patient, the patient's family and the professions of echocardiography. Transporting critically ill patients and recognizing emergency situations.

Prerequisite: ECHO 231.

ECHO 227 Basic ECG Recognition and Testing

(F,S)(3-0-3)

Basics of ECG testing, heart pressures, blood volume/physiology and the electrical conduction system. Focus on interpretation of ECG rhythms: normal ECG, ventricular hypertrophy, bundle branch block, AV block, myocardial ischemia, bradycardia, tachycardia, atrial fibrillation, ventricular fibrillation and irregular rhythms.

ECHO 231 Echocardiography I

(W)(3-3-4)

An introduction to scanning techniques and tomographic views according to the American Society of Echocardiography standards. B-mode image, pulsed and continuous wave Doppler, and color-flow imaging.

Prerequisite: ECHO 320.

ECHO 232 Echocardiography II

(S)(3-3-4)

An intermediate level of instruction in scanning techniques and tomographic views according to the American Society of Echocardiography standards. Emphasis on cardiac pathology and the echocardiography evaluation.

Prerequisite: ECHO 231.

ECHO 320 Cardiographic Methods

(F)(3-0-3)

Recognition of ECG tracing with normal and abnormal arrhythmias, treadmill testing, holter monitoring, phonocardiography, and heart auscultation. Review of case examples for analysis and synthesis. Integration of cardiographic monitoring methods with cardiac ultrasound imaging. Review of cardiac anatomy.

Prerequisite: ECHO 232

ECHO 321 Stress and Transesophageal Echo

(F)(3-0-3)

Cardiac applications, protocols, and techniques related to stress echo and trans-

esophageal echo. TEE anatomy, acquisition of images and the cardiovascular operating room. Particular emphasis on the mitral valve and surgical repairs.

Prerequisite: Admission into MIT Echocardiography Program

ECHO 325 Pediatric Echocardiography

(F,W)(3-0-3)

Congenital heart disease, including neonate/infant and adult disorders. Congenital disorders including cardiac situs, ventricular morphology, great artery connections, valvular and subvalvular obstruction, atrial septal defect, ventricular septal defect.

Prerequisite: ECHO 333.

ECHO 332 Invasive Cardiology

(F,S)(3-0-3)

Cardiac catheterization testing. Coronary artery interventions such as percutaneous coronary intervention (PCI) and chamber pressure measurements.

Prerequisite: ECHO 231.

ECHO 333 Echocardiography III

(F)(3-3-4)

An advanced level of instruction in scanning techniques and tomographic views according to the American Society of Echocardiography standards. Cardiac pathology, and advanced methods in echocardiography.

Prerequisite: ECHO 232.

ECHO 334 Echocardiography IV

(F,W,S)(3-3-4)

An advanced level of instruction in scanning techniques and tomographic views according to the American Society of Echocardiography standards. Special topics including 3-D, 4-D, tissue Doppler, cardiac resynchronization and other technological advances.

Prerequisite: ECHO 333.

ECHO 365 Abdominal/Renal Testing

(F,W,S)(3-3-4)

Abdominal vascular anatomy and common disease processes. Students will be asked to perform basic abdominal vascular tests following very specific protocols and interpretations.

Prerequisites: ECHO 325, ECHO 376.

Corequisites: ECHO 385, ECHO 388.

ECHO 376 Survey of Vascular Testing

(W,S)(2-3-3)

Basic vascular pathophysiology in carotid,

arterial, and venous testing. Waveform recognition, interpretation, and protocols for testing. Prerequisite: ECHO 333.

ECHO 385 Echocardiography Laboratory Management

(F,W,S)(3-0-3)

Focus on human resource skills as necessary to manage an echocardiography laboratory. Includes the interview process, hiring and firing, as well as employee performance evaluation. Other topics will include reimbursement, licensure, accreditation and other management issues.

ECHO 388 Externship Preparation

(S)(3-0-3)

Review and summarization of key concepts in Echocardiography. Focus is on patient care and interpersonal scenarios the externship student will likely face while in the hospital environment or independent echo lab. Review and discussion of the Echocardiography Externship Handbook.

Corequisite: ECHO 334.

ECHO 420 Echocardiography Externship

(F,W,S)(0-40-15)

Students work as registered professionals in the field and must complete nine months (three terms) of experience in Echocardiography.

Prerequisite: Admission to Echocardiography Degree Completion Program.

ECHO 420A Echocardiography Externship

(F,W,S)(0-22-8)

Students work as registered professionals in the field. Patient echo exams with normal and abnormal stress tests, normal and abnormal wall motion. Case study presentation.

Prerequisite: Admission to Echocardiography Degree Completion Program.

ECHO 420B Echocardiography Externship

(F,W,S)(0-18-7)

Students work as registered professionals in the field. Cardiac surgical echoes (TEE) and contrast studies using various pharmacological agents. Case study presentation.

Prerequisite: Admission to Echocardiography Degree Completion Program.

ECHO 421 Echo Senior Project

(F,W,S)(4-0-4)

Students design a research-based senior proj-

ect in the field of echocardiography, including interviews, research, literature review and formal presentation of the project.

Prerequisites: ECHO 420; WRI 123 or WRI 227.

(ECO) Economics

ECO 107, ECO 207, ECO 307, ECO 407 Seminar

(Hours to be arranged each term.) SS

ECO 201 Principles of Economics, Microeconomics

(F,W,S)(3-0-3) SS

Topics include scarcity, consumer choice, supply and demand, elasticity, cost and pricing theory, theory of market structures (competition, monopoly, monopolistic competition, oligopoly).

Prerequisite: College level math.

ECO 202 Principles of Economics, Macroeconomics

(F,W,S)(3-0-3) SS

An introduction to the economic problem.

Topics include gross domestic product, unemployment, monetary policy, fiscal policy, macro equilibrium, inflation, and supply and demand.

Prerequisite: College level math.

ECO 203 Principles of Economics, Special Topics

(W,S)(3-0-3) SS

A survey of micro- and macroeconomic topics of current interest. Topics may include labor practices, international economics, natural resource economics, urban planning, and economic policy issues. Students prepare a research paper and present results to the class.

Prerequisites: ECO 201, ECO 202.

ECO 357 Energy Economics and Policy

(W)(3-0-3) SS

Explores the role of energy and energy resources from the economic perspective. Analyzes U.S. and global energy markets and policy; traditional and alternative energy sources; pricing of externalities and public goods; the use of market instruments, subsidies and taxes; and the political economy.

Prerequisites: ECO 201 or ECO 202, and MATH 243 or MATH 361.

ECO 367 International Economics and Finance Management

(W)(4-0-4) SS

Financial management involving international monetary environment; foreign exchange risk management; source and availability of funds to finance trade and multinational operations; taxation planning and control; international portfolio diversification; international banking; capital budgeting; political risk evaluation of performance.

Prerequisites: BUS 308 and ECO 201 or ECO 202.

(EE) Electrical Engineering**EE 101, EE 102, EE 103****Introduction to Engineering I, II, III**

101-F(0-3-1) 102-W(0-3-1) 103-S(0-3-1)

A three course sequence introducing the field of engineering, focusing on electrical engineering and renewable energy. Success strategies. Engineering and scientific notation. Ohm's Law. Problem solving, communication skills, ethics in engineering. Professional development and lifelong learning. Introduction to the design process culminating in a team design experience.

EE 107, EE 207, EE 307, EE 407 Seminar

(Hours to be arranged each term.)

EE 121 Fundamentals of Electric Circuits I

(3-3-4)

DC Analysis and First-Order transients. Ohm's Law, Kirchoff's laws, nodal analysis, mesh analysis, source transformations, Thevenin and Norton equivalents, maximum power transfer, superposition, introduction to op-amps, inductance and capacitance, transient response of RC and RL circuits. Prerequisite: MATH 111

EE 123 Fundamentals of Electric Circuits II

(3-3-4)

AC analysis, second-order transients, introduction to electric power. Transient response of second-order circuits, sinusoids and phasors, sinusoidal steady-state analysis, nodal analysis, mesh analysis, source transformations, Thevenin and Norton equivalents, sinusoidal steady-state power calculations, balanced three-phase circuits, mutual inductance, transformers.

Prerequisite: EE 121, MATH 112

EE 131 Digital Electronics I

(F,W,S)(3-3-4)

Introduction to combinational logic, gates, Boolean Algebra, Karnaugh Mapping, Number Systems/Codes, arithmetic circuits, decoders/ encoders, mux/demux, comparators, basic sequential gates (Latches/FF) introduction to HDL (Verilog/VHDL), PLD HW implementation.

Pre- or corequisite: MATH 111.

EE 133 Digital Electronics II

(F,W)(3-3-4)

Introduction to sequential logic, with HDL, Review latches and flip/flops, timers, counters/ registers, HDL implementation, PLD HW Implementation, finite state machine design/ analysis, logic testing and timing analysis.

Prerequisites: CST 162 or EE 131 with grade "C" or better, MATH 111.

EE 219 Introduction to Semiconductor Devices and Amplifiers

(3-3-4)

Introduction to semiconductor devices, characteristics of biasing of diodes and transistors, analysis and design of circuits using diodes, bipolar junction transistors and field-effect transistors. Applications of transistors as amplifiers and switches.

Prerequisite: EE 123

EE 221 Circuits I

(F,W)(3-3-4)

DC and AC principles and analysis. Ohm's law. Kirchoff's laws. Nodal analysis. Loop analysis. Source transformations. Thevenin and Norton equivalent circuits. Maximum power transfer. Sinusoidal signals. Basic magnetic fields. Lenz's law. Induced currents. Inductance. Basic electric fields. Capacitance. Reactance. Complex impedance. Phasors and steady-state analysis.

Corequisite: MATH 251.

EE 223 Circuits II

(W,S)(3-3-4)

Single phase AC power. Transformers. Balanced three-phase power. Ideal op-amp. Basic op-amp circuits. First-and second-order circuits and transients. Steady-state frequency response. Bode plots. First-and second-order passive filters (LP, HP, BP). Resonance. Active op-amp filters. Prerequisite: EE 221, with

grade "C" or better.

Corequisite: MATH 252.

EE 225 Circuits III

(F,S)(3-3-4)

Laplace Transform definitions and properties. Laplace applications. Laplace circuit analysis, including stability concepts. Fourier series. Fourier transform definitions and properties. Steady-state Fourier circuit analysis. Basic two-port parameters and analysis.

Prerequisite: EE 223 with grade "C" or better.

Corequisite: MATH 321.

EE 236 LabVIEW Programming

(3-3-4)

An object oriented programming course using National Instruments LabVIEW programming language designed for programming data-logging, instrumentation and control applications. Basic flow-charting is introduced. Logical constructs as implemented by LabVIEW are investigated. Example control problems are investigated and programmed using LabVIEW.

Prerequisite: MATH 112.

EE 311 Signals and Systems

(S)(3-3-4)

Spectrum. Fourier Series. Time-Frequency Spectrum. Sampling and Aliasing. Reconstruction. Sampling Theorem. Discrete-Time Signals and Systems. Convolution Sum. Continuous-Time Signals and Systems. Frequency Response. Continuous-Time Fourier Transform. Relationship between CTFT, DTFT, DFT, and FFT. Spectrogram. Z-Transform.

Prerequisite: EE 225 with grade "C" or better.

EE 320 Advanced Circuit and Systems Analysis

(F,S)(4-3-5)

Methods of circuit analysis and circuit theorems. Introduction to the Laplace transform and its applications. Advanced circuit analysis using Laplace transforms techniques. Transfer function analysis. Impulse and frequency response of circuits and systems. Bode plots. Stability.

Prerequisites: EE 223 or EE 123, MATH 252.

EE 321 Electronics I

(F,W)(4-3-5)

Basic semiconductor theory. Diodes and diode circuits. Bipolar-junction transistor

(BJT). Ebers-Moll model. BJT amplifiers (CE, CB & CD). Multistage and differential amplifiers. MetalOxide-Semiconductor Field-Effect Transistor (MOSFET). MOSFET amplifiers (CS, CG & CD). Multistage MOSFET amplifiers. OP-amps.
Prerequisites: EE 223 or EE 123, MATH 252.

EE 323 Electronics II

(W)(4-3-5)
Current sources. Current mirrors. Cascode active loads. Multistage amplifiers. Differential amplifiers. Frequency response. Miller's theorem. Negative feedback amplifier types: Voltage, Current, transconductance and transresistance. Stability and pole location. Gain and phase margins. Frequency compensation.
Prerequisite: EE 321.

EE 325 Electronics III

(S)(4-3-5)
Real operational amplifiers and basic circuits. Output stages. Power amplifiers. Filters, passive and active. Oscillators. Wave-shaping circuits. D/A and A/D circuits.
Prerequisite: EE 323, with grade "C" or better.

EE 331 Digital System Design with HDL

(F,W)(3-3-4)
Introduces the student to a Hardware Descriptive Language and describes its role in digital design. Dataflow, Behavioral and Structural Modeling, Logic Partitioning, Hierarchical Design, CPLDs and FPGAs. DC Parameters and CPLD Timing Models. Design examples including keyboard scanner, counters, ALUs, multipliers and controllers.
Prerequisite: CST 133 or EE 133

EE 333 Microcontroller Engineering

(F,W)(3-3-4)
Microcontroller engineering using popular microcontroller, internal structures and control units, timing, interrupts and memory interfacing, assembly language programming specific to microcontroller, on-chip peripheral devices.
Prerequisite: CST 133 or EE 133

EE 335 Advanced Microcontroller Engineering

(W,S)(3-3-4)
Second course Microcontroller Engineering, further use programmable microcontroller peripherals, A/D conversion, PWM, synchronous serial.

Prerequisite: EE 333 with grade "C" or better.

EE 341 Electricity and Magnetism with Transmission Lines

(F)(4-0-4)
Review vector calculus. Flux, potential, gradient, divergence, curl and field intensity. Static electric and magnetic fields. Maxwell's equations. Boundary conditions. Uniform plane waves in media and free space. Reflection and transmission at interfaces. Propagation of guided waves. Transmission line. Antennas.
Prerequisites: EE 221 or EE 123; MATH 254N, PHY 222.

EE 343 Solid-State Electronic Devices

(F,W)(3-0-3)
Crystal properties and growth of semiconductors. Atoms and electrons. Energy bands and charge carriers in semiconductors. Excess carriers in semiconductors. p-n junctions. FETs and BJTs. Optoelectronic devices. High-frequency and high-power devices.
Prerequisite: PHY 222.
Corequisite: EE 321.

EE 347 Digital Logic

(W)(3-3-4)
Number systems; combinational logic including Boolean algebra, DeMorgan's Theorems and Karnaugh Maps; digital TTL, CMOS IC characteristics; conventional IC functions; sequential logic including flip-flops, counters, registers and state diagrams. Combinational and sequential logic circuits will be simulated, built and tested.
Prerequisite: MATH 112.

EE 355 Control System Design

(W)(3-3-4)
Continuous-domain systems and Laplace transform review. System modeling, identification and linearization. System response and stability analysis. Classical tracking and regulating controller design using computers. PID tuning. Lab exercises in modeling, design and implementation.
Prerequisites: EE 225 or EE 320; EE 321.

EE 401 Communication Systems

(S)(4-3-5)
Signal Analysis, Fourier series, Fourier Transforms; Analog signal transmission and Reception (AM, FM, PM); effects of noise in Analog Systems. Digital Data and Communication Systems; effects of noise in Digital Systems.

Prerequisite: EE 311 or EE 430.

EE 419 Power Electronics

(F,W,S)(3-3-4)
Power electronic device characterization. Rectifiers, DC-DC converters and Inverters design, modeling, and build.
Prerequisite: EE 321.

EE 421 Analog Integrated - Circuit Design

(W)(4-3-5)
Models of IC active devices. Review single-transistor and multiple-transistor amplifiers. Current mirrors, active loads, and references. Output stages. Operational amplifiers with single-ended outputs. Frequency response of ICs, noise in ICs, bipolar, MOS and BiC-MOS IC technology.
Prerequisite: EE 323.
Corequisite: EE 325.

EE 423 CMOS Digital Integrated-Circuit Design

(W)(4-3-5)
MOSFETs, threshold voltage, body effect, channel length, CMOS, inverter characteristics, transmission gates, performance (latch-up, parameter estimation, capacitance), domino logic, registers, scan test, layout.
Prerequisites: CST 133 or EE 133; EE 321.

EE 425 Wireless Communication

(S)(3-3-4)
Baseband digital systems, messages, characters and symbols, sampling theorems. Noise sources, M-ary signals, baseband formatting including PCM waveforms, digital filters including FIR and IIR. Matched filters, band-pass modulation and demodulation techniques, and an introduction to spread spectrum transmission.
Prerequisites: EE/CST 133 and EE 223, both with grade "C" or better.

EE 430 Linear Systems and Digital Signal Processing

(W)(4-3-5)
Introduction to signals and systems. Spectral analysis techniques. Fourier Series and the continuous-time Fourier transform (CTFT). Discrete-time Fourier transform (DTFT) and digital Fourier transform (DFT). Computational spectral analysis using the FFT. FIR and IIR filters. Z-transform. Practical implementation of digital filters and computational spectral analysis using MATLAB.
Prerequisite: EE 225 or EE 320.

EE 431 Digital Signal Processing

(F)(3-0-3)

Discrete systems and signals, linear time invariant systems, difference equations, frequency response, Z-transforms, analysis software, discrete Fourier transforms.

Prerequisites: EE 311, EE 335, both with grade "C" or better.

EE 432 Advanced Digital System Design with HDL

(S)(3-3-4)

Advanced digital signal design with hardware description languages such as VHDL and Verilog. Practical application of principles of digital design to system design using FPGAs. Completion of a FPGA-based system design project.

Prerequisite: EE 331.

EE 441 Biomedical I – Introduction to Biomedical Engineering

(3-3-4)

Introduction to biomedical engineering, anatomy and physiology for engineers, bioelectric phenomena, biomedical sensors, biomedical instrumentation, biosignal processing, cardiovascular mechanics, biomaterials, tissue engineering, biomedical imaging and clinical engineering.

Prerequisite: EE 311 with grade "C" or better.

EE 443 Biomedical II – Signal Processing

(3-3-4)

Fundamental problems of biomedical signal processing; signal analysis; signal modeling, sources and types of biomedical signals. Arterial and ambulatory blood pressure (ABP/ABPM); intracranial pressures (ICP); pulse oximetry (SpO₂); electrocardiogram (ECG). Stochastic, harmonic models, spectrum analysis and time-frequency analysis.

Prerequisite: EE 311 with grade "C" or better.

EE 445 Biomedical III – Instrumentation

(3-3-4)

Review of biological systems (human), signals, measurements and transducers; bioelectrical signals and amplifiers; electrocardiograph (ECG); blood pressure; ultrasonography; x-ray; radiology and nuclear medicine equipment; power sources; electro-magnetic interference (EMI) effects; and electrical safety.

Prerequisite: EE 311 with grade "C" or better

EE 448 Geometric Optics

(W)(3-3-4)

Reflection and refraction at plane and curved surfaces; imaging properties of lenses; first-order Gaussian optics and thin-lens system layout; matrix optics; ray-tracing software; spherical and chromatic aberrations.

Prerequisite: PHY 223

EE 449 Radiometry & Optical Detection

(F)(3-3-4)

Fundamentals of radiometry and photometry; detection of light using thermal and photon (photoemissive, photoconductive, and photovoltaic) methods; noise processes; blackbodies; charge transfer devices; spectroradiometry.

Prerequisite: PHY 223, EE 223

EE 450 Physical Optics

(S)(3-3-4)

Spherical and planar waves; scalar diffraction theory; Fresnel and Fraunhofer diffraction and application to measurement; interference and interferometers; optical transfer functions; coherent optical systems and holography.

Prerequisite: PHY 223

EE 451 Lasers

(F)(3-3-4)

Laser radiation properties, laser cavities, coherence, atomic spectra, pumping rate, power gain, threshold conditions, beam shape, mode structure; ion, molecular, solid-state, dye, semiconductor, and fiber lasers.

Prerequisites: EE 450 or PHY 450

EE 452 Waveguides and Fiber Optics

(W)(3-3-4)

Light propagation in fibers and waveguides; termination, coupling, and splicing of fibers; fiber optic communication; optical time domain reflectometry, fiber amplifiers, and fiber sensors.

Prerequisites: EE 450 or PHY 450

EE 453 Optical Metrology

(S)(3-3-4)

Modern optical metrology with emphasis on non-destructive testing; Fourier optics; Moiré and polarization methods; classic and holographic interferometry; speckle techniques; fringe analysis.

Prerequisites: EE 450 or PHY 450

EE 471 Machine Learning I

(W)(4-0-4)

Theory and practice of Genetic Algorithms, Evolution Strategies, Backprop, Kernel Methods, Naïve Bayes, Bayesian Belief Nets, Fuzzy Inference; brief discussion of Genetic Programming, Swarm Intelligence, Reinforcement Learning, Bayes Optimal

Prerequisite: EE 430; or MATH 327 and CST116

EE 473 Machine Learning II

(S)(3-3-4)

Integration of Information Theory and Statistical Learning into a generalized framework including Support-Vector Machines, Adaptive Resonance, and Adaptive Critics, plus project.

Prerequisite: EE 471

EE 548 Geometric Optics

(F)(3-3-4)

Reflection and refraction at plane and curved surfaces; imaging properties of lenses; first-order Gaussian optics and thin-lens system layout; matrix optics; ray-tracing software; spherical and chromatic aberrations.

Prerequisite: PHY 223

EE 549 Radiometry & Optical Detection

(W)(3-3-4)

Fundamentals of radiometry and photometry; detection of light using thermal and photon (photoemissive, photoconductive, and photovoltaic) methods; noise processes; blackbodies; charge transfer devices; spectroradiometry.

Prerequisite: PHY 223

EE 550 Physical Optics

(S)(3-3-4)

Spherical and planar waves; scalar diffraction theory; Fresnel and Fraunhofer diffraction and application to measurement; interference and interferometers; optical transfer functions; coherent optical systems and holography.

Prerequisite: PHY 223

EE 551 Lasers

(F)(3-3-4)

Laser radiation properties, laser cavities, coherence, atomic spectra, pumping rate, power gain, threshold conditions, beam shape, mode structure; ion, molecular, solid-state, dye, semiconductor, and fiber lasers.

Prerequisite: EE/PHY 450 or EE/PHY 550

EE 553 Optical Metrology

(S)(3-3-4)

Modern optical metrology with emphasis on non-destructive testing; Fourier optics; Moire and polarization methods; classic and holographic interferometry; speckle techniques; fringe analysis.

Prerequisite: EE/PHY 450 or EE/PHY 550

(EET) Electronics Engineering Technology

EET 215 Digital Circuits I

(F)(3-3-4)

Introduction to combinational logic, gates, boolean algebra, Karnaugh mapping, number systems/codes, arithmetic circuits, encoders/decoders, multiplexers/demultiplexers, comparators, parity, code conversions, introduction to HDL, PLD HW implementation.

Prerequisite: MATH 111.

EET 216 Digital Circuits II

(W)(3-3-4)

Introduction to sequential logic, latches, flip-flops, timers, counters, registers, finite state machines, logic testing. DC parameters and timing analysis.

Prerequisite: EET 215.

EET 217 Electric Circuits I

(3-3-4)

DC Analysis and First-Order Transients. Ohm's law, Kirchhoff's laws, nodal analysis, mesh analysis, source transformations, Thevenin and Norton equivalents, maximum power transfer, superposition, introduction to op-amps, inductance and capacitance, transient response of RC and RL circuits.

Prerequisite: MATH 111.

EET 218 Electric Circuits II

(3-3-4)

AC Analysis, Second-Order Transients, introduction to electric power. Transient response of second-order circuits, sinusoids and phasors, sinusoidal steady-state analysis, nodal analysis, mesh analysis, source transformations, Thevenin and Norton equivalents, sinusoidal steady-state power calculations, balanced three-phase circuits, mutual inductance, transformers.

Prerequisites: EET 217, MATH 112.

EET 219 Semiconductor Devices and Amplifiers

(3-3-4)

Introduction to semiconductor devices, characteristics and biasing of diodes and transistors, analysis and design of circuits using diodes, bipolar junction transistors and field-effect transistors. Applications of transistors as diodes and switches.

Prerequisite: EET 218.

EET 237 AC Circuits, Filters and Signals

(S)(3-0-3)

RC transient analysis, sinusoidal AC voltage, phasors, average and effective value, the decibel, simple RC transfer functions, low-pass, high-pass and band-pass filters, periodic and aperiodic signals in time and frequency, bandwidth. For non-EET majors.

Prerequisites: EE 221 or EET 115 with grade "C" or better; MATH 252.

Corequisite: EET 238.

EET 238 AC Circuits, Filters and Signals Laboratory (S)(0-3-1)

Lab to accompany EET 237. For non-EET majors.

Prerequisites: EE 221 or EET 115 with grade "C" or better, MATH 252.

Corequisite: EET 237.

EET 308 Introduction to MOS Microelectronics

(W)(3-0-3)

Introduction to microelectronics, semiconductor physics, integrated circuit (IC) technology, pn junction and MOS (Metal-Oxide-Semiconductor) electrostatics, MOS FETs (Field-Effect Transistors), selected digital circuits using CMOS (Complementary MOS) FETs, PSPICE modeling of IC MOSFETs.

Prerequisites: EET 245 or EET 237 and CST 262 or instructor consent.

Corequisite: EET 309.

EET 309 Introduction to MOS Microelectronics Laboratory

(W)(0-3-1)

Laboratory companion to EET 308. Theoretical concepts discussed in lecture verified using available components and instrumentation. Computer simulation using PSPICE.

Written and oral laboratory reports required. Prerequisites: EET 246 or EET 238 and CST 262 or instructor consent.

Corequisite: EET 308.

(EMS) Emergency Medical Technology-Paramedic

EMS 107, EMS 207 Seminar

(Hours to be arranged each term.)

EMS 115 Introduction to EMS

(S)(3-0-3)

Introduces the fundamentals of an emergency medical services system, history, and professional roles and responsibilities. Discusses medical/legal and ethical issues, research and evidence based practice.

EMS 135 Wilderness First Aid

(Su)(1-0-1)

Basic First Aid and CPR training for the outdoor adventurer or world traveler. Scenario-based learning using medical equipment improvised for wilderness settings. Course completion earns Wilderness First Aid and CPR certifications meeting the outdoor industry requirements. Customized group courses available.

EMS 151 Emergency Medical Technician (EMT) I

(F)(3-9-6)

The first of two courses required for an entry-level career in emergency medical services. The course introduces students to the EMS system, professional attributes of an EMT, ambulance operations and the basic knowledge and skills of an EMT.

Prerequisites: Current CPR certification.

EMS 152 Emergency Medical Technician (EMT) II

(W)(3-9-6)

The second of two course focuses on the basic recognition and treatment of specific illnesses and injuries. The course includes 16-hours clinical and ambulance experience. Students successfully completing the course are eligible for Oregon and national certification examinations.

Prerequisite: EMS 151.

EMS 190 Emergency Medical Technician Externship

(0-12-4)

EMS field experience with an affiliated transport agency. Students work at a BLS level under the direct supervision on one of the local EMS agency ambulances.

Prerequisites: EMS 152 or Oregon EMT certification.

EMS 200 Medical Terminology

(F)(3-0-3)

Students build a strong medical vocabulary using prefixes, suffixes, and Greek and Latin verbs and adjectives. Students learn anatomical roots and examine anatomical structures, disease, procedures, tumors, and descriptive terms using simple word analysis.

EMS 211 Prehospital Emergency Pharmacology

(W)(3-0-3)

Lectures relating specific emergencies to the types of medications used for treatment. Includes classifications, actions, indications, administration and dosages, precautions and side effects of each of the medications used in prehospital treatment of medical and traumatic emergencies. In addition, students learn common prescription medications found in the home.
Prerequisite: CHE 210.

EMS 218 Trauma Emergencies

(F)(3-0-3)

Introduces the epidemiology and kinematics of trauma, and integrates the assessment findings with pathophysiology in the management of the acutely injured patient. Discusses considerations for special patient populations and includes a Prehospital Trauma Life Support certification course.

EMS 231 Medical Emergencies I

(F)(4-0-4)

The first in a series of three courses addressing the epidemiology and pathophysiology of various medical complaints; integrates assessment findings with the formulation of a treatment plan for the acute illness.

EMS 232 Medical Emergencies II

(W)(3-0-3)

A continuation of the series of three courses addressing the epidemiology and pathophysiology of various medical complaints; integrates assessment findings with the formulation of a treatment plan for the acute illness.
Prerequisite: EMS 231.

EMS 233 Medical Emergencies III

(S)(3-0-3)

The conclusion of the sequence in medical emergencies where the epidemiology, pathophysiology and assessment findings are integrated to form a treatments plan for acute illnesses in the emergency setting.
Prerequisite: EMS 232.

EMS 235 Basic Electrocardiography

(F)(3-0-3)

Fundamentals of electrocardiography and interpretation of normal and abnormal ECG patterns. Normal and abnormal wave patterns, presentation and treatment of common cardiac diseases.

EMS 236 Advanced Electrocardiography

(W)(3-0-3)

Building upon basic EKG knowledge, this course advances into 12-lead EKG interpretation and prehospital treatment. Focusing on signs and symptoms of ischemia or infarction, axis deviation, and other EKG anomalies, students learn about various treatment modalities.

EMS 241 Paramedic Crisis Resource Management I

(F)(2-3-3)

The first in a series of 3 courses addressing human factors contribution to EMS scene management. PCRMI focuses on human error, perception modalities, human emotion and motivation, and teamwork theory.

EMS 242 Paramedic Crises Resource Management II

(W)(1-0-1)

The second class in a series of 3 courses addressing the theory and practice of human factors contribution to EMS scene management. PCRMI 2 focuses on the following human factor contributions to scene performance; review of acute healthcare environment challenges, cognitive attention, and crisis communication strategies.
Prerequisite EMS 241.

EMS 243 Paramedic Crises Resource Management III

(S)(1-0-1)

The third class in a series of 3 courses addressing the theory and practice of human factors contribution to EMS scene management. PCRMI 3 focuses on the following human factor contributions to scene performance; stress and coping on decision-making, on-scene leadership characteristics, and organizational influences on error.
Prerequisite: EMS 242

EMS 271 Paramedic Skills Laboratory I

(F)(2-3-3)

The first of three courses reviews EMT level skills and introduces the advanced level paramedic skills. Students learn safe and effective skills performance and begin to integrate assessment, management and skills performance.

EMS 272 Paramedic Skills Laboratory II

(W)(1-3-2)

The second course in the series continues the development of advanced level skills proficiency. Students integrate knowledge of specific patient complaints with assessment and management skills.
Prerequisite: EMS 271.

EMS 273 Paramedic Skills Laboratory III

(S)(0-3-1)

The third course in the series of advanced level skills development. Students demonstrate proficiency and prepare for paramedic licensing examinations.
Prerequisite: EMS 272.

EMS 283 Clinical Practicum I

(W,S)(0-18-6)

Focusing on the emergency medical practices of a paramedic, students integrate classroom studies into clinical practices while working under the direct supervision of health care professionals.
Prerequisites: CHE 210, EMS 218, EMS 231, EMS 235, EMS 241, EMS 271.

EMS 284 Clinical Practicum II

(W,S)(0-18-6)

Students integrate knowledge and skills with patient care practices as they rotate through clinical experience in a variety medical specialties. Students work under the direct supervision of health care professionals in each medical specialty.
Prerequisites: CHE 210, EMS 218, EMS 231, EMS 235, EMS 241, EMS 271.

EMS 291 Paramedic Field Externship Practicum I

(S)(0-12-4)

The first of two field experience courses with an affiliated advanced life support agency. Students complete an orientation to the field and work under the direct supervision of a paramedic preceptor responding to 911 emergency calls.

EMS 292 Paramedic Field Externship Practicum II

(Su)(0-36-12)

The continuation of the field experience courses with an affiliated advanced life support agency. Students work in the field and work under the direct supervision of a paramedic preceptor responding to 911 emergency calls.

Prerequisites: EMS 291

EMS 321 Community Paramedic I

(W)(4-0-4)

First course in a two course series addressing the management of chronic illness, social service connection, and healthcare system navigation as it relates to the prehospital environment.

Prerequisite: Current National or State Paramedic Certification.

EMS 322 Community Paramedic II

Second course in a two course series addressing the management of chronic illness, social service connection and healthcare system navigation as it relates to the prehospital environment.

Prerequisite: Current National or State Paramedic Certification.

EMS 331 Critical Care Transport I

(W)(4-0-4)

The first of 2 courses is designed to prepare paramedics to provide advanced critical care during transports, including performing advanced clinical patient assessments and providing invasive care beyond the standard scope of advanced pre-hospital care.

Prerequisite: Paramedic Credentials or instructor permission.

EMS 332 Critical Care Transport II

(S)(4-0-4)

The second of 2 courses is designed to prepare paramedics to provide advanced critical care during transports, including performing advanced clinical patient assessments and providing invasive care beyond the standard scope of advanced pre-hospital care.

Prerequisites: EMS 331, EMS 381.

EMS 341 Community Paramedic Clinical I

(F)(0-6-2)

The first course in a series of two courses addressing the management of chronic illness, social service connection, and health care system navigation as it relates to the prehospital environment. This course focuses on the

management of chronic/sub-acute illness.

Prerequisite: Current National or State Paramedic Certification.

Co-requisite: EMS 321

EMS 342

(W)(0-6-2)

The second course in a series of two courses addressing the management of chronic illness, social service connection, and health care system navigation as it relates to the prehospital environment. This course focuses on the management of chronic/sub-acute illness.

Co-requisite: EMS 322

EMS 381 Critical Care Clinical Practicum I

(W)(0-3-1)

The first of two practicum classes that exposes students to critical care transport topics focusing on psychomotor skills and the science behind them. This practicum is designed to prepare the student for EMS 382 ICU and critical care transport experience.

Co-requisite: EMS 331

EMS 382 Clinical Care Clinical Practicum II

(S)(0-9-3)

The second of two practicum classes that exposes students to critical care transport environments that may include experiences with intensive care units, fixed wing transport, rotor wing transport, critical care ground transport, as well as various specialty critical care teams.

Prerequisite: EMS 331

Co-requisite: EMS 332

EMS 444 EMS Systems Leadership and Management

(F)(3-0-3)

Explores the fundamental skills of managing and leading in EMS: concepts, principles and practices of leaders in the EMS industry. Case study discussions and analysis. Examines EMS systems, operations, resources and regulation of EMS. Industry leaders provide guest lectures.

Prerequisites: PSY 347, BUS 317

EMS 456 Research Methods in EMS

(S)(2-0-2)

An introductory course in EMS research covering hypothesis formulation, design and use of data-gathering instruments, data collection, and methods of data analysis and presentation. Research and technical reports appearing in professional publications and

archives are examined.

Prerequisite: MATH 361

EMS 496 Capstone Project I

(W)(1-6-3)

Students formulate a detailed plan for a project or independent research study within the EMS industry. Project plan will include topic outline and goals, timeline, industry contacts. Faculty advisor will be assigned.

Prerequisites: WRI 227, MATH 361

EMS 497 Capstone Project II

(S)(1-6-3)

Implementation and completion of student project planned in EMS 496. Project results to be delivered in a report presented to an audience of EMS peers. Students will have scheduled meetings with a faculty advisor to track progress and determine readiness for presentation.

Prerequisite: EMS 496

(ENGR) Engineering**ENGR 101 Introduction to Engineering I**

(F)(1-3-2)

Introduces the student to engineering with a focus on academic success, professional development, ethics, communication, creative problem solving techniques, engineering tools (CAD/CAE), and design concepts. A discipline-specific team-based laboratory experience encourages consideration of a chosen engineering discipline.

ENGR 102 Introduction to Engineering II

(W)(1-3-2)

The student will focus on their chosen discipline through an interdisciplinary team-based design project including problem identification, measurement, analysis and presentation to peers. Emphasis will be placed on proper usage of engineering tools and instruments and sound design practices.

Prerequisite: ENGR 101.

ENGR 111 MMET Orientation

(F)(1-3-2)

Topics include: survey of the engineering profession, educational and professional development, standards of practice; engineering information, calculations, and analysis. An engineering design project will be incorporated. This course provides knowledge and skills to engineering students which will

benefit their future academic and professional endeavors.

Prerequisite: Declared major in the BSME, BSMET, or BSMFG program.

ENGR 207 Seminar

(Hours to be arranged each term.)

ENGR 211 Engineering Mechanics: Statics

(F,W,S)(4-0-4)

Fundamental principles of mechanics of rigid bodies and the application of these principles to engineering problems.

Pre- or corequisite: MATH 252.

Prerequisite: PHY 201 or PHY 221.

ENGR 212 Engineering Mechanics: Dynamics

(W,S)(3-0-3)

Kinematics of particles and rigid bodies.

Kinetics of particles and rigid bodies in plane motion, including Newton's second law, work and energy, and impulse and momentum.

Prerequisites: ENGR 211, MATH 252.

ENGR 213 Engineering Mechanics: Strength of Materials

(F,W,S)(3-3-4)

Internal stresses and deformations of structural members and machines when subjected to external forces.

Prerequisite: ENGR 211.

ENGR 236 Fundamentals of Electric Circuits

(F,S)(3-0-3)

Resistive circuits, operational amplifiers, capacitors, inductors, transient analysis, sine waves, AC circuit analysis, resonance, transformers. Not for Electronics Engineering Technology and Computer Engineering Technology students.

Prerequisites: MATH 251, PHY 202/222.

ENGR 266 Engineering Computation

(F,W,S)(2-3-3)

Programming and problem solving using current computer software. General programming techniques using conditional statements, looping, subroutines, and data input/output will be stressed. Consideration of features specific to the software being used will also be presented.

Prerequisite: MATH 111.

ENGR 267 Engineering

Programming

(W,S)(2-3-3)

Computer programming principles. Control structures. Structural programming principles. Functions and scripts. MATLAB programming. LabVIEW programming. Application of engineering programming principles in projects.

Prerequisite: MATH 251.

ENGR 305 Nanoscience and Nanotechnology

(F)(4-0-4)

Survey of chemical and physical phenomena as applied to nanoscale materials, including metal and semiconductor nanoparticles and carbon nanostructures. Discussion of major synthesis and characterization techniques. Biological and engineering applications of nanoscale materials.

Prerequisites: PHY222 or PHY223, and CHE202 or CHE222

ENGR 318 Engineering Mechanics: Fluids

(F)(3-3-4)

Fundamental properties of fluids, fluid statics and pressure variation, flow characterization, momentum and forces due to fluid motion, energy of fluids in motion, and flow in conduits. Emphasis on civil and mechanical engineering applications of fluid mechanics principles.

Prerequisites: ENGR 211 and MATH 252.

ENGR 355 Thermodynamics

(F,W)(3-0-3)

An introductory course in thermodynamics, the science of heat energy conversion. Develops understanding of energy, heat, work, efficiency, and ideal thermodynamic cycles. Teaches first and second laws of thermodynamics and perfect gas law.

Prerequisites: MATH 252; PHY 202 or PHY 222.

ENGR 407 Seminar

(Hours to be arranged each term.)

ENGR 420 Engineering Modeling

(F)(3-3-4)

Development of linear and nonlinear models of engineering systems. Modeling of mechanical, electrical, electromechanical, fluid, and thermal systems. System identification from data.

Prerequisites: ENGR 266 or 267, MATH 341, EE 225 or MECH 490, PHY 223

ENGR 421 Automation Systems

(F)(3-3-4)

Design of industrial automation systems.

Industrial networking and data handling.

Industrial controller and operator interface configuration and programming. Design of SCADA systems.

Prerequisites: EE 355 or MECH 436, REE 463 or MECH 363, ENGR 420

ENGR 422 Process Control

(W)(3-3-4)

Design of continuous and batch process control systems. Advanced control schemes, including model-based methods.

Prerequisite: ENGR 421

ENGR 423 Motion Control and Robotics

(S)(3-3-4)

Motion control components, including power supplies, controllers, instrumentation, and actuators. Robot kinematics and servo control. Design of motion control systems.

Prerequisites: ENGR 421, ENGR 212, REE 253 or MET 326

ENGR 445 Engineering Project Management

(S)(3-0-3)

Applications of the Critical Path Method to organization and control of engineering projects. Applications software will be used to create and evaluate project networks to develop management reports.

Prerequisites: Junior standing in Engineering or Engineering Technology.

ENGR 465 Capstone Project

(F,W,S)(0-6-2)

Students apply material learned in other courses, develop expertise on a specific topic, work closely with a faculty member to implement the project and improve professional communication skills by writing a project report. Course may be repeated for credit.

Prerequisites: Junior standing and instructor permission.

ENGR 485 Fundamentals of Engineering Exam Preparation

(S)(1-0-1)

A preparation course covering the requirements of, and providing a review for, the NCEES FE exam.

Prerequisite: Senior class-level standing in an MMET program.

(ENGT) Engineering Technology

ENGT 101 Engineering Technology Techniques

(2-6-4)

Engineering terminology and problem solving tools including computer aided drafting, technical sketching, word processing, spread sheets, multiview projections, significant figures, and engineering problem solving techniques.

Prerequisite: MATH 100.

ENGT 103 Engineering Terminology

(F)(3-2-4)

Terminology, symbols, and units commonly used in the engineering field. Interpretation and reproduction techniques of engineering drawings and graphs. A brief overview of the field of civil engineering. This course is designed primarily for the Office Systems Technology program.

ENGT 104 Electrical and Electronic Nomenclature and Symbols

(W)(3-0-3)

A survey course in basic electricity and electronics, emphasizing terminology and nomenclature. This course is designed primarily for the Office Systems Technology program.

ENGT 107, ENGT 207, ENGT 307, ENGT 407 Seminar

(Hours to be arranged each term.)

ENGT 230 Statics

(F)(3-0-3)

Fundamental principles of mechanics of rigid bodies and the application of these principles to engineering problems

Corequisite: MATH 112.

ENGT 231 Strength of Materials

(F,W,S)(3-0-3)

Internal stresses, deflections, and deformations of structural members and machines when subjected to external forces.

Prerequisite: ENGT 230 or ENGR 211.

ENGT 232 Advanced Strength of Materials

(F,W,S)(2-3-3)

Internal stresses, deflections, and deformations of structural members and machines when subjected to external forces. Column buckling, 3-D stress states, and failure criteria.

Prerequisite: ENGT 231.

ENGT 310 Introduction to Geothermal Energy

(S)(3-0-3)

Overview of geothermal energy: distribution, geology, hydrology, and geochemistry; exploration and extraction techniques; uses including power generation, space heating, agriculture, process and multistage utilization; and environmental, economic, and legal considerations. Field trips to local sites.

ENGT 311 Passive Solar and Solar Cell Design

(W)(3-0-3)

Residential passive solar heating and super-insulation construction techniques including heat load calculations using the Balcomb SHF method. Technical and economic analysis of solar electric cells, storage batteries, and inverter technology.

Prerequisite: PHY 202 or instructor consent.

ENGT 312 Critical Path Techniques

(F)(1-3-2)

Scheduling techniques used by management on engineering and industrial projects. The course will concentrate on the Critical Path Method (CPM), but will also include comparisons with Gantt charts and Program Evaluation Review Technique (PERT). Concepts will be applied to mini-projects in class and expanded through the use of selected computer software packages.

ENGT 370 Introduction to Automation and Robotics

(2-3-3)

A survey of automation and all areas of robotics with an emphasis on the industrial robot. It will include history, terminology, use, future, impact on society, and hands-on laboratories.

Prerequisites: MATH 112, a programming course.

ENGT 390, 490 Co-op Field Practice

(390-F,W,S)(490-F,W)(Variable Credit)

An approved work program related to the student's field of specialization for a continuous three-month or six-month period. The employer and the type, level, and difficulty of the particular job must be approved by the student's Engineering Technology Department prior to the employment period. A written comprehensive report of each season's activity must be submitted during the following term of residence.

Prerequisites: Associate degree and two terms of residence.

ENGT 391, 491 Co-op Field Practice

(391-F,W,S)(491-Su)(Variable Credit)

An approved work program related to the student's field of specialization for a continuous three-month period.

ENGT 415 Occupational Safety

(S)(2-3-3)

Topics include current occupational safety and health issues. Practical application of regulations in the industrial setting. Compliance to Industrial Hygiene and General Safety Standards. Common safety violations and implementation of safety programs.

Prerequisite: Junior standing in MFG.

ENGT 471 Microprocessor Application in Automation and Robotics

(2-3-3)

This is an applied course in using microprocessors to support controlling motion, such as in robotic manipulators and automated equipment and interfacing sensor inputs.

Prerequisites: CST 331 and ENGT 370.

ENGT 500 Research Methods

(F)(3-0-3)

Study of industrial analytical techniques used to develop new technologies, including the use of computer aided engineering systems and software for design purposes. Examination of research and development methods, current industrial practices and applications of new technologies.

ENGT 507 Seminar

(Hours to be arranged each term.)

In-depth examination of current theories, research, trends and processes of industry. Individual study, information exchange, and research of selected industrial topics.

ENGT 518 Data Communications

(F)(3-3-4)

Data communications and computer network protocols, hardware elements, and software algorithms. Error handling, routing, flow control, host-to-host communications, and local area networks.

ENGT 521 ASIC Design I

(F)(3-3-4)

Techniques for designing Application Specific Integrated Circuits (ASICs). Comprehensive study of computer concepts using com-

puter aided design tools. Implementation of ASIC devices in digital computing systems including: modeling (using VHDL), digital synthesis, place and routing functions, and layout. Design exercises accomplished using hardware description languages and simulation.

Prerequisite: VLSI or ASIC coursework or experience.

ENGT 522 ASIC Design II

(W)(3-3-4)

Techniques used to transform hardware description language-based designs to physical layout. Applications of synthesis tools for floor planning and layout of Application Specific Integrated Circuits. Comprehensive study of logic design, layout generated design, and advanced CMOS circuit techniques used when designing with standard cells.

Prerequisite: ENGT 521.

ENGT 523 Advanced ASIC Design

(S)(3-3-4)

Introduction to very large scale integration (VLSI) technology and design of CMOS integrated circuits including: the device fabrication process and design rules as they apply to device layout. Analysis, design, simulation and layout rules presented. Logic gates and function design, simulation and physical layout.

Prerequisite: ENGT 522.

ENGT 545 Advanced Microcomputers

(S)(3-3-4)

Microprocessor technology and its application to the design of practical digital computing systems. Design techniques used to develop and design newer generation microprocessor-based computing systems. Assembly language programming and interfacing of microprocessor-based systems. Prerequisite: Microprocessor coursework or experience.

ENGT 546 Advanced Computer Architectures

(W)(3-3-4)

Advanced topics in computer architectures including design of computer hardware, organizational structures, and architectural properties of parallel, vector and multiprocessing systems. Computer organizational structures of memory and I/O subsystems, multiprocessor computer architectures, and data flow computers.

Prerequisite: Course work or experience in

computer architecture and organization.

ENGT 565 Semiconductor Device Physics and Processes

(3-0-3)

Simple models and physical insight to solid state physics. Crystal structure and symmetry, crystal lattices, reciprocal lattices, equilibrium and nonequilibrium processes in semiconductors. Thermal properties, energy band, and semiconductor properties.

ENGT 581 Master's Project I

(F,W)(1-9-4)

Students prepare the proposal for the Master's project under the guidance of a project advisor. Project proposal guidelines and accepted format presented. Approval of the proposal by the student's project committee constitutes completion of the course.

ENGT 582 Master's Project II

(F,W,S)(1-9-4)

Students complete task specified by the project advisor. Preliminary results of the student's project presented to the student's project committee. Acceptance of these results constitutes completion of the course. Prerequisite: ENGT 581.

ENGT 583 Master's Project III

(W,S)(1-9-4)

Students produce the final report demonstrating the completion of the project. Final results of the student's Master's project presented to the student's project committee. Acceptance of the report by the student's project committee constitutes completion of the course.

Prerequisite: ENGT 582.

(ENV) Environmental Sciences

ENV 107, ENV 207, ENV 307, ENV 407 Seminar

(Hours to be arranged each term.)

Prerequisite: ENV major or instructor consent.

ENV 112 Environmental Social Sciences

(W)(2-0-2)

An introduction to the integration of science, social systems, environmental policy, and sustainability focusing on types of data, sampling techniques, and statistical methods

used by social scientists. Emphasis on active learning and case study approaches.

Prerequisites: BIO 111, BIO 112, ECO 201, MATH 111 or instructor consent.

ENV 214 Watershed Science & Technology

(F,S)(2-3-3)

Science and technology of watershed processes, monitoring, and assessment. Applications and case studies focused on sustainable management and restoration of water resources and their associated aquatic, riparian, and upland ecosystems. Local and regional sites of interest are highlighted.

Prerequisite(s): BIO 111 or GEOG 105, or instructor consent

ENV 224 Scientific Reasoning and Methodology

(W)(3-0-3)

Fundamental principles and practices of scientific reasoning and methodology, including contrasts with other ways of making knowledge, the power of questions, theories versus hypotheses, understanding experiments, supporting claims, drawing inferences, reproducibility, and coping with uncertainty in typical uncontrolled natural experiments. Prerequisite(s): BIO 111 or GEOG 105, or instructor consent

ENV 226 Environmental Data Analysis

(S)(2-3-3)

Introduction to compilation, manipulation, and analysis of datasets common to environmental analysis. Includes measures of central tendency and spread; characterizing data distribution; linear regression; exceedance probability and cumulative frequency functions; understanding time series; and basic principles of graphical data displays. Prerequisites: BIO 111 or GEOG 105, or instructor consent

ENV 261 Sophomore Project Proposal

(W)(2-0-2)

Application of scientific reasoning and methodology, including literature survey and review; identification of topics, questions, and hypotheses; and experimental design and methodology. Requires preparation and presentation of a research proposal.

Prerequisite: BIO 213 or instructor consent.

ENV 262 Sophomore Project

(S)(1-6-3)

Completion of field, laboratory, or investigative project with agencies, faculty members, or industry. Includes data collection, analysis and presentation of a scientific paper.

Prerequisite: BIO 261 or instructor consent

ENV 265 Field Methods in Environmental Sciences

(F)(1-6-3)

Basic principles of experimental design, site and instrument selection for field research. Basic instrumentation and data acquisition techniques are used to contribute to authentic research programs at different locations alongside environmental science professionals.

ENV 314 Environmental Management and Restoration

(W)(3-0-3)

Overview of legislative, regulatory, and public and private voluntary activities involving the management and restoration of natural ecosystems and their services. Emphasis on the National Environmental Policy, Clean Water, and Endangered Species Acts, with illustrative case studies from local and regional environments.

Prerequisite: WRI 122.

ENV 318 Systems Modeling

(2-3-3)

Computer simulation of dynamic systems. Fundamentals of numerical simulation. Simulation of positive and negative feedback loops. Examination of differing model approaches. Multiple independent variables. Randomness. Application towards ecological systems.

Prerequisite: BIO 213.

ENV 325 Environmental Microbiology

(W)(2-6-4)

Microbial processes with emphasis on soil and water habitats. The impact of microorganisms in health, water and food sanitation, waste disposal, and bioremediation. Microscopy, laboratory, and field techniques for the isolation and identification of microorganisms.

Prerequisites: BIO 213, CHE 223.

ENV 336 Environmental Hydrology

(S)(3-3-4)

Study of the hydrologic cycle; quantitative measurement of precipitation, infiltration,

runoff, streamflow and storage in watersheds. Curve fitting, hydrographic analysis, statistical analysis of extreme flows, flood routing and runoff modeling for small and urban watersheds.

Prerequisites: ENV 225, MATH 252, MATH 361.

ENV 365 Advanced Field Methods in Environmental Sciences

(F)(1-6-3)

Advanced principles of experimental design, site and instrument selection for field research. Advanced instrumentation and data acquisition techniques are used as part of authentic research programs at different locations alongside environmental science professionals. Course may be repeated for credit.

Prerequisites: MATH 112 and WRI 122.

ENV 427 Greenhouse Gas Accounting/Footprints

(S)(3-0-3)

Course topics include US and international greenhouse gas (GHG) management policies. GHG assessment methods and tools, emissions trading programs, climate risk and risk management, data and information sources, measurement standards and protocols and related sustainability concepts and policies. Course also listed as REE 427 (cannot be used for graduation credit by students who have taken REE 427).

Prerequisites: Junior or senior standing, MATH 361 and WRI 227.

ENV 435 Atmospheric Physics

(F)(3-3-4)

The physics of transport and diffusion of air pollution. Atmospheric thermodynamics. Mixing heights, plume rise, and fundamentals of atmospheric turbulence. Eulerian and Lagrangian dispersion models.

Prerequisites: MATH 252, PHY 202 or PHY 222.

ENV 466 Integrated Watershed Analysis

(3-3-4)

Land use hydrology and watershed management practices to improve and maintain water quality. Emphasis on integrated, multi-disciplinary assessment methods.

Prerequisites: CIV 467, ENV 336.

Corequisite: CHE 465.

ENV 469 Treatment Wetlands

(W)(3-0-3)

Treatment wetland features; biological,

chemical and physical properties. Planning, design and performance assessment principles for municipal, agricultural and stormwater treatment wetlands. Considers vegetation and microbiology, aerobic and anaerobic biogeochemistry, hydraulics and treatment efficiencies. Local case studies.

Prerequisites: CHE 202, MATH 251.

ENV 472 Senior Project Proposal

(W)(2-0-2)

Application of scientific reasoning and methodology, including literature survey and review; identification of topics, questions, and hypotheses; and experimental design and methodology. Requires preparation and presentation of a research proposal.

Prerequisite: ENV 262 or instructor consent.

ENV 473 Senior Project Data Collection

(S)(1-6-3)

Application of scientific reasoning and methodology, including collection and development of field, laboratory, and/or geospatial data in collaboration with faculty and industry professionals. Required data reporting.

Prerequisite: ENV 472.

ENV 474 Senior Project Analysis and Presentation

(F)(1-6-3)

Analysis and presentation of project data, including statistical, graphical, geospatial, and/or other scientific methods. Review, presentation, and manuscript development are required.

Prerequisite: ENV 473; BIO 434 or MATH 362; or instructor consent

**(GEOG) Geography
GEOG 105 Physical Geography**

(F) (3-3-4)

Comprehensive introduction to physical geography, including maps and representation of the earth's surface, the climate system and weather phenomena, plate tectonics, landform evolution and interpretation, and human-landscape interactions. Satisfies lab science.

GEOG 106 Cultural Geography I

(F,W)(3-0-3) SS

Cultural geography of the major world developed regions other than the United States – Europe, Australia and New Zealand, the former Soviet Union, Canada and Japan. The course emphasizes the regional approach.

GEOG 107 Cultural Geography II

(W)(3-0-3) SS

Cultural geography of the world's underdeveloped realms—the countries of Middle and South Americas, Africa and Asia. The course emphasizes the regional approach.

GEOG 108 Cultural Geography III

(S)(3-0-3) SS

An introduction to cultural geography of selected world realms, namely The Middle East, South Asia, East Asia, Southeast Asia, and The Pacific Realm. Cultural imprints on the physical landscape will be discussed and regional approach emphasized.

GEOG 207, 307, 407 Seminar

(Hours to be arranged each term.)

(GEOL) Geology**GEOL 201 Physical Geology**

(3-3-4)

A brief systematic description of the major rock-forming minerals and the three major rock groups. The events of erosion, transportation and deposition of chemically altered and physically fragmented rocks and the resulting sculpturing of the earth's surface are discussed.

GEOL 107, GEOL 207, GEOL 307, GEOL 407 Seminar

(Hours to be arranged each term.)

(GIS) Geographic Information Systems**GIS 103 The Digital Earth**

(F)(2-3-3)

Introduction to the digital representation of the features and attributes of our natural world. Concepts, vocabulary, and use of GIS and GPS, and how these systems help solve geospatial problems. Integration of GPS data into GIS. Introduction to the use of various 'free-ware' software applications used for geospatial analysis.
Prerequisite: none

GIS 107, GIS 207, GIS 307, GIS 407 Seminar

(Hours to be arranged each term.)

GIS 134 Geographic Information Systems

(W)(1-6-3)

Coordinate systems. Creating, editing, and querying feature and attribute data. Symbolizing, classifying, and labeling features.

Creating and using tabular relationships. Introduction to elements of map design, Shapefile-KML and CAD-GIS data conversion.

Introduction to ModelBuilder™ software. Use of raster data, analyzing raster surfaces. Use of web-based GIS applications and services. Extensive use of ArcGIS™ software.

Prerequisite: CE 203 or GIS 103

GIS 205 GIS Data Integration

(S)(1-3-2)

Construction and use of a data dictionary. Principles of Differential Correction. Importing feature and nonfeature data into a GIS.

Data Conversion. Theory and operation of GPS. Use of GPS and other tools for field data collection. Extensive use and creation of web-based GIS applications and services.

Prerequisites: GIS 103 and GIS 134

GIS 306 Geospatial Raster Analysis

(F)(3-3-4)

Manipulation and storage of raster data. Measurement scales. Map algebra. Georeferencing raster datasets. Least-cost path and corridor modeling techniques. Distance, surface and density mapping techniques. Use of local, focal, block, and zonal statistical functions. Viewshed and hydrologic analyses.
Prerequisite: GIS 134.

GIS 316 Geospatial Vector Analysis I

(W)(3-3-4)

Coordinates, datums, projections. Advanced editing and annotation techniques. Use of subtypes and domains. Map and geodatabase topology. Advanced overlay and proximity analysis. Linear referencing and dynamic segmentation. Geocoding. Professional map creation skills. GIS project design fundamentals. Creation and use of online GIS resources and applications.
Prerequisite: GIS 134.

GIS 332 Customizing the GIS Environment I

(W)(3-3-4)

Customizing geoprocessing workflows with Python. Working with lists, and dictionaries. String manipulation. Branching. Error handling. Working with geometries. Use of cursors to access spatial and non-spatial data. Tool creation.
Prerequisites: GIS 316 and MIS 118

GIS 426 Geospatial Vector Analysis II

(S)(3-3-4)

Advanced geospatial analysis. Spatial adjustment techniques. Extensive use of subtypes, domains, validation rules, and cardinalities.

Use and creation of directed and undirected networks for geospatial analysis. Routing.

Conflation. Quantitative assessment of geographic patterns and distributions.

Prerequisite: GIS 316

GIS 432 Customizing the GIS Environment II

(S)(3-3-4)

Creation and management of Add-Ins. Building and deploying stand-alone GIS applications. Introduction to the server environment. Use of HTML, CSS, and JavaScript for creating web applications and services.

Prerequisite: GIS 332

GIS 446 GIS Database Development

(F)(3-3-4)

Advanced geodatabase design. Import and export of XML. Extensive use and creation of relationship classes. Study, use, design, and creation of data models.

Prerequisites: GIS 426 and MIS 275

GIS 456 GIS Web Services and Management

(W)(3-0-3)

Implementation of a GIS. Definition of information products. Discussion of the server-client relationship. Server site configuration and administration. Sharing GIS content on the web. Building web applications and services.

Prerequisites: GIS 446 and GIS 432

GIS 468 GIS Practicum

(Hours to be arranged each term.)

(GME) Geomatics**GME 107, GME 207, GME 307, GME 407 Seminar**

(Hours to be arranged each term.)

GME 161 Plane Surveying I

(F)(3-3-4)

Fundamental concepts of plane surveying including theory of measurements, systematic and random errors. Distance and angle measurement using total stations and differential leveling. Calculation of bearings, azimuths, coordinates, area and traverse adjustments.

Introduction to horizontal and vertical curve computations.

Corequisite: MATH 111.

GME 162 Plane Surveying II

(S)(2-6-4)

Digital theodolites and data collectors, instrument testing and observational error analysis. Theory of leveling, solar observation and computation. E.D.M. use and calibration. Field labs including solar observations, traversing, leveling and horizontal curve layout. Introduction to COGO software.

Prerequisites: GME 161, MATH 112.

GME 163 Route Surveying

(F)(2-6-4)

Laboratory intensive project overview including horizontal and vertical control for preliminary location and construction surveys for a secondary road. Instruction in basic elements of horizontal and vertical route alignment and layout. Determination of earthwork quantities. CAD drafting of plan, profile and cross-sections.

Prerequisites: GME 162, GME 175, both with grade "C" or better.

GME 175 Computations and Platting

(W)(2-3-3)

Coordinate geometry concepts with emphasis on solutions to standard surveying computations. Introduction to calculator and Excel spreadsheet computations. Introduction to map composition and platting using industry standard software.

Prerequisite: GME 161.

Corequisite: CE 203.

GME 241 Boundary Law I

(F)(3-0-3)

Statute law, common law, and legal principles relating to land boundaries. Each student will be required to use the county law library to research assigned cases.

Prerequisites: GME 161, WRI 121 or instructor consent.

GME 242 Land Descriptions and Cadastre

(W)(2-0-2)

Real property descriptions and land record systems. Emphasis on interpreting and writing land descriptions, and introduction to researching records in various Land Information Systems.

Prerequisites: GME 161, GME 241, both with grade "C" or better.

GME 264 Digital Design for Surveying

(W)(0-6-2)

Use of Carlson software to solve and plot assignments covering traverse calculations, horizontal and vertical curve alignments, profiles and earthwork volumes. Hand calculations will be made to supplement the computer solutions.

Prerequisites: CE 203, GME 163 with grade "C" or better.

GME 297 Seminar

(Hours to be arranged each term.)

GME 299 Independent Studies

(Hour to be arranged each term.)

GME 324 Geomatics Computer Programming

(F)(1-6-3)

Students develop Visual Basic programs and Excel spreadsheets to solve geomatics problems. Extensive use of Excel spreadsheets including developing custom functions and VBA extensions. Students are introduced to MS Access relational database, and develop a functioning geomatics database.

Prerequisites: GME 264, MIS 115.

GME 343 Boundary Surveys

(F)(2-6-4)

Planning, organizing, calculating and applying field procedures for boundary and cadastral surveys. Writing deed descriptions; researching public record systems relative to property boundaries.

Prerequisites: GME 163, GME 242, both with grade "C" or better.

GME 351 Construction and Engineering Surveying

(S)(2-3-3)

Organizing, planning and estimating costs for construction and engineering surveying projects. Field projects related to construction, layout of engineering works and site mapping.

Prerequisites: GME 163, GME 264.

GME 355 Digital Photogrammetry

(F)(2-3-3)

Introduction to Photogrammetry, topics include geometry of the vertical image, the stereo pair, and parallax computations. Aerotriangulation of image blocks, and project planning and mission design.

Students use Softcopy workstations to com-

pile topographic maps.

Prerequisites: GME 264, MATH 252.

GME 372 Subdivision Planning and Platting

(S)(2-3-3)

Land use planning; governmental regulations as applied to subdivisions; subdivision planning, computations and preparation of subdivision plats.

Prerequisites: GME 242, GME 264, both with grade "C" or better.

GME 381 Advanced Cadastral Surveying I

(2-0-2)

History of United States land surveying and pertinent boundary law. Introduction to records research and boundary law principles; analysis of legal descriptions in deeds and other documents that transfer land title.

Course utilizes BLM CFedS materials.

Prerequisite: Instructor permission, ability to perform standard surveying computations, an understanding of boundary law.

GME 395, GME 495 Cooperative Field Experience

(0-40-4)

An approved work program related to geomatics practice involving full-time meaningful activity. The employer, type of work and level of difficulty must be approved by the Geomatics Co-op Coordinator prior to the work period. Progress reports are prepared by the student during the work period and submitted for review. A comprehensive written report is required at the end of each co-op period. A co-op period may be three months for 2 credits or six months for 4 credits. A tuition fee is required for credits earned by co-op work experience.

Prerequisites: Completed freshman year and two terms residence.

GME 396, GME 496 Cooperative Field Practice

(0-40-2)

Three month, two credit hour version of GME 395 and GME 495.

GME 415 Advanced Road Design

(W)(2-6-4)

Complete road design project including "L" and "P" line locations; horizontal and vertical curve calculations with consideration of stopping and sight distances; earthwork and mass diagram calculations; drainage and road construction materials.

Prerequisite: GME 351.

GME 425 Remote Sensing

(F)(3-3-4)

Topics in remote sensing and photogrammetry including an introduction to classic digital image processing techniques. Digital surface modeling using terrestrial and aerial LiDAR, and semi-global matching image processing. Students use softcopy image processing software. Prerequisites: MATH 252, PHY 222.

GME 434 Advanced Geographic Information Systems

(W)(2-6-4)

Review and compare land tenure systems in the United States and Foreign countries. Introduction to principles of land administration. Use of geospatial data models for management of parcel data and use of ArcGIS software for creation of Land Information Systems designed to manage cadastral data. Prerequisites: GIS 134, GIS 316. Corequisite: GME 452.

GME 444 Adjustment by Least Squares

(S)(3-3-4)

Theory of the least squares method and error propagation; variances and co-variances of observed, derived and adjusted quantities. Modeling of geomatics problems using different techniques of least squares. Linearization and iteration of nonlinear equations. Adjustment validation using hypothesis testing. Prerequisites: MATH 254N, MATH 361.

GME 451 Geodesy

(F)(4-0-4)

Size and shape of the earth. Geometry of the reference ellipsoid. Spherical, ellipsoidal and local coordinate systems. Coordinate transformations in 2-D and 3-D. Datums and datum conversion. Reduction of field observations to the ellipsoid. The geoid, orthometric heights, and leveling. Prerequisite: MATH 254N.

GME 452 Map Projections

(W)(2-3-3)

Overview of map projections used in cartography, and conformal map projections used in the geomatics profession. Emphasis on state plane coordinate systems and local map projections. Extensive use of Excel for analysis and computations. Prerequisite: GME 451 with grade "C" or better.

GME 454 GNSS Surveying

(W)(2-6-4)

Study of the theory and operation of the Global Positioning System and other Global Navigation Satellite Systems. Design of GPS networks in accordance with current standards and specifications. Laboratory exercises introduce the student to a variety of GNSS applications. Prerequisites: GME 444, GME 451, both with grade "C" or better.

GME 455 GNSS Surveying for GIS

(W)(2-6-4)

Study of the theory and operation of the Global Positioning System and other Global Navigation Satellite Systems. Design of GPS networks in accordance with current standards and specifications. Laboratory exercises introduce the student to a variety of GNSS applications. Prerequisite: GME 451 with grade "C" or better.

GME 466 Boundary Law II

(W)(3-0-3)

Evidence, professional liability, written and unwritten transfers of land ownership and title interests. A term paper is required of each student. Prerequisite: GME 343 with grade "C" or better. Corequisite: WRI 327.

GME 468 Geomatics Practicum

(S)(1-3-2)

Students design and complete a Geomatics project. Students demonstrate ability to work independently. Projects are under the supervision of faculty members and comply with any related state statutes and local ordinances. Prerequisites: GME 452 and GME 454 or GME 455.

GME 482 Advanced Cadastral Surveying II

(2-0-2)

Introduction to the complex process of evaluating field evidence and correlating with written records. Various scenarios discuss analysis aspects. Practical advice, legal concepts, and issues involved in evaluating corner evidence. Course utilizes BLM CFedS materials. Prerequisite: GME 381 with grade "C" or better.

GME 483 Advanced Cadastral Surveying III

(2-0-2)

Introduction to water boundaries to create awareness of basic riparian issues. Subdivision of sections addresses normal subdivision lotted closing sections, elongated and fractional sections, and the three-mile method of section subdivision. Course utilizes BLM CFedS materials. Prerequisite: GME 482 with grade "C" or better.

GME 497 CFedS

(F,W,S)(4-0-4)

Provides academic credit for licensed professional land surveyors who successfully completed the rigorous BLM Certified Federal Surveyor (CFedS) examination. Prerequisite: Successful completion of the CFedS examination.

GME 498 Workshop

(Hours to be arranged each term.)

GME 499 Independent Study

(Hours to be arranged each term.)

(HED) Health Education**HED 107, HED 207, HED 307, HED 407 Seminar**

(Hours to be arranged each term.)

HED 240 Emergency Care and CPR

(F,W,S)(2-0-2)

Comprehensive coverage of emergency care for a wide variety of injuries or illnesses. Course content includes artificial respiration and cardiopulmonary resuscitation, wounds, and bleeding; shock; burns; poisonings; bone, joint, and muscle injuries; cold- and heat-related injuries; alcohol and drug emergencies; and methods of transportation. Emphasis on victim examination, evaluation, and assessment tools and appropriate immediate and temporary care.

HED 246 Drugs and Alcohol Problems of Modern Society

(S)(2-0-2)

Physiological and psychological effects of drugs, from caffeine to heroin. A brief study of neurophysiology and pharmacology. Investigation of the major drug classifications. Other topics include alcohol advertising, co-

dependency, drug-affected babies, treatment and recovery, and legalization issues.

HED 250 Contemporary Health Issues

(2-0-2)

Topics related to the maintenance of a healthy lifestyle. Emphasis on lifestyle choices and behavior patterns that affect one's state of wellness. Topics include stress management; emotional, social, and spiritual well-being; nutrition, fitness and exercise; weight management; cardiovascular disease and cancer risk reduction; addictions; and other lifestyle-related health behaviors.

HED 260 Diet and Exercise for Lifetime Fitness

(2-0-2)

Practical concepts of nutrition and exercise, their role in disease risk, obesity, and weight control. Consumer concerns, advertising, fads, gimmicks. Fitness and dietary evaluations.

HED 275 Introduction to Sports Medicine

(S)(2-3-3)

An introduction to the principles and practice of sports medicine. Emphasis on the prevention and treatment of common sports injuries. Instruction includes understanding the basic mechanisms behind injury and practical experience in preventative measures and basic treatment.

(HIST) History

HIST 101, 102, 103 History of Western Civilization

(101-F)(102-W)(103-S)(3-0-3) SS

Development of Western civilization from early beginning to the present, with attention to political, economic, religious, social, and cultural factors. Courses need not be taken in sequence. HIST 101: From the origins of human civilization to 1000 A.D. HIST 102: From 1000 A.D. to 1789. HIST 103: From 1789 to the present.

HIST 107, HIST 207, HIST 307, HIST 407 Seminar

(Hours to be arranged each term.) SS

HIST 201, 202, 203 U.S. History

(201-F,W)(202-W)(203-S)(3-0-3) SS

The historical development of the United

States, its economic, political, and social institutions from the colonial period to the present. Courses need not be taken in sequence. HIST 201: Pre-Columbian and colonial times to 1840. HIST 202: 1840, Westward expansion and the Civil War to 1899. HIST 203: 1900 to present.

HIST 224 Technology and the Ancient World

(F)(3-0-3) SS

The interaction of technology and world civilization from earliest times to 1500 A.D. Topics include the development of agriculture, urbanization, the place of technology in the Roman and Chinese empires, Medieval engineering, and the technological roots of globalization.

HIST 225 Technology and the Rise of the West

(W)(3-0-3) SS

The economic and social roots of Western dominance of the world economy after 1500. Topics include the Trans-Atlantic Exchange, the Industrial Revolution, urbanization, globalization, and the technological roots of colonialism.

HIST 226 Technology and the Modern World

(S)(3-0-3) SS

The interaction of technological change and world civilization in the 20th century. Topics include the role of corporations in technological change, the theory of Large Technological Systems (LTS), Cold War science and technology, and origins of the internet.

HIST 245 Hitler and the Holocaust

(W)(3-0-3) SS

Introduction to the history of the Holocaust, with a focus on the role of Adolph Hitler. Topics include Hitler's life and political career, the social, technological and economic structure of the Holocaust, and Hitler and the Holocaust in popular culture.

HIST 275 Introduction to the History of Medicine

(F)(3-0-3) SS

Introduction to the history of medicine, with a focus on American medicine in the 19th and 20th centuries. Topics include medical professionalization, the social, technological and economic structure of the medical industry, and medicine in popular culture.

HIST 335 The Engineering Profession

(F,W)(3-0-3) SS

The emergence and development of the engineering profession in Europe and North America. Topics include the changing nature of the profession's work and institutions, the role of engineering professional societies, the relationship between engineers, engineering technologists, and engineering technicians, and the place of engineers in society. Prerequisite: WRI 123 or WRI 227.

HIST 356 A History of Energy

(F,W,S)(3-0-3) SS

Study of the emphasis societies place on the development, safeguarding and exploitation of energy resources. Development of energy resources since the Industrial Revolution; exploitation of energy resources; oil shocks of the 1970s, glut of the 1980s; the modern energy paradigm.

Prerequisite: WRI 123 or WRI 227.

HIST 357 History of the Electric Grid

(S)(3-0-3) SS

Study of the electric grid as a large technological system. Topics of study include the creation of the electric grid by Edison and others, rural electrification, the rise and fall of the utility consensus and the politics of deregulation.

Prerequisite: WRI 123 or WRI 227.

HIST 392 Modern Asia

(S)(3-0-3) SS

China, Japan, and Korea from the early nineteenth century to the present. Emphasis on modern political movements and economic and cultural transformation.

Prerequisite: WRI 123 or WRI 227.

HIST 452 Globalization and the Pacific Northwest

(F,S)(3-0-3) SS

This seminar addresses globalization in the PNW. Topics include colonialism, mercantilism, markets, imperialism, and cultural exchange. PNW industries involved in globalization such as timber, fishing, agriculture, tourism, and oil will be examined. Social movements and protests will also be considered.

Prerequisites: WRI 122

HIST 468 History of the Pacific Northwest

(S)(3-0-3) SS

This course will cover the history of the Pacific Northwest including Native American settlements, exploration and later American settlements. It will include the impacts of institutional growth, urbanization, and resource development. The impact of national events upon the region will be explored.
Prerequisite: WRI 122.

HIST 478 History of Oregon

(3-0-3) SS

An overview of the history of Oregon. The primary focus is the pattern of European settlement of Oregon, the origins and development of state government and the impact of commercial and industrial development.
Prerequisite: WRI 123 or WRI 227.

(HSC) Health Sciences**HSC 207 Seminar**

(Hours to be arranged each term.) Prerequisite: Health Sciences major or instructor consent.

HSC 407 Seminar

(Hours to be arranged each term.)

HSC 485 Research and Project Proposal

(3-0-3)

General aspects of conducting research with emphasis on biomedical approaches, constructing and testing hypotheses, interpreting and validating data, assessment of selected research paper, development and submission of a research proposal.

Prerequisite: MATH 361, Health Sciences major or instructor consent.

(HUM) Humanities**HUM 105 Everyone's a Critic: Texts, Images, Games**

(F)(3-0-3) H

Introduction to the methods of literary analysis and cultural studies. How to effectively and thoroughly analyze, discuss and criticize the meanings behind literature, visual art, film, the graphic novel, and video games from the perspective of literary studies.

HUM 107, HUM 207, HUM 307, HUM 407 Seminar

(Hours to be arranged each term.) H

HUM 125 Introduction to Technology, Society and Values

(F,W,S)(3-0-3) H

An introduction to the relationship of economic, political, and social contexts to technological development with a focus on human values.

HUM 147 Western Culture in the Classical Age

(F)(3-0-3) H

Study of the ideas and values from the classical period which have profoundly influenced Western culture. Readings and discussion will focus on arts, literature, and philosophy.

HUM 148 Western Culture in the Medieval Age

(W)(3-0-3) H

Study of the ideas and values from the early Medieval to the Renaissance period which have profoundly influenced Western culture. Readings and discussion will focus on arts, literature, and philosophy.

HUM 149 Western Culture in the Modern Age

(S)(3-0-3) H

Study of the ideas and values from the Age of Enlightenment to today which have profoundly influenced Western Culture. Readings and discussion will focus on arts, literature, and philosophy.

HUM 235 Introduction to Film

(F,S)(3-3-4) H

Introduction to film history and appreciation. Students will engage with film across periods, genres, and national traditions to develop their understanding and analysis of the art of cinema. Film making techniques and the evolution of film culture are addressed.

HUM 245 Digital Diversity

(W)(3-0-3) H

A cultural studies approach to internet culture, this course considers online identity construction, the worldwide technological access gap, social media as a mechanism for political revolution, and race/class/gender bias in virtual communities.

HUM 335 Video Game Studies

(S)(3-0-3) H

Students will read essays and criticism about video games, including traditional console and PC games, "serious games," and social-media-powered games. If possible, some assignments will also involve playing the games

we discuss.

Prerequisites: WRI 121 or WRI 122

HUM 366 Engineering, Business and the Holocaust

(W)(3-0-3) H

Examines three questions: what happened during the Holocaust, who was responsible, and what happened to those responsible. Topics include Nazi philosophy, anti-Semitic legislation, the camp system, German engineering and American business involvement, and aftermath.

Prerequisite: WRI 122.

(JOUR) Journalism**JOUR 107, JOUR 207, JOUR 307, JOUR 407 Seminar**

(Hours to be arranged each term.)

JOUR 211 Publications—Student Newspaper

(F,W,S)(2-3-3)

Practical experience and training in the elementary principles of newspaper writing, makeup, and layout. Members of this class will publish the student newspaper.

Prerequisite: WRI 121.

JOUR 311 Advanced Publications—Student Newspaper

(S)(1-3-3)

Provides advanced experience and training in principles of newspaper editing, reporting, writing, makeup, layout, and specialty areas. Class members serve as the editorial staff.
Prerequisite: JOUR 211.

(LIS) Library Science**LIS 305 Research Strategies**

(W,S) (3-0-3)

Designed to guide students in senior projects, professional and graduate research. Understand information access, use, and synthesis, literature reviews, inquiry development, and research design. Recognize and practice ethical information use across professions. Articulate applications and limitations of researched topics.

Prerequisites: WRI 123 and WRI 227

(LIT) Literature**LIT 104, LIT 105, LIT 106****Introduction to Literature**

(104-F)(105-W)(106-S)(3-0-3) H

Literature and the nature of literary experi-

ence through reading of prose and poetry drawn from American and other literatures. Works representing principal literary types are read in their entirety when possible, with emphasis on such elements as structure, style, characterization, imagery, and symbolism.

LIT 107, LIT 207, LIT 307, LIT 407 Seminar

(Hours to be arranged each term.) *H*

LIT 225 Contemporary Theater: Ashland Plays

(S)(3-0-3) *H*

Contemporary live drama viewed at Ashland Shakespearean Festival Theater. Review and analysis of original script prior to play experience. Post review and analysis of play performance, content: plot, character, diction, melody, spectacle.

LIT 235 American Multicultural Literature

(F)(3-0-3) *H*

An introductory study of short stories, poetry, essays, and a novel that illustrates the diversity of North American culture.

LIT 246 Creative Writing

(W)(3-0-3) *H*

Examines the elements, structures and traditions of fiction writing through readings, discussions, and creative writing exercises. For students interested in writing fiction.

Prerequisite: WRI 122.

LIT 253 19th Century American Literature

(F)(3-0-3) *H*

Survey of American Literature from 1800-1900. Genres include short stories, novels, poetry, nonfiction narratives, and drama. Topics include Romanticism, Gothic literature, Transcendentalism, Colonialism, Emancipation, and Women's Rights.

LIT 254 20th Century American Literature

(W)(3-0-3) *H*

Survey of American Literature from 1900-1970. Genres include short stories, novels, poetry, nonfiction narratives, and drama. Topics include Urban Gothic literature, Modernism, World Wars 1 and 2, and Environmentalism.

LIT 255 Contemporary American Literature

(S)(3-0-3) *H*

Survey of American Literature from 1970-present. Genres include short stories, novels, poetry, nonfiction narratives, graphic novels, and drama. Topics include Postmodernism, the Cold War, Cyberpunk Literature, Postapocalyptic Literature, and Environmentalism.

LIT 266 Native American Literature and Film

(S)(3-0-3) *H*

Explores connections to the human condition found in literature and stories authored by Native Americans with focus on a variety of themes including assimilation, ethnicity, survival and stereotyping. Documentary films and commercial cinema support and lend context to the readings. Students are encouraged to define and/or redefine their worldviews.

LIT 305 Ecological Issues in Nature Writing

(W)(3-0-3) *H*

Study of nature writers and the role of the environment in Western culture. Texts and authors will be studied from a literary studies perspective and a social justice perspective.

Prerequisites: WRI 121 or WRI 122

LIT 315 Science Fiction Literature and Film

(S)(3-0-3) *H*

Study of science fiction literature and film as expressions of the relationship between technology and culture(s). Approach will primarily be from a literary analysis perspective, with elements of film studies included.

Prerequisites: WRI 121 or WRI 122

LIT 325 The Metropolis

(F)(3-0-3) *H*

Study of the history of the modern city in Western culture from a cultural studies perspective. Students discuss works of literature, film, and new media dealing with our understanding of urban space over time.

Prerequisites: WRI 121 or WRI 122

LIT 335 Travel Literature: Fiction and Nonfiction

(F)(3-0-3) *H*

Study of travel narratives in Western Culture from the British Empire to today. Focus will

be on narratives' depictions of wilderness vs. civilization and traveling as a transformative experience.

Prerequisites: WRI 121 or WRI 122

LIT 345 Postapocalyptic Literature and Film

(S)(3-0-3) *H*

Inquiry into the recent popularity of postapocalyptic-themed literature and films. Study of postapocalyptic subgenres including natural disasters, rogue artificial intelligence, zombies, etc. and the historiocultural context from which they each have emerged.

Prerequisites: WRI 121 or WRI 122

LIT 367 Art and Trash in Contemporary Fiction

(F,W)(3-0-3) *H*

In-depth study of contemporary fiction, finding meaning in literature responsive to the human condition and relevant to the reader. Includes works from authors such as Margaret Atwood, Tim O'Brien, Alice Munro and Anthony Doerr.

Prerequisite: WRI 122.

LIT 373 British Culture and Literature: Romanticism to the Present

(3-0-3) *H*

Explores features of culture and selected works and writers from the Nineteenth and Twentieth Centuries in Britain. Some film presentation included.

LIT 381 Contemporary World Literature

(F,S)(3-0-3) *H*

An in-depth study of selected writers and works organized thematically, geographically, and ethnically. The focus on contemporary works provides insight into current world cultures and explores globalization while encouraging students to critically examine their worldviews.

Prerequisite: WRI 122.

LIT 456 Topics in Film

(F,W,S)(3-0-3) *H*

Examines films as stories using modern literary criticism techniques. Offerings include close analysis of contemporary film, selected directors, selected genres and surveys of film history.

Prerequisites: 3 credits of English or Humanities and WRI 121.

(MATH) Mathematics

Note: Unless otherwise indicated with F, W, S courses will be offered as often as requested.

MATH 20 Basic Mathematics

(3-0-3)

Operations with whole numbers, fractions and decimals. Ratio, proportion, and percent, with applications. Calculations using length, area, and volume. Estimation and unit conversion. Credits earned apply for enrollment (eligibility), but not apply toward a degree. An additional fee is required above regular tuition.

MATH 70 Elementary Algebra

(F,W)(4-0-4)

For students whose preparation contains no algebra background or whose placement examination scores do not qualify for entry into Intermediate Algebra. The topics covered stress the fundamental properties of algebra, solving equations, and manipulating algebraic fractions. Credits earned apply for enrollment (eligibility) but do not apply toward a degree. An additional fee is required above regular tuition.

Prerequisite: MATH 20 with grade "C" or better, or equivalent.

MATH 97 Algebra Review

(Su)(2-0-2)

Structured review for students whose Math Placement score may not reflect an accurate evaluation or students who want a refresher but who do not require a math placement. The course has individualized directed study using a comprehensive programmed instructional technology.

Course is graded P/W.

MATH 100 Intermediate Algebra

(F,W,S)(4-0-4)

Fundamentals of algebra, linear and quadratic equations, systems of equations, inequalities, functions and graphs, radicals and exponents, and stated problems. (May not be used for graduation credit.)

Prerequisite: MATH 70 with grade "C" or better, or equivalent.

MATH 101 Accelerated Algebra

(F,W)(70, 100, 111)(4-0-4)

An accelerated algebra course with topics ranging from Elementary Algebra (MATH 70) to College Algebra (MATH 111). For entering students with good high school algebra backgrounds. All students will start in Elementary Algebra, and may receive

credit for one of MATH 70, MATH 100, or MATH 111, depending on individual level of achievement. An additional self-support course fee is required.

MATH 105 Collegiate Mathematics

(S)(4-0-4)

A variety of modern mathematical topics based on contemporary applications. Topics include combinatorics, probability, statistics, finance, matrices, and logarithmic and exponential functions.

Prerequisite: Intermediate Algebra with grade "C" or better.

MATH 107, MATH 207, MATH 307, MATH 407 Seminar

(Hours to be arranged each term.)

MATH 111 College Algebra

(F,W,S)(4-0-4)

Study of functions including graphs, operations and inverses. Includes polynomial, rational, exponential, logarithmic functions and their applications, and systems of equations.

Prerequisite: MATH 100 with grade "C" or better, or equivalent.

MATH 111A, MATH 111B College Algebra

(111A FW; 111B WS)(1-2-2)

For students requiring Math 111 but desiring to learn the material at a slower pace. Math 111 content covered upon completion of MATH 111A and MATH 111B.

Prerequisite: For MATH 111A—Math 100 with grade "C" or better, or equivalent. Prerequisite: For MATH 111B—Math 111A with grade "C" or better.

MATH 112 Trigonometry

(F,W,S)(4-0-4)

The trigonometric functions and their applications. Topics include graphs, identities, trigonometric equations, vectors, and complex numbers.

Prerequisite: MATH 111 with grade "C" or better, or equivalent.

MATH 211 Fundamentals of Elementary Mathematics I

(4-0-4)

This is the first course in the mathematics sequence for prospective elementary teachers. Topics include problem solving strategies, set theory, numeration, computational algorithms for whole numbers and integers, estimation, relations; use is made of calcula-

tors and manipulatives.

Prerequisite: MATH 100 or equivalent with grade "C" or better.

MATH 212 Fundamentals of Elementary Mathematics II

(4-0-4)

This is the second course in the mathematics sequence for prospective elementary teachers. Topics include decimals, percents, ratios and proportions, real numbers, probability and statistics; use is made of calculators and manipulatives.

Prerequisite: MATH 211 with grade "C" or better.

MATH 213 Fundamentals of Elementary Mathematics III

(4-0-4)

This is the third course in the mathematics sequence for prospective elementary teachers and covers basic geometry. Topics include geometric shapes and their properties, measurement, congruence and similarity, and coordinate and transformational geometry; use is made of calculators and manipulatives.

Prerequisite: MATH 211 with grade "C" or better.

MATH 221 Introduction to Computational Software

(W,S)(2-0-2)

Solve applied problems involving formulas, functions, summation and iteration using Excel and MATLAB. Use built-in functions and graphing capabilities of MATLAB and Excel. Do vector and matrix calculations and write function files using MATLAB. Write and execute macros in Excel.

Prerequisite: MATH 112.

MATH 243 Introductory Statistics

(F,W,S)(4-0-4)

Descriptive statistics, numerical and graphical presentation of data, estimation and margin of error, hypothesis testing, correlation; interpretation of statistical results. Cannot be taken for graduation credit by students who have taken MATH 361.

Prerequisite: MATH 100 or instructor's consent.

MATH 251 Differential Calculus

(F,W,S)(4-0-4)

Theory, computational techniques and applications of the derivative.

Prerequisite: MATH 112 with grade "C" or better, or equivalent.

MATH 252 Integral Calculus

(F,W,S)(4-0-4)

Computational techniques for and applications of the definite and indefinite integrals. Prerequisite: MATH 251 with grade “C” or better.

MATH 253N Sequences and Series

(F,S)(4-0-4)

Indeterminate forms and improper integrals. Infinite sequences and series, convergence, power series. Taylor series and applications. This course replaces MATH 254. Prerequisite: MATH 252 with grade “C” or better.

MATH 254N Vector Calculus I

(F,W,S)(4-0-4)

Vectors, vector functions, and curves in two and three dimensions. Surfaces, partial derivatives, gradients, and directional derivatives. Multiple integrals using rectangular and other coordinate systems. Physical and geometric applications. Prerequisite: MATH 252 with grade “C” or better.

MATH 261 Introduction to Linear Algebra

(W,S)(3-0-3)

Matrices and matrix operations, systems of linear equations, vectors in a geometric setting, projections, dot products, cross products, inverse matrices, determinants, linear transformations, Eigenvalues, Eigenvectors. Use of MATLAB or equivalent CAS and/or a graphing calculator required. Pre- or corequisite: MATH 251 or instructor consent.

MATH 311 Introduction to Real Analysis

(W)(4-0-4)

A one term stand-alone course on topics in real analysis, covering properties of real numbers, completeness axiom, continuity, convergence of sequences and series of numbers, convergence of sequences and series of functions. Emphasis will be placed on proofs. Prerequisites: MATH 253N and MATH 327, both with grade “C” or better.

MATH 321 Applied Differential Equations I

(F,W,S)(4-0-4)

The first in a two term sequence on the solutions of ordinary differential equations. Introduction to differential equations, first and second order equations with applications.

Prerequisite: MATH 252 with grade “C” or better.

MATH 322 Applied Differential Equations II

(S)(4-0-4)

The second in a two term sequence on the solutions of ordinary differential equations. Introduction to systems of equations, the Laplace transform and series solutions. Prerequisites: MATH 321 and MATH 341.

MATH 327 Discrete Mathematics

(W,S)(4-0-4)

Introduction to proof and mathematical abstraction. Topics include sets, set operations, functions, relations, sequences, series, recurrence relations, mathematical induction, equivalence relations. Prerequisites: MATH 252, or junior standing and MATH 111, both with grade “C” or better.

MATH 341 Linear Algebra I

(F,W,S)(4-0-4)

The study of vectors and matrices in Euclidean space, their geometric interpretations and application to systems of equations. Includes linear independence of vectors, basis and dimension, introduction to linear transformations, eigenvalues and eigenvectors, diagonalization, determinants. Prerequisite: MATH 252 with grade “C” or better.

MATH 342 Linear Algebra II

(S)(4-0-4)

A continuation of the topics of MATH 341 to the setting of abstract vector spaces. Includes the study of orthogonality, inner product spaces, eigenvalues and eigenvectors, matrix decompositions and a more advanced study of linear transformations. Prerequisite: MATH 341.

MATH 346 Number Theory

(3-0-3)

A proof-based course in the theory of the integers, including divisibility, primes, Euclid’s Algorithm, Euler’s Theorem and an introduction to algebraic structures. The course also includes applications of number theory such as RSA encryption. Prerequisite: MATH 327 with grade “C” or better.

MATH 347 Fundamentals of Abstract Algebra

(S)(4-0-4)

Introduction to group theory and algebraic structures with applications.

Prerequisites: MATH 254N, MATH 327, both with grade “C” or better.

MATH 354 Vector Calculus II

(W)(4-0-4)

Review of vector functions, space curves, gradients, and directional derivatives. Introduction to vector analysis: vector fields, divergence, curl, line integrals, surface integrals, conservative fields, and the theorems of Gauss, Green and Stokes with applications to force, work, mass, and charge. Prerequisite: MATH 254N with grade “C” or better.

MATH 361 Statistical Methods I

(F,W,S)(4-0-4)

Descriptive statistics, experimental design, introduction to probability, common probability distributions, random variables, sampling distributions, hypothesis testing and confidence intervals for means using one and two samples, simple linear regression. Prerequisite: MATH 111 or instructor’s consent.

MATH 362 Statistical Methods II

(W,S)(4-0-4)

Review of inferential statistics, analysis of variance one factor and two factor, simple and multiple regression, analysis of categorical data using tests and confidence intervals for proportions and chi-square tests, correlation, goodness of fit, non-parametric tests. Data sets used will come from various fields including: business, psychology, biology, environmental science, engineering, manufacturing and communication. Prerequisite: MATH 361 or instructor consent.

MATH 371, MATH 372 Finite Mathematics and Calculus I, II

(F,W,S)(4-0-4)

Linear functions, matrices, linear programming, mathematics of finance, derivatives and their applications. The integral and its applications, and calculus of several variables. (MATH 371 cannot be used for graduation credit by students who have taken MATH 251.) Prerequisite: For MATH 371–MATH 111 with grade “C” or better. Prerequisite: For MATH 372–MATH 371 with grade “C” or better.

MATH 411 Topics in Complex Analysis

(W)(4-0-4)

Complex numbers and functions, differentiation and integration, Cauchy's theorem and integral formula,

Taylor and Laurent series, Residue theorem.

Prerequisite: Math 254N

MATH 421 Applied Partial Differential Equations I

(F)(4-0-4)

The first course in a three term sequence in applied partial differential equations. Modeling physical systems using differential equations, classifying differential equations and introduction to the methods of solving partial differential equations (separation of variables, Fourier series, transform methods).

Prerequisite: MATH 322, MATH 254N.

MATH 422 Applied Partial Differential Equations II

(W)(4-0-4)

The second course in a three term sequence in applied partial differential equations.

Introduction to solution techniques using eigenvalues and eigenfunctions. Presentation of eigenfunctions which form orthogonal bases such as Bessel functions and Legendre polynomials.

Prerequisite: MATH 421, MATH 341

Corequisite: MATH 354

MATH 423 Applied Partial Differential Equations III

(S)(4-0-4)

The third course in a three term sequence. Applications of linear and weakly nonlinear partial differential equations. Analytical solution techniques for parabolic, elliptic, and hyperbolic equations. Green's functions, integral methods, shocks, and the method of characteristics.

Prerequisite: MATH 422.

MATH 451 Numerical Methods I

(F,W)(4-0-4)

Computer applications of matrix methods, iterative solutions of equations, and systems of equations, polynomial interpolation and curve fitting, numerical differentiation and integration.

Prerequisites: MATH 252, MATH 341 or MATH 261, and a programming language.

MATH 452 Numerical Methods II

(W)(4-0-4)

Numerical solution of ordinary differential

equations. Numerical solution of initial-value problems using Runge-Kutta methods and linear multistep methods; introduction to boundary value problems. Analysis of stability, accuracy, and implementation of methods.

Prerequisites: MATH 451 and MATH 321.

MATH 453 Numerical Methods III

(S)(4-0-4)

Numerical solution of partial differential equations. Numerical solution of boundary value problems and initial-boundary value problems using finite difference and finite element methods. Analysis of stability, accuracy, and implementation of methods.

Prerequisites: MATH 421 and MATH 452.

MATH 465 Mathematical Statistics

(W,S)(4-0-4)

Counting techniques, probability, discrete and continuous random variables and distribution functions, joint probability distributions; expected value, variance and covariance; decision making.

Prerequisite: MATH 254N.

(MECH) Mechanical Engineering**MECH 107, MECH 207, MECH 307, MECH 407 Seminar**

(Hours to be arranged each term.)

MECH 160 Materials I

(2-3-3)

Survey of materials used in industry and their physical and chemical principles as they relate to structure, properties, corrosion, and engineering applications. Major consideration given to metal alloys. Introduction to polymers, ceramics and composites included.

Prerequisite: CHE 221 or equivalent.

MECH 304, MECH 404 Co-op Field Practice

(Terms and hours to be arranged with approval of the curriculum coordinator.)

An approved work program related to the student's field of specialization for a continuous three-month period. The employer and the type, level, and difficulty of the particular job must be approved prior to the employment period. A written comprehensive report must be submitted during the following term of residence.

MECH 312 Dynamics II

(S)(3-0-3)

Continuation of the study of kinematics and kinetics of particles and rigid bodies, with applications to mechanical systems of current interest to engineers.

Prerequisites: ENGR 212, MATH 321.

MECH 313 Thermodynamics II

(S)(3-0-3)

Application of laws and principles of thermodynamics to real thermodynamic cycles. Teaches analysis of performance and design of internal and external combustion engines, steam generators, heat pumps, compressors, and refrigeration machinery.

Prerequisite: ENGR 355.

MECH 315 Machine Design I

(S)(3-0-3)

Study of stress and fatigue analysis as applied to machine elements.

Prerequisite: ENGR 213.

MECH 316 Machine Design II

(F,S)(3-0-3)

Application of stress and fatigue analysis in the design and selection of machine elements.

Prerequisite: MECH 315.

MECH 318 Fluid Mechanics I

(F,W)(3-3-4)

Covers fluid properties, fluid statics, conservation laws of pipe flow, drag, lift fluid dynamics, measurement of flow, viscous flow, laminar, and turbulent flow, and forces due to fluid motion.

Prerequisites: ENGR 211, PHY 221.

MECH 323 Heat Transfer I

(F,S)(3-0-3)

An introduction to the three modes of heat transfer, conduction, convection, and radiation. Teaches the analytical and empirical techniques used for solving problems in heat transfer, including those for which computer application is most suited.

Prerequisites: MATH 321, MECH 318.

MECH 326 Electric Power Systems

(2-3-3)

Study related to theory and application of industrial electric power systems. Topics covered include transformers, motors, generators, motor controls, and protective devices.

Prerequisites: MECH 363 and ENGR 236.

MECH 351 Finite Element Analysis

(F,S)(2-3-3)

This course is an introduction to the use of finite element analysis (FEA) in the solution of mechanical engineering problems. Existing FEA computer codes are used.

Prerequisite: MET 375

Pre- or Corequisite: MECH 315

MECH 360 Engineering Materials II (W)(3-0-3)

This course extends the MET 160 Engineering Materials I course using a more theoretical approach. Subjects include metals, polymers, ceramics, and composites.

Prerequisite: MET 160 and CHE 201 or CHE 221

MECH 363 Engineering Instrumentation (F)(2-3-3)

Study of measurement techniques and equipment used in mechanical engineering. Instrumentation for measurements in mechanics, thermodynamics, fluid dynamics, and electrical systems are considered. Methods of calibration, correction, and data reduction are presented.

Prerequisite: ENGR 213, PHY 222.

Pre- or Co-requisite: ENGR 236.

MECH 375 Solid Modeling (2-3-3)

Introduces solid modeling techniques as applied to mechanical design. Topics include extruded and swept shapes, Boolean operations, and other construction techniques.

Prerequisite: MET 242.

MECH 405 Reading and Conference (Hours to be arranged each term.)

MECH 414 Introduction to Aerodynamics (W)(3-0-3)

An introductory course on the fundamentals of aerodynamics. Includes a review of the behavior of fluids in motion, definition of the important parameters in aerodynamic behavior, and study of flow about simple aerodynamic shapes. Emphasis will be placed on low-speed aerodynamics.

Prerequisites: ENGR 355, MECH 318.

MECH 415 Design Project (2-3-3)

This course involves using material from prior course work in individual student projects.

Prerequisites: MECH 315, MECH 318, MET 242.

Pre- or corequisite: MECH 316.

MECH 417 Fluid Mechanics II (F)(2-3-3)

Fluid Kinematics, differential analysis, similitude and modeling, and compressible flow. Computational fluid dynamics is introduced. An alternative to MECH 418. MECH 417 covers less topics/theory but does include a laboratory session.

Prerequisite: ENGR 355, MATH 321, MECH 318

MECH 418 Fluid Mechanics II (F)(3-0-3)

A continuation of the study of the principles and applications of fluids in engineering, including: fluid kinematics, dimensional analysis and modeling, differential analysis of fluid flow, Navier-Stokes equations, compressible flow, open-channel flow, and turbomachinery. An alternative to MECH 417. MECH 418 covers more topics/theory but does not include a laboratory session.

Prerequisites: ENGR 355, MATH 321, and MECH 318

MECH 421 Introduction to Wind Tunnels (2-3-3)

An introductory course on the experimental techniques used in wind tunnel testing of aerodynamic shapes. Includes operating characteristics of wind tunnels, the characteristics of and use of models and model instrumentation, and the development of analytical techniques for reduction of wind tunnel data.

Prerequisites: MECH 318, MECH 363.

MECH 427 Experiments in Thermodynamics (2-3-3)

Application of laws and principles of thermodynamics to performance testing of heat engines. Teaches measurement of power, determination of efficiency, preparation of heat balances, analysis of combustion products, and preparation of engineering reports.

Prerequisites: MECH 313, MECH 363.

MECH 433 HVAC (F)(2-3-3)

Heating, ventilating, and air conditioning. Application of laws and principles of thermodynamics to analysis, design, and control of mechanically-controlled environments for human comfort, animal health, and food preservation. Teaches computation of heating and cooling loads, humidity control, heating, and refrigeration.

Prerequisite: MECH 323.

MECH 436 Classical Control Systems (S)(2-3-3)

An introduction to control systems. Both classic control theory and programmable logic controllers are considered. Topics include block diagrams, mathematical models, transfer functions, Laplace transforms, frequency responses along with control components and PLC programming.

Prerequisites: MECH 318, MECH 480.

MECH 437 Heat Transfer II (W)(1-3-2)

A study of experimental heat transfer. Methods and instrumentation used for investigating heat transfer systems will be considered. Laboratory investigations include studies of heat exchangers, forced and free convection experiments, and determination of radiation and convection coefficients.

Prerequisites: MECH 323, MECH 363.

MECH 438 Reciprocating and Turbine Engines (3-0-3)

Introduction to construction, operation, and theory of reciprocating and turbine engines. Students will learn engine design, history of development, theory and practice of operation.

Prerequisites: MECH 313, MECH 315, MECH 318.

MECH 475 Parametric Modeling (W)(2-3-3)

Introduces feature-based parametric solid modeling techniques as applied to Mechanical Design. Emphasizes the concepts and practices of parametric modeling from the user's perspective. Theoretical and development backgrounds are also covered.

Prerequisite: MET 375.

MECH 480 Mechanical Vibrations (W)(2-3-3)

An introduction to mechanical vibration. Topics include the equations of motion, resonant frequencies, mode shapes, damping and applications. The laboratory will introduce vibration instrumentation.

Prerequisites: ENGR 212, ENGR 266, MATH 321, MECH 315, MECH 363.

MECH 490 Senior Projects I (F)(2-3-3)

The first of a three-term comprehensive group design project, focusing on the design proposal. This sequence applies material from

prior course work, along with concepts of project management, design optimization, and other material related to a group engineering project.

Prerequisites: ENGR 355, MECH 315, MECH 318, MET 375; or instructor consent.

MECH 491 Senior Projects II

(W)(2-3-3)

The second of a three-term comprehensive group design project, focusing on project design.

Prerequisites: MECH 490, previous term from same instructor, or advisor and instructor consent.

MECH 492 Senior Projects III

(S)(1-6-3)

The third of a three-term comprehensive group design project, focusing on project construction and testing.

Prerequisites: MECH 491, previous term from same instructor, or advisor and instructor consent.

(MET) Mechanical Engineering Technology

MET 107, MET 207, MET 307, MET 407 Seminar

(Hours to be arranged each term.)

MET 108 Geometric Dimensioning and Tolerancing

(2-0-2)

The study and application of ANSI geometric dimensioning and tolerancing principles relative to the preparation of engineering drawings.

Prerequisite: MET 241.

MET 160 Engineering Materials I

(F,W,S)(2-3-3)

Survey of materials used in industry and their physical and chemical principles as they relate to structure, properties, corrosion, and engineering applications. Major consideration given to metal alloys. Introduction to polymers, ceramics, and composites included. Prerequisite: CHE 101 and 104, or CHE 201 and 204, or CHE 221

MET 218 Fluid Mechanics

(W,S)(3-3-4)

Covers fluid properties, laws of fluid statics, and fluid dynamics, measurement of flow, viscous flow, laminar, and turbulent flow, flow in ducts, forces due to fluid motion, and fluid machinery.

Prerequisites: MATH 112; PHY 201 or PHY 221.

MET 232 Thermodynamics

(F)(3-0-3)

An introductory course in thermodynamics. Develops understanding of energy, heat, work, efficiency, the ideal gas law, the first and second laws of thermodynamics and the general energy equation.

Prerequisites: MATH 252; PHY 202 or PHY 222.

MET 241 CAD for Mechanical Design I

(F,W,S)(1-3-2)

Computer aided drafting (CAD) for mechanical design. The focus of this course is the construction of 2-D drawings using current industry software. Topics include construction principles, input schemes, command structures, and data management.

Prerequisite: ENGR 111.

MET 242 CAD for Mechanical Design II

(F,W,S)(1-3-2)

Computer aided drafting (CAD) for mechanical design. The focus of this course is the construction of drawing sets using current industry software. Topics include detail part drawings, assembly drawings, and an introduction to 3-D drafting.

Prerequisite: MET 241.

MET 298 Reading and Conference

(Hours to be arranged each term.)

MET 299 Laboratory Practice

(Hours to be arranged each term.)

MET 304, 404 MET Co-op Field Practice

(Terms and hours to be arranged with approval of the curriculum coordinator.)

An approved work program related to the student's field of specialization for a continuous three-month period. The employer and the type, level, and difficulty of the particular job must be approved prior to the employment period. A written comprehensive report must be submitted during the following term of residence.

MET 313 Applied Thermodynamics

(W,S)(3-0-3)

Application of laws and principles of thermodynamics to real thermodynamic cycles. Teaches analysis of performance and design of internal and external combustion engines, steam generators, heat pumps, compressors, and refrigeration machinery.

Prerequisite: ENGR 355 or MET 232.

MET 315 Machine Design I

(F,W)(3-0-3)

Knowledge and skills developed in preceding courses are extended and applied to design and selection of machine elements and machines. Attention is given to functional requirements, methods of manufacture, choice of materials, and economic factors.

Prerequisites: ENGR 213 or ENGT 232; MET 160; PHY 201 or PHY 221.

MET 316 Machine Design II

(W,S)(3-0-3)

A study of power transmission systems components, their selection, and application to power transmission systems. Special consideration is given to the dynamic characteristics of the systems.

Prerequisite: MET 315.

MET 323 Heat Transfer I

(F,W,S)(3-0-3)

An introduction to the three modes of heat transfer, conduction, convection, and radiation. Teaches the analytical and empirical techniques used for solving problems in heat transfer, including those for which computer application is most suited.

Prerequisites: ENGR 355 or MET 232; MET 218.

MET 326 Electric Power Systems

(F,W,S)(2-3-3)

Study related to theory and application of industrial electric power systems. Topics covered include transformers, motors, generators, motor controls, and protective devices.

Prerequisite: ENGR 236 or EE 223.

MET 351 Finite Element Analysis

(W,S)(2-3-3)

This course is an introduction to the use of finite element analysis (FEA) in the solution of mechanical engineering problems. Existing FEA computer codes are used.

Prerequisite: MET 375.

Pre- or corequisite: MET 315.

MET 360 Engineering Materials II

(F)(3-0-3)

This course extends the MET 160 Engineering Materials I course using a more theoretical approach. Subjects include metals, polymers, ceramics, and composites.

Prerequisite: MET 160

MET 363 Engineering Instrumentation

(F)(2-3-3)

Study of measurement techniques and equipment used in mechanical engineering. Instrumentation for measurements in mechanics, thermodynamics, fluid dynamics, and electrical systems considered. Methods of calibration, correction, and data reduction presented.

Prerequisite: PHY 202 or PHY 222.

Pre- or Co-requisite: ENGR 236.

MET 375 Solid Modeling

(F,W,S)(2-3-3)

Introduces solid modeling techniques as applied to mechanical design. Topics include extruded and swept shapes, Boolean operations, and other construction techniques.

Prerequisite: MET 242.

MET 405 Reading and Conference

(Hours to be arranged each term.)

MET 414 Applied Aerodynamics

(W)(3-0-3)

An introductory course on the fundamentals of aerodynamics. Includes a review of the behavior of fluids in motion, definition of the important parameters in aerodynamic behavior, and study of flow about simple aerodynamic shapes. Emphasis will be placed on low-speed aerodynamics.

Prerequisites: ENGR 355 or MET 232; MET 218.

MET 415 Design Project

(F,S)(2-3-3)

This course involves using material from prior coursework in individual student projects.

Prerequisites: MET 218, MET 315.

Pre- or corequisite: MET 316.

MET 416 Energy Systems

(F)(3-0-3)

Compares available energy resources by application of laws and principles of thermodynamics. Provides computational skills for assessment of a given resource with respect to a given application. Develops understanding of energy economics.

Prerequisites: ENGR 355 or MET 232; MET 326.

MET 417 Gas Laws

(F)(2-3-3)

Application of thermodynamics and fluid mechanics to the analysis of flow of both ideal and real gasses in pipes, nozzles, diffusers, compressors and turbines. The course also emphasizes the use of appropriate instrumentation.

Prerequisites: MET 218, MET 313, MET 363.

MET 421 Wind Tunnel Technology

(W)(2-3-3)

An introductory course on the experimental techniques used in wind tunnel testing of aerodynamic shapes. Includes operating characteristics of wind tunnels, the characteristics of and use of models and model instrumentation, and the development of analytical techniques for reduction of wind tunnel data.

Prerequisites: ENGR 355 or MET 232; MET 218, MET 363.

MET 426 Fluid Power Systems

(W,S)(2-3-3)

A mechanical approach to industrial hydraulic applications with emphasis on selection and function of hardware and interfacing of hydraulic systems with mechanical, fluidic and electrical/ electronic controls.

Prerequisites: MET 218, MET 363.

MET 427 Experiments in Thermodynamics

(S)(2-3-3)

Application of laws and principles of thermodynamics to performance testing of heat engines. Teaches measurement of power, determination of efficiency, preparation of heat balances, analysis of combustion products, and preparation of engineering reports.

Prerequisites: MET 313, MET 363.

MET 433 HVAC

(W)(2-3-3)

Heating, ventilating, and air conditioning. Application of laws and principles of thermodynamics to analysis, design, and control of mechanically-controlled environments for human comfort, animal health, and food preservation. Teaches computation of heating and cooling loads, humidity control, heating, and refrigeration.

Prerequisites: MET 313, MET 323.

MET 436 Control Systems

(F,W,S)(3-0-3)

An introduction to control systems. Both classic control theory and modern digital process control are considered. Topics include block diagrams, mathematical models, transfer functions, Laplace transforms, frequency response along with control components and digital controllers.

Prerequisites: ENGR 212, ENGR 236, ENGR 355 or MET 232; MET 218, MET 363.

MET 437 Heat Transfer II

(F,W)(1-3-2)

A study of experimental heat transfer. Methods and instrumentation used for investigating heat transfer systems will be considered. Laboratory investigations include studies of heat exchangers, forced and free convection experiments, and determination of radiation and convection coefficients.

Prerequisites: MET 323, MET 363.

MET 438 Reciprocating and Turbine Engines

(W,S)(3-0-3)

Introduction to construction, operation, and theory of reciprocating and turbine engines. Students will learn engine design, history of development, theory and practice of operation.

Prerequisites: MET 218, MET 313, MET 315.

MET 462 Vacuum Technology

(2-3-3)

An introductory course defining the role of high and ultra-high vacua in the process of high vacuum technology. Material will include such topics as vacuum pumping, vacuum gauging, processing of materials in a vacuum, evaporative deposition, sputtering, thin films, mass spectrometry, and leak detection.

Prerequisite: MET 417.

MET 465 Computational Strength of Materials

(3-0-3)

Advanced topics in structural mechanics using calculus and finite element approaches. Topics include stresses and deflections of non-uniform 2-d beams; shafts and connecting rods; axisymmetric shells; circular and rectangular plates; inertial stresses from rotation and seismic effects. Applications are emphasized.

Prerequisites: ENGT 230 and ENGT 231; or

ENGR 211 and ENGR 213; MET 351 and MATH 252.

MET 475 Parametric Modeling

(W)(2-3-3)

Introduces feature-based parametric solid modeling techniques as applied to Mechanical Design. Emphasizes the concepts and practices of parametric modeling from the user's perspective. Theoretical and development backgrounds are also covered. Prerequisite: MET 375.

MET 480 Vibrations

(F,W)(2-3-3)

An introduction to mechanical vibration. Topics include the equations of motion, resonant frequencies, mode shapes, damping and applications. The laboratory will introduce vibration instrumentation.

Prerequisites: ENGR 212, ENGR 266, MATH 321, MECH 315, MECH 363.

MET 490 Senior Projects I

(F)(2-3-3)

The first of a three-term comprehensive group design project, focusing on the design proposal. This sequence applies material from prior coursework, along with concepts of project management, design optimization, and other material related to a group engineering project.

Prerequisites: ENGR 355 or MET 232; MET 218, MET 315 and MET 375; or instructor consent.

MET 491 Senior Projects II

(W)(2-3-3)

The second of a three-term comprehensive group design project, focusing on project design.

Prerequisite: MET 490 previous term from same instructor, or advisor and instructor consent.

MET 492 Senior Projects III

(S)(1-6-3)

The third of a three-term comprehensive group design project, focusing on project construction and testing.

Prerequisite: MET 491 previous term from same instructor, or advisor and instructor consent.

(MFG) Manufacturing Engineering Technology

MFG 101 Introduction to Manufacturing

(S)(2-3-3)

An introduction to the manufacturing engineering technology discipline. Orientation to the use of personal computers. Instruction in problem solving and laboratory procedures emphasized. Laboratory provides demonstration and practice in a variety of manufacturing equipment and procedures.

MFG 103 Introductory Welding Processes

(F,W,S)(2-3-3)

Applications of welding in modern industry. Topics include: Oxyacetylene welding and cutting, shielded metal arc welding, gas tungsten arc welding, gas metal arc welding, and robotic welding.

MFG 107, MFG 207, MFG 307, MFG 407 Seminar

(Hours to be arranged each term.)

MFG 112 Introduction to Manufacturing Processes

(W)(3-0-3)

A survey of common manufacturing processes, including a history of manufacturing technology. Manufacturing economic considerations. Influence of product design on process selection. Manufacturing taxonomy, surface finish, tolerances, and functional specifications.

MFG 120 Manufacturing Processes I

(F,W,S)(2-6-4)

An introductory course in metal removal processes emphasizing drilling, milling, and lathe processes. Includes tool bit grinding. Emphasis on production speeds and feeds. Prerequisites: MATH 100, ENGR 111.

MFG 204 Data Management

(2-0-2)

Current topics in data acquisition and management.

MFG 220 Manufacturing Processes II

(W)(2-3-3)

Advanced concepts in material removal.

Turning, milling, shaping, and drilling. Cutting tools and cutting requirements.

Prerequisites: MET 160, MET 241, MFG 120.

MFG 223 Casting and Molding Processes

(S)(3-3-4)

Casting and molding processes including: pattern making, casting and molding methods, mold and core making, pouring, cleanup, sand conditioning and testing, quality considerations and economic factors.

Prerequisites: ENGT 115, MET 160.

MFG 245 Electronics Manufacturing

(F)(3-0-3)

Processes and materials specific to the production of printed circuit board and integrated circuit components. Topics include surface mount technology, vacuum system theory, photolithography, etching and deposition processes, microbonding, and component packaging.

Prerequisites: CHE 101, MET 112.

MFG 275 CAD for Manufacturing

(2-3-3)

Computer aided drafting for manufacturing. Presents equipment and programs from the user's perspective. Topics include construction principles, input schemes, command structures, and data management.

Prerequisite: One computer language.

MFG 295 Individual Studies

(Hours to be arranged each term.)

MFG 298 Reading and Conference

(Hours to be arranged each term.)

MFG 299 Laboratory Practice

(Hours to be arranged each term.)

MFG 313 Manufacturing Analysis and Planning

(F,S)(3-0-3)

Analysis and planning of manufacturing methods, procedures and equipment. Includes designing for manufacturing efficiency, tolerance analysis, equipment and resource allocation and scheduling.

Prerequisite: ACC 333 or MGT 321 or MFG 120.

MFG 314 Geometric Dimensioning and Tolerancing

(F,S)(2-3-3)

The study and application of ANSI and ISO

geometric dimensioning and tolerancing principles and practices relative to product design and manufacturing operations.
Prerequisites: MATH 112, MET 242.

MFG 317 Machine Element Design

(F)(3-0-3)

Stress calculations and design of machine elements for general applications. Theories of failure, fatigue considerations, and material selection of shafts and associated parts, gear and belt drives, bearings, power screws, threaded fasteners, riveting, welding, and springs.

Prerequisites: ENGR 213 or ENGT 231 and MET 241, or instructor consent.

MFG 325 Principles of Metrology, Machining and Welding

(3-3-4)

Measuring techniques using precision devices. Metal removal processes such as lathe, mill, and grinder. Correct use of tools and cutting parameters. Basic welding processes and theory.

MFG 326 Solid Mechanics

(3-0-3)

Concentrated study of statics and strength of materials comprising the principles of equilibrium, strain-stress relationships, and analysis of internal stresses for different loading systems.

Prerequisite: MATH 112.

MFG 331 Industrial Controls

(W,S)(2-3-3)

Fundamentals of control of manufacturing processes. Applications of relay logic, input and output devices, and programmable logic controllers (PLC). Design of complete control circuits, selection of components, and cost estimation. PLC programming for discrete event control and for analog applications.

Prerequisite: MET 326.

MFG 333 Statistical Methods for Quality Improvement

(F,W,S)(3-0-3)

Strategies for continuous manufacturing process improvement. Graphical and numerical methods for data analysis. Methods for manufacturing process control and acceptance criteria.

Prerequisite: MATH 361.

MFG 334 Manufacturing Group Project

(W,S)(1-6-3)

Development of a product by a group of manufacturing students working together. This includes creating or modifying the design of the product, writing operation sheets, specifying materials, tools and equipment needed, design of special tooling, setup and operation of equipment and actual manufacturing of the project.

Prerequisite: MFG 342.

MFG 341 Numerical Control Programming

(F)(2-3-3)

Introduction to manual numerical control programming. Includes interpreting part drawings, process planning, machining setup and sequence. Program debugging and introduction to tool path simulation and computer-aided programming tools.

Prerequisites: MATH 112, MFG 120, MET 241.

MFG 342 Computer Aided Machining

(W,S)(2-3-3)

Development of CNC machine tool manufacturing programs using computer-aided process planning and advanced CAD/CAM software. Emphasis on analysis and planning required for successful CNC production, development of CAD drawings and solid models for CAM program development, toolpath simulation, and manufacturing engineering issues.

Prerequisites: MFG 341, MET 375.

MFG 343 Manufacturing Tool Design

(W)(3-0-3)

Fundamentals of jig and fixture design. Locating and clamping methods for manufacturing production. Design of sheet-metal stamping, piercing, and forming tools. Study of the effect of manufacturing machines and production methods on tooling design.

Prerequisites: MET 241, MET 315, MFG 314, or instructor consent.

MFG 344 Design of Manufacturing Tooling

(S)(2-3-3)

Using material from prior courses students work in individual and team design projects. Design and analyze a variety of manufacturing fixtures, jigs, molds, and stamping dies.

Prerequisites: MET 241, MFG 343.

MFG 351, MFG 352, MFG 353 Microelectronics Manufacturing Processes I, II, III

(3-0-3)

A three term sequence providing in-depth theory of the processes used in the manufacture of electronic components. Primary topics include integrated circuits, printed circuits, electronic assembly. Vacuum system theory, photolithography, process specific chemistry, etching and deposition processes, and surface mount technology.

Prerequisites: For MFG 351—CHE 101, PHY 202.

Prerequisite: For MFG 352—MFG 351. Prerequisite: For MFG 353—MFG 352.

MFG 404 Co-op Field Practice

(Terms and hours to be arranged with approval of the curriculum coordinator.)

An approved work program related to the student's field of specialization for a continuous three-month period. The employer and the type, level, and difficulty of the particular job must be approved prior to the employment period. A written comprehensive report must be submitted during the following term of residence.

MFG 405 Reading and Conference

(Hours to be arranged each term.)

MFG 408 Workshop

(Hours to be arranged each term.)

MFG 415 Finishing Methods

(F)(2-0-2)

Review of material finishing technologies with focus on functional requirements of final product, life-cycle environmental considerations, and manufacturing technologies for material finishing.

Prerequisite: MET 160.

MFG 420 Manufacturing Processes III

(W)(3-0-3)

Introduction to less conventional and recently developed manufacturing processes and materials. Emphasis on understanding unique characteristics, advantages, limitations, and applications. Analysis required for selection of appropriate materials and processes. Examples of computer programs that aid the selection process.

Prerequisites: MATH 112; and MFG 220 or MFG 325; and PHY 201/PHY 221.

MFG 425 Plastic Manufacturing Processes

(S)(2-3-3)

Fundamentals of polymer science and plastic manufacturing methods. Introduction to the affect of chemistry and morphology of plastics on material selection, product design, and process design. Emphasis is on thermo-plastic processes such as injection molding. Prerequisites: MET 160 and MET 375, or instructor consent.

MFG 445 Plant Layout and Handling Systems

(3-0-3)

In-depth study of facilities planning for manufacturing engineers. Focus is on layout optimization algorithms and applications, work cell design, warehouse design, materials handling systems, process/product/material/labor cost estimates and evaluations, and agile manufacturing. Prerequisites: MFG 112, MFG 313.

MFG 447 Lean Manufacturing

(W,S)(2-3-3)

Introduction of principles, techniques and skills of lean manufacturing. Process optimization and quality improvement for manufacturing. Plant layout, design and job scheduling. JIT skills, such as Kaizen, Kanban, value added analysis and one piece flow to reduce inventory and waste. Prerequisites: MFG 313 or MFG 333.

MFG 453 Automation and Robotics in Manufacturing

(F,S)(2-3-3)

Study of the appropriate level of manufacturing automation based upon economics and productivity. Discussion of robotics and a study of automated manufacturing including automatic machine design and material handling.

Prerequisite: Senior standing in MET or MfgET or permission of instructor.

MFG 454 Thermal Systems for Manufacturing

(F,S)(3-0-3)

Fundamentals of thermal energy analysis, including introduction to thermodynamics and heat transfer. Emphasis is on solving manufacturing related problems in thermal process control and analysis.

Prerequisite: MATH 252.

MFG 456 Materials Science

(3-0-3)

Study of the relationship of a material's structure to its properties. Materials studied include nonferrous metals, polymers, ceramics, composites, and electronics materials.

Prerequisite: MFG 420.

MFG 461 Senior Project I

(F)(1-6-3)

The first term of the three-term comprehensive capstone manufacturing project. This term concentrates on the development and presentation of a formal project proposal, followed by early stages of project development. Prerequisites: MFG 313, MFG 331, MFG 342 or instructor consent.

MFG 462 Senior Project II

(W)(0-9-3)

The second term of a three-term project. This term concentrates on material acquisition and process development.

Prerequisite: MFG 461.

MFG 463 Senior Project III

(S)(0-9-3)

The final term of a three-term project. Process refinement and production of the product agreed to during the proposal phase. Requires formal reporting and presentation.

Prerequisite: MFG 462.

MFG 465 Advanced Welding Methods

(F,S)(3-0-3)

High energy density, solid state, and plastics welding processes. Welding metallurgy supports, metal combination choices and solutions to typical welding problems. Codes, procedure qualification, welding design and nondestructive testing.

Prerequisites: MET 160, MFG 103.

MFG 503 Thesis

(F,W,S)(Variable credit 1-16)

Course may be repeated for credit.

MFG 507 Seminar

(Hours to be arranged each term.)

MFG 521 The Manufacturing Management Team in the Global Enterprise

(S)(3-0-3)

Concepts and theories needed to understand the management of people, work groups, and organizations in a global environment. Exploration of cultural differences, organizations,

communication and business relationships; strategic thinking in a global context, and international e-communications. Emphasis on contemporary case studies regarding the operational problems facing the international firm.

MFG 522 Manufacturing Business Philosophies

(s)(3-0-3)

Contemporary world class manufacturing concepts and philosophies including Just-in-Time (JIT) applications for manufacturing and inventory management; methods and practices of total quality control in manufacturing; and continuous improvement techniques in manufacturing. Focus on contemporary cases in global manufacturing.

MFG 523 Capitalization Principles for Manufacturing

(3-0-3)

Theory and concepts of capitalization for manufacturing assets; land, buildings, and equipment. Historical cost for valuing an asset. Net income, real and tax depreciation, and timing the disposal or exchange of assets. Exploration of capitalization of cost, post-acquisition asset costs, interest capitalization and expense, asset impairments, and multinational capital budgeting and financial management.

MFG 524 Project and Budget Planning for Manufacturing

(W,S)(3-0-3)

Exploration of the theories, tools, and techniques needed to effectively plan and manage manufacturing projects and budgets. Development of the characteristics of project plans including scope of work statements, work breakdown structure, project schedules, schedule and budget metrics, and project change cost analysis. Core topics include cost, time, and resource estimation, management and budgeting.

MFG 525 International Economics for Manufacturing

(3-0-3)

Exploration of international economics. Impact on manufacturing industries. Focus on the foundations of international trade including classical and modern theories of production and industrial organization. Free trade policies; foreign competition; direct foreign investment, fiscal and monetary policy; tariffs, quotas, and subsidies. International monetary market on production, and

anti-globalization politics. Concentration on contemporary cases in manufacturing.
Prerequisites: ECO 201 and ECO 202 or equivalent (See instructor).

MFG 531 Engineering Mechanics
(S)(3-0-3)

Fundamentals of statics. Dry, viscous, and rolling friction. Kinematics of particles: rectilinear and curvilinear motion. Kinetics of particles: work and energy, impulse and momentum. Kinematics of rigid bodies: translation and rotation. Kinetics of rigid bodies: work and energy, impulse and momentum. Fundamentals of stress analysis.

MFG 533 Thermal Processes and Technology in Manufacturing
(F)(3-0-3)

Review of the laws of thermodynamics. Review of heat transfer including conduction, convection, and radiation. Vacuum technology. Autoclave processes. Cryogenics: materials, techniques, and safety. Plasma processes. The processing of nonmetals. The processing of insulation materials. Energy costs and conservation in manufacturing processes.

MFG 534 Design Technology for Manufacturability
(F)(3-0-3)

Cutting costs and improving productivity. Managing the manufacturing supply chain. Reducing time to market. Establishing core competencies and maintaining vital corporate best practices. The role of standards and lean manufacturing in design.

MFG 535 Product Life Software
(F)(3-0-3)

Use of high-end enterprise-wide software products for integrating design, automating the workflow, and comprehensively controlling security. Revision management over all types of data. Creating document links. Leveraging subject matter experts across the extended enterprise.

MFG 536 Automated Technology for Tool Path Generation
(F)(3-0-3)

Reviewing and validating manufacturing processes for administrators, managers, and designers. Reviewing the creation of tool paths using standard 3D and 2D mechanical design tools and the generative 2.5-axis and 3, 4 and 5-axis surface machining NC software tools. Controller, machine, and software selection and integration.

MFG 537 Product Data Management and Configuration Control
(3-0-3)

Capturing intellectual property at its source from CAD design, manufacturing and maintenance, driving the product information across the extended enterprise, and enabling its use in other branches and partners in the enterprise. Creating the integration of better and more efficient decisions and processes over the life cycle of the product.

MFG 538 Special Problems in Manufacturing Software
(W,S)(3-0-3)

Independent study using advanced functionality in high-end manufacturing and enterprise software. Approval of faculty advisor required.

MFG 562 Advanced Materials Science and Technology
(F)(3-0-3)

Advanced engineering materials. Recent advances in development and applications of metals, polymers, ceramics, and composites. Emphasis on the relationship between structure and properties. Manufacturing processes explored. Application of established standards for materials properties determination.

MFG 563 Inventory Control and Production Planning
(3-0-3)

Introduction of concepts, principles, techniques, strategies and applications related to demand forecasting, production planning, performance measurements, quality control, inventory control and continuous improvement for manufacturing systems.

MFG 564 Quality Concepts and Philosophies
(3-0-3)

Understanding quality, Models and Framework for TQM, Leadership & Commitment, Planning, Strategy & Goal deployment, Partnerships & Resources, Performance measurement, Self-assessment, Audits & Reviews, Benchmarking, Process Management, Continuous Improvement; Culture change through teamwork, Communication, Implementing TQM, and Case studies.

MFG 595 Selected Graduate Topics in Manufacturing
(3-0-3)

Manufacturing related topics in engineering

science and design. Manufacturing related topics in software and computer integration. Manufacturing related topics in materials and processing technology. Manufacturing related topics in business and management. Course may be repeated for credit.

MFG 596 Selected Topics in Engineering Science and Design Technology
(F,W,S)(3-0-3)

Manufacturing related topics in engineering science and design. Course may be repeated for credit.

MFG 597 Selected Topics in Manufacturing Software and Computer Integration
(F,W,S)(3-0-3)

Manufacturing related topics in software and computer integration. Course may be repeated for credit.

MFG 598 Selected Topics in Advanced Manufacturing Materials and Processes Technology
(F,S)(3-0-3)

Manufacturing related topics in materials and processing technology. Course may be repeated for credit.

MFG 599 Selected Topics in Business, Financial and Management Processes
(F,S)(3-0-3)

Manufacturing related topics in business and management. Course may be repeated for credit.

(MGT) Management
MGT 107, MGT 207, MGT 307, MGT 407 Seminar
(Hours to be arranged each term.)

MGT 212 Fundamentals of Renewable Energy Management
(3-0-3)

Explores primary energy sources available for power generation. Includes cost comparisons of traditional sources (gas, coal, nuclear, hydro) and renewable sources (solar, geo-thermal, wind, biofuels, wave and tidal). Evaluates and benchmarks benefits of traditional versus renewable energy sources, long-term vs. short-term feasibility and strategic decision-making in energy generation and

utilization.

Prerequisites: ACC 201 and REE 201.

MGT 321 Operations Management I
(F,W)(3-0-3)

Functions of the operations division within the organizational structure. Manufacturing and service organization trends. Capacity planning with forecasting and master scheduling. Introduction to Just-In-Time concepts. Prerequisite: BUS 215, BUS 317 or BUS 304.

MGT 322 Operations Management II

(W,S)(3-0-3)

Supply chain management for service and manufacturing companies. Covers flows of goods and services through relationships with business customers, suppliers and partners. Students learn how to manage strategic, operational and tactical planning using best-known practices and efficient use of information systems. Evaluate and design effective supply chains.

Prerequisite: MGT 321.

MGT 323 Operations Management III

(F,W,S)(3-0-3)

Effective budgeting methods for industrial environments. Budget planning, formation and cost controls. Flexible budgets and expense management. Manufacturing/non-manufacturing costs and cost/contribution analysis.

Prerequisite: ACC 203 with grade "C" or better.

MGT 335 Project Management

(F,S)(3-0-3)

Advanced application of the Critical Path Method to organization and control of project implementation. Applications software will be used to create and evaluate project networks and to develop management reports.

Prerequisite: BUS 215 or BUS 317 or MET 112.

MGT 345 Engineering Economy

(F,W,S)(3-0-3)

Capital expenditure, economic life and replacement analysis based on net present value, periodic costs, internal and incremental rates of return. Coverage of compound interest, value flows, economic equivalences, depreciation, taxes and inflation.

Prerequisite: MATH 105 or MATH 111.

MGT 391, MGT 392 Co-op Field Practice

(0-9-3)

Credit will be given for an approved work program related to the student's field of specialization for a continuous 10-week period. The employer and the type, level and difficulty of the particular job must be approved by the Management Department prior to employment.

MGT 421, Quality Management

(F,W)(3-0-3)

Qualitative and quantitative methods of quality assurance in manufacturing and service industries. Assessing quality systems using the ISO 9000 series of standards. Application of basic statistical techniques including control charts, sampling procedures, and graphical analysis to assess quality performance. Use of computing systems in establishing quality assurance.

Prerequisite: MATH 361

MGT 422, Materials Management

(W,S)(3-0-3)

Approaches to materials management common to production and service industries. Demand forecasting, inventory management, scheduling, requirements planning and capacity planning using qualitative and quantitative methods. Application of computing systems in materials management processes.

Prerequisite: MGT 321

MGT 423 Logistics Management

(F,S)(3-0-3)

Approaches to warehousing practices and distribution of goods and services across the supply chain. Warehouse justification and decisions. Procurement, packaging, handling, transport and ownership arrangements. Relationship management, sustainability and risk assessment.

Prerequisite: MGT 322

MGT 461 Lean/Six Sigma Management I

(F,W)(3-0-3)

Lean thinking as applied to production and service operations. Kaizen, kaikaku, pull production and systems, value stream mapping and analysis. Standardized work charts and combination tables to streamline work content and achieve flow. Identifying sources of muda and its elimination.

Prerequisite: BUS 215 or MGT 321.

MGT 462 Lean/Six Sigma Management II

(W,S)(3-0-3)

Overview course of Six Sigma management roles, responsibilities and terminology. Students will understand the tools and the phases of the DMAIC model and explore business cases to understand how Six Sigma techniques are applied to business.

Prerequisite: MATH 361.

MGT 463 Lean/Six Sigma Management III

(F,S)(3-0-3)

Deployment and management of Lean Six Sigma within the enterprise. Planning and assessment of deployment sustainability, infrastructure, success factors and metrics that describe the value proposition associated with institutionalizing large strategic initiatives such as Lean Six Sigma.

Prerequisite: MGT 462.

(MIS) Management Information Systems

MIS 101 Word Processing Software Laboratory

(F,W,S)(0-3-1)

Word processing lab using Microsoft Word software. Includes creating and editing documents, letters, Web pages, forms, labels, and newsletters, research papers, an index and table of contents.

MIS 102 Spreadsheet Software Laboratory

(F,W,S)(0-3-1)

Spreadsheet lab using Microsoft Excel software. Includes creating worksheets, charts, formulas, functions, what-if analysis, sorting, multiple worksheets, workbooks, templates, pivot tables and importing of data.

MIS 103 Presentation Graphics Software Laboratory

(F,S)(0-3-1)

Presentation graphics lab using Microsoft PowerPoint software. Creation of presentations for use on paper, overhead transparencies, on a projection device, and Internet virtual presentations. Includes use of text, graphics, charts, and multimedia applications to create professional-looking presentations.

MIS 107, MIS 207, MIS 307, MIS 407 Seminar

(Hours to be arranged each term.)

MIS 113 Introduction to Database Systems

(F,S)(2-3-3)

Introduces concepts of desktop computer-based database systems. Topics include database management issues, database design, creating and maintaining a database, normalization, table structures, and creating user queries, reports, and forms. Basic database security is discussed.

MIS 115 Visual BASIC Programming

(F,W)(3-3-4)

Computer concepts and problem solving methods in the Windows environment using Visual BASIC. Topics include algorithms, simple data types, condition and iterative structures, functions and procedures, and the program documentation.

Prerequisite: MATH 100 or instructor consent.

MIS 116 C++ Programming I

(W)(3-3-4)

Computer concepts and problem solving methods using C++ programming language. Topics include: algorithms, simple data types, conditional and iterative structures, function definition, structured programming and documentation. Cannot be taken for graduation credit if student has completed CST 116.

Pre- or corequisite: MATH 111.

MIS 118 Programming Fundamentals

(F,W,S)(3-3-4)

Computer concepts and problem solving methods in the Windows environment using C# programming language. Topics include algorithms, simple data types, condition and iterative structures, functions and procedures, and the program documentation.

Prerequisite: MATH 100 or instructor consent.

MIS 126 C++ Programming II

(F)(3-3-4)

Solving complex problems using advanced features of the C++ language. Topics include function usage, pointer data type, dynamic memory allocation, string manipulation, and structure and union data types. Emphasis is on structured program design techniques.

Cannot be taken for graduation credit if student has completed CST 126.

Prerequisite: MIS 116, with grade "C" or better or instructor consent.

MIS 130 Computer Organization

(3-3-4)

Introduces number systems, Boolean algebra, digital logic, computer arithmetic, instruction sets, memory, system software, and network organization and architecture. Laboratory exercises on digital logic, computer architecture, machine language and assembly language programming. Completion of a programming project.

Corequisite: MATH 100.

MIS 136 Object-Oriented Programming with C++

(F)(3-3-4)

A study of object oriented programming with C++. Beginning and intermediate concepts are covered including classes, objects, member functions, overloading, inheritance, polymorphism, templates, and virtual functions. This course prepares students with a strong C background for upper-division coursework using C++. Cannot be taken for graduation credit if student has completed CST 136.

Prerequisite: MIS 126, with grade "C" or better.

MIS 145 Introduction to PC Hardware/Software

(F,W)(3-3-4)

An introduction to PC hardware and software that prepares students as an entry-level PC technician. The course covers topics including: PC system components, peripheral devices, data storage, networking, printing, mobile devices, operating system installation and management, file management, basic data security, and the troubleshooting process.

MIS 206 Introduction to Management Information Systems

(F,W,S)(3-0-3)

Introduction to key components in information systems. Identification of major hardware components and primary categories of software applications. Data resource management concepts; elements of how information systems work to support problem solving and business opportunities. Ethics of information systems usage.

MIS 215 Business Application Programming

(W,S)(3-3-4)

Object-oriented and/or procedural languages

employed with an emphasis on structured design, user interface design and error processing. Utilizing advanced language elements and program structures to integrate software development with data management.

Prerequisites: MIS 115 and MIS 275 with grade "C" or better, or instructor consent.

MIS 218 Database Programming

(F,S)(3-3-4)

Object-oriented and/or procedural languages employed with an emphasis on structured design, user interface design and error processing. Utilizing advanced language elements and program structures to integrate software development with data management.

Pre-Req: MIS 275 and MIS 118 with a "C" or better.

MIS 225 Business on the Internet

(F,S)(3-3-4)

The role of the Internet and related technologies in modern business and electronic commerce. Hands on course for creating dynamic Web pages. Emphasizes Internet marketing and Web page editor with hypertext markup language (HTML) with some exposure to JavaScript.

MIS 251 Networking I

(F,S)(3-3-4)

Introduction to voice and data networking concepts and technologies, including network types, common network standards, network interface cards, wired and wireless network components, IP addressing and sunbathing, network protocols, basic network security, and troubleshooting common network issues.

Prerequisite: MIS 145 with grade "C" or better.

MIS 255 Health Informatics Concepts and Practices

(F,W)(3-0-3)

The discipline of health informatics is introduced, including history, knowledge of health informatics, data management, vocabularies, standards and tools as applied in the support of health care delivery. The course provides foundation knowledge and understanding of the impact of information technology on the health care industry and vice versa. Particular attention is paid to the design, usage and acceptance of information technology applications. This course introduces students to the concepts and practices of health informatics.

MIS 273 Systems Administration I
(F,W,S)(3-3-4)

Introduces the fundamental skills required to install, configure and manage a Windows Server. Topics covered include installing and configuring Active Directory, domain controllers, DNS, users and group definition, print queues, network roles and services and application servers.

Prerequisite: MIS 145 with a "C" or better

MIS 275 Introduction to Relational Databases

(F,W,S)(2-3-3)

The relational model, DBMS functions, administration, design methodology, modeling and normalization. Hands-on design, development and use of an enterprise database system using SQL Server. SQL fundamentals will be introduced, covering select statements, data manipulation, sub-queries, multi-table queries, functions and data types.

MIS 311 Introduction to Systems Analysis

(F,W,S)(3-0-3)

Introduction to state-of-the-art business information systems. Acquiring, processing and distributing information in a technological environment. The MIS organization: its place in business, key trends and implications. Introduction to computing hardware. Introduction to System Development Life Cycle.

Prerequisite: WRI 121.

MIS 312 Systems Analysis I

(F,W)(4-0-4)

Planning and Analysis phases of Systems Development Life Cycle. Focus on software development life cycles; entity relationships, data flow diagrams, prototyping and other forms of data or system modeling. Designing, selecting and installing new systems for end users. Includes cost/benefit and value-added evaluations.

Prerequisites: MIS 275 and MIS 311.

MIS 315 Computer Software Techniques

(3-0-3)

Lectures are divided between data structures and operating systems. Data structures section involves data representation, B-trees, graphs, and files. Operating systems section involves process, memory, and file management as related to UNIX. Cannot be taken for graduation credit if student has completed CST 313.

Prerequisite: MIS 126 with grade "C" or better.

MIS 318 Advanced Programming

(W)(3-3-4)

Advanced survey of programming topics in areas such as Object Oriented, Data Mining, Business Intelligence and Web Scripting. Application will be emphasized through the development of software applications that provide business solutions. Prepares students with a strong programming background for upper division MIS courses.

Prerequisite: MIS 218 with a "C" or better.

MIS 322 Systems Analysis II

(W,S)(3-3-4)

Design, implementation and maintenance phases of Systems Development Life Cycle. Focus on software development life cycles. Designing, selecting and installing new systems for end users. Includes cost/benefit and value-added evaluations. Define and perform data modeling, process modeling, network modeling and their importance.

Prerequisites: MIS 218 and MIS 312, and MGT 335 with grade "C" or better.

Co-requisite: MIS 341

MIS 334 Business Analytics

(F)(4-0-4)

Understanding of Descriptive, Predictive and Prescriptive Analytics. Regression, Forecasting, Simulation, Sampling and Optimization in relation to business application. Introduction to Data Mining Algorithms are also covered.

Prerequisite MATH 362

MIS 341 Relational Database Design I

(F,W)(3-3-4)

A comprehensive study of SQL and TSQL using the SQL Server relational database management system. Hands-on training will include the use of TSQL, SQL Server Management Studio, database creation, CLR, data queries, view definitions and use, operators and functions, triggers, calculations, indexing, cursors and data manipulation.

Prerequisites: MIS 118 with a "C" or better and MIS 275 with a "C" or better.

MIS 343 Relational Database Design III

(W)(2-3-3)

Install, create and maintain an Oracle database. Oracle database architecture and

component interactions. Implement, configure and monitor an operational database in an effective manner including performance monitoring, database security, user management and backup/recovery techniques.

Prerequisite: MIS 342.

MIS 344 Business Intelligence

(W,S)(2-3-3)

Develop analytic solutions to gain functional understanding of Business Intelligence to solve business problems. Covers the development of Crystal Reports and Dash-boarding tools to develop reporting and interface solutions for business.

Prerequisite: MIS 334 with grade "C" or better.

MIS 345 Health Care Information Systems Management

(F,W)(3-0-3)

Information systems within healthcare organizations are examined. Business, clinical, and healthcare delivery processes are identified as they relate to data acquisition and information systems. Key issues confronting design, organization and management of healthcare systems are identified, examined, and solutions are explored and developed.

Prerequisites: BUS 317 and BUS 313.

MIS 351 Networking II

(F,W)(3-3-4)

Intermediate course covering voice and data networking concepts and technologies including routing and switching. Focus on enterprise networking and the design, documentation and management of complex networks.

Prerequisites: MIS 251 with a "C" or better.

MIS 357 Information and Communication Systems in Health Care

(W)(2-3-3)

Addresses the role of computer-based information and communications systems in patient care and health care administration, including hands-on experience with the acquisition, storage and use of information in the electronic medical record and systems such as PACS, lab and pharmacy systems and computerized provider order entry (CPOE).

Prerequisite: MIS 255.

MIS 375 Decision Support Systems

(F,W,S)(2-3-3)

Use of personal computer application programs for analysis and reporting, problem

solving and decision assistance.

Prerequisites: MIS 102, MATH 361 and MATH 371.

MIS 385 NoSQL

(S)(2-3-3)

Develop concepts and a fundamental skill set of NoSQL and document-oriented data models. Conducting cross comparison between relational and document-oriented data models. Students will gain a broader understanding of DBA techniques used in managing database systems through replication and sharding approaches. Prerequisite: MIS 341 with a grade of a "C" or better.

MIS 390, 490 Co-op Field Experience

(Hours to be arranged each term.)

An approved work program related to the student's field of specialization for a continuous three-month or six-month period. The employer type, level, and difficulty of the particular job must be approved by the student's advisor prior to the employment period. A written comprehensive report of activities must be submitted during the following term of residence.

Prerequisites: All MIS 100 and 200 level courses.

MIS 405 Reading and Conference

(Hours to be arranged each term.)

MIS 408 Workshop

(Hours to be arranged each term.)

MIS 414 Information Systems Development

(F,W,S)(2-3-3)

Review of systems analysis. Tools, techniques, and reference sources used to research, configure and justify the hardware, software, staff, and facilities required for a computer system. Changeover, file conversion and testing. Post-installation audit, backup, security and privacy.

Prerequisites: MIS 312 and a programming language.

MIS 425 Information Systems Security

(S)(3-3-4)

An overview of security challenges and strategies of countermeasure in the information systems environment. Topics include definition of terms, concepts, elements, and goals incorporation industry standards and

practices with a focus on availability, vulnerability, integrity, and confidentiality aspects of information systems.

Prerequisite: MIS 251, MIS 273

MIS 442/542 Advanced Database Application Programming

(S)(3-3-4)

Construct graphical end-user interfaces for scalable, high-performance Internet applications. Building, testing, debugging and deploying interactive Internet applications that use an enterprise level Database Management System. Develops experience with the System Development Life Cycle (SDLC) for web/database integration for application development. Develop understanding and application of Software as a Service (SaaS). For graduate credit students will participate in a field placement project working with companies such as the BLM to create a working application demonstrating mastery of the subject material.

Prerequisites: MIS 218 and MIS 341, both with grade "C" or better.

MIS 445 Legal, Ethical and Social Issues in Health Care Technology

(S)(3-0-3)

Legal, ethical, and social issues in health care, especially as they impact systems design, development, use, and management will be examined.

Prerequisites: BUS 313.

MIS 446 Data Mining

(W)(2-3-3)

Defining the project cycle of data mining through data collection, analysis and assessment. Classification, Clustering, Association, Regression, Forecasting, Sequence Analysis and Deviation Analysis are applied to the project life cycle of data mining applications. Prerequisites: MIS 344 and MIS 334 both with a "C" or better

MIS 451 Networking III

(F,W,S)(3-3-4)

Focus on technologies and tools used in advanced enterprise networks. Includes project labs using network infrastructure to implement design goals and team projects.

Prerequisite: MIS 351.

MIS 495 Senior Project Selection

(S)(1-0-1)

Selection of the senior project capstone project concept that meets industry demands and stakeholders requirement.

Prerequisite: MIS 322 with a "C" or better or Advisor's Consent

MIS 496 Senior Project Management

(F,S)(2-3-3)

Focuses on project management. Includes best-known industry practices, as well as planning, organizing and managing resources to bring about successful completion of specific project goals and objectives. Produces formal proposal for Senior Project.

Prerequisites: MIS 495 with a "C" or better.

MIS 497 Senior Project II

(W)(1-6-3)

Senior project students will plan, develop and carry through to completion a management information systems project for a client they select. Formal proposal, progress reports and project demonstration/presentation. The instructor serves as the student's consultant. Prerequisite: MIS 496 with grade "C" or better.

MIS 498 Senior Project III

(F,S)(1-6-3)

Senior students plan, develop and complete a project for a client or an independent research project. Periodic progress reports and presentations required. Instructor functions as a consultant. Deliver final project. Prerequisite: MIS 497 with grade "C" or better.

(MIT) Medical Imaging Technology

MIT 103 Introduction to Medical Imaging

(F,W,S)(3-0-3)

Orientation to the art and science of medical imaging. History and development of radiologic science, diagnostic medical sonography, vascular technology, nuclear medicine technology, medical ethics, health care industry, related professional organizations, and regulatory agencies.

MIT 107, MIT 207, MIT 307, MIT 407 Seminar

(Hours to be arranged each term.)

MIT 209 PACS I: Intro to Picture Archiving Communications System

(F)(3-0-3)

An introduction to Picture Archiving

Communications System (PACS). PACS Workflow within the department and interdepartmentally, PARCA and CIIP certification, procurement, and PACS system administration.

MIT 219 PACS II: PACS Communication and Administration
(F)(3-0-3)

Study of policies and procedures for PACS. Observation of the healthcare organization and PACS role within the organization. Overview of PACS components, image acquisition, viewing of images, and image archiving.

MIT 229 PACS III: PACS Technical Requirements and Image Quality
(W)(3-0-3)

Overview of computer basics, technical requirements, and Operating System basics. An introduction to HIPAA and PACS image quality.

MIT 231 Sonographic Principles and Instrumentation I
(F,W,S)(3-3-4)

Properties of sound waves, propagation and interaction of ultrasound in tissue, basic ultrasound instrumentation, static, and real time ultrasound imaging principles and artifacts are covered. Laboratory includes demonstration of wave characteristics and introduction to basic instrumentation of real-time ultrasound imaging. Satisfies Science elective.
Prerequisite: PHY 217 with grade "C" or better.

MIT 232 Sonographic Principles and Instrumentation II
(S)(3-3-4)

Advanced physical principles. Hemodynamics, Doppler physics, color imaging, and artifacts associated with them are covered. Digital signal and image processing and bio effects are also discussed. Laboratory develops instrumentation skills. Satisfies Science elective.
Prerequisite: MIT 231 with grade "C" or better.

MIT 239 PACS IV: PACS Implementation and System Management
(W)(3-0-3)

Overview of implementing PACS. Starting from procurement to the Return on Investment (ROI). This will include the proposal,

approval process, integration, a post install. Class will include the study of DICOM and HL7.

MIT 249 PACS V: DICOM
(S)(3-0-3)

Study of DICOM standard and how it allows for modalities to communicate inside and outside of a facility.

MIT 259 PACS VI: PACS Security
(S)(3-0-3)

Overview of Information Technology, IHE, security, structured reporting and networking fundamentals.

(MUS) Music
MUS 107, MUS 207, MUS 307, MUS 407 Seminar
(Hours to be arranged each term.) H

MUS 195 Band
(0-3-1) HP (One hour each term.)

MUS 197 Chorus
(0-3-1) HP (One hour each term.)

(NMT) Nuclear Medicine Technology
NMT 107, NMT 207, NMT 307, NMT 407 Seminar
(Hours to be arranged each term.)

NMT 205 Nuclear Medicine Administration
(W)(2-0-2)
Orientation to the principles of management, marketing nuclear medicine services, and administrative procedures.
Prerequisite: MIT 103 with grade "C" or better.

NMT 212 Nuclear Medicine Physics/Radiation Biophysics
(F)(3-0-3)
Interactions of radiation with matter. Introduction to the cellular and systemic responses to radiation. Early and late somatic and genetic effects described. Critical organ dose calculations risks versus benefits. Overview of film processors, associated chemistry.

NMT 215 Radiochemistry and Radiopharmacy
(W)(3-3-4)

The design and function of radionuclide generators, labeling procedures, sterility and pyrogenicity considerations, radionuclide and radiochemical quality control procedures.
Prerequisite: CHE 350 with grade "C" or better.

NMT 217 Patient Care
(F)(3-3-4)

Basic concepts of patient care, including consideration of physical and psychological needs of the patient and family. Routine and emergency patient care procedures. Infection control procedures utilizing Universal Precautions. Role of the nuclear medicine technologist in patient education.
Prerequisite: MIT 103.

NMT 225 Nuclear Physics/Instrumentation
(S)(3-3-4)

An in-depth examination of the physics in nuclear medicine, principles of detection, considerations of counting and imaging, collimators, planar imaging and associated quality assurance and control. Use of all major instrumentation in Nuclear Medicine Departments.
Prerequisite: NMT 215 with grade "C" or better.

NMT 256 Cardiovascular Imaging
(S)(3-0-3)
Introduction to Cardiovascular Imaging techniques in Nuclear Medicine including planar, SPECT, and PET imaging acquisition and processing protocols, radiopharmaceuticals, cardiac anatomy and physiology, exercise and pharmacological stress testing, and EKG principles.
Prerequisites: NMT 205, NMT 215, NMT 217.

NMT 311 Imaging Procedures I
(F)(3-3-4)
Proper patient care before, during and after the procedure, identification and administration of prescribed radiopharmaceuticals. The use of imaging devices and external detectors for body organ imaging.
Prerequisite: NMT 225 with grade "C" or better.

NMT 312 Imaging Procedures II
(W)(3-3-4)
Proper patient care before, during and after

the procedure, identification and administration of prescribed radiopharmaceuticals. The use of imaging devices and external detectors for body and organ imaging.

Prerequisite: NMT 225 with grade "C" or better.

NMT 313 Therapeutic Procedures

(S)(3-0-3)

Common therapeutic applications of radio-nuclides, dose ranges for each application, and proper techniques for calculating quantities of administered radiopharmaceuticals. Includes patient care, follow-up procedures and disposal of excreta.

Prerequisite: NMT 312 with grade "C" or better.

NMT 325 SPECT Imaging and Computer Applications

(S)(3-3-4)

Single photon emission computed tomography (SPECT) imaging and computer applications as applied to nuclear medicine imaging. Demonstration of computer techniques and ECG monitoring and interpretation. Theoretic basis of computer operations and medical applications in nuclear medicine. Lab experience with computerized systems, including hospital sites.

Prerequisites: BIO 335 and NMT 312 with grade "C" or better.

NMT 346 Magnetic Resonance

(F)(3-3-4)

Physics and principles used in the production of magnetic resonance images and spectroscopy. Static magnetic fields, gradient magnetic fields, secondary coil fields, nuclear magnetic resonance (NMR), spatial domain, frequency domain, computer data acquisition, relaxation times, pulse sequence diagrams. Laboratory simulation is included.

Prerequisites: NMT 225 and PHY 217 (or equivalent) with grade "C" or better.

NMT 355 Computed Tomography

(W)(3-3-4)

X-ray physics, scanner components and data acquisition of computed tomography. Image reconstruction, manipulation and artifacts. CT patient care and imaging procedures of the head, neck, spine, chest, abdomen, pelvis and musculoskeletal system. Laboratory simulator practice on image manipulation, scan post processing and reconstruction.

Prerequisite: NMT 311 with grade "C" or better.

Corequisites: NMT 367, BIO 335.

NMT 367 PET Imaging

(F)(3-0-3)

Introduction to Position Emission Tomography (PET) imaging techniques including acquisition protocols, processing protocols, quality control procedures, radiation protection, patient screening, radiopharmaceuticals, image fusion, and imaging procedures.

Prerequisite: NMT 225 with grade "C" or better.

Corequisites: NMT 311 and NMT 346.

NMT 388 Externship Preparation

(S)(3-0-3)

Review and summarize key concepts in Nuclear Medicine. Focus is on patient care and interpersonal scenarios the externship student will likely face while in the hospital environment. Review and discussion of the NMT Externship Handbook and Procedures Log.

Prerequisites: Third quarter junior level status is required for this course.

NMT 410 Nuclear Medicine Technology Externship

(F,W,S)(0-40-15)

All students must complete four consecutive terms (12 months) of clinical experience in nuclear medicine technology at an Oregon Tech approved site. Students will work under the direct supervision of a registered Nuclear Medicine Technologist.

Prerequisite: All NMT courses with grade "C" or better.

NMT 445 Computed Tomography Clinical Experience

(F,W,S)(0-15-5)

All students must complete three consecutive terms (9 months) of clinical experience in computed tomography at a hospital or clinic of their choosing. Students will work under the direct supervision of an ARRT (CT) board registered technologist.

Prerequisite: ARRT and/or NMTCB registry in Nuclear Medicine Technology. Successful completion and faculty approval of Computed Tomography and Cross Sectional anatomy course.

(PHED) Physical Education

PHED 100 Belly Dance: Beginning

(F,W,S)(0-3-1)

Experience an unique dance form. Students

will learn basic hip, rib, and shoulder isolations and of course shimmys. All of this and more are done in combinations, and finally a choreographed dance.

PHED 101 Belly Dance: Intermediate

(W,S)(0-3-1)

A continuation of the beginning class. More complex moves are introduced and more technical expertise is expected. Dancing with veils will be introduced. There will be more complex choreography and music. Dance experience is helpful.

PHED 102 Zumba

(F,W,S)(0-3-1)

Zumba is an exhilarating, effective, easy to follow, Latin inspired, calorie burning dance fitness party. Zumba classes feature exotic rhythms set to high energy Latin and international beats.

PHED 107, PHED 307, PHED 407 Seminar

(Hours to be arranged each term.)

PHED 110 Boot Camp/Kick Boxing

(F,W)(0-3-1)

This is a high-low workout with an emphasis on kickboxing (both Taebo and Turbo kickboxing), also included is body pump workouts, core ball as well as Winsor Pilates stretching.

PHED 111 Core Strength and Balance

(W,S)(0-3-1)

BOSU ball training to improve balance and core strength and alleviate back pain and instability. This class includes full body training, using floor work, cardio circuits, and isometric exercises.

PHED 112 Intro to Cardio and Core

(S)(0-3-1)

A survey participation of cardiovascular group exercise using cardio kickboxing (including both Taebo and Turbo kickboxing), dance aerobics, and step aerobics.

PHED 113 Super Circuit and Cardio Training

(F,W,S)(0-3-1)

This course is designed to use a combination of free weights and/or the universal machines, along with cardiovascular fitness to provide a comprehensive program to increase muscle strength and endurance.

PHED 120 Pilates and Body Pump

(W,S)(0-3-1)

Focus is the floor techniques developed by Joseph Pilates as well as ball Pilates/core strength training. Use of a core ball and body pump bar for anaerobic workout and tone.

PHED 121 Total Fitness**Conditioning I**

(F,W,S)(0-3-1)

Opportunity to do an independent study of a selected aspect of physical education. Class designed to develop and encourage healthy attitudes and habits with regard to cardiovascular efficiency, body composition, muscular strength and endurance, and flexibility.

PHED 122 Total Fitness**Conditioning II**

(F,W,S)(0-3-1)

Opportunity to do an independent study of a selected aspect of physical education. Class designed to develop and encourage healthy attitudes and habits with regard to body composition, muscular strength and endurance. Geared toward weight training workouts. isometric exercises.

PHED 112 Intro to Cardio and Core

(S)(0-3-1)

A survey participation of cardiovascular group exercise using cardio kickboxing (including both Taebo and Turbo kickboxing), dance aerobics, and step aerobics.

PHED 113 Super Circuit and Cardio Training

(F,W,S)(0-3-1)

This course is designed to use a combination of free weights and/or the universal machines, along with cardiovascular fitness to provide a comprehensive program to increase muscle strength and endurance.

PHED 120 Pilates and Body Pump

(W,S)(0-3-1)

Focus is the floor techniques developed by Joseph Pilates as well as ball Pilates/core strength training. Use of a core ball and body pump bar for anaerobic workout and tone.

PHED 121 Total Fitness**Conditioning I**

(F,W,S)(0-3-1)

Opportunity to do an independent study of a selected aspect of physical education. Class designed to develop and encourage healthy attitudes and habits with regard to cardiovascular efficiency, body composition, muscular

strength and endurance, and flexibility.

PHED 123 Dancercise/Step Aerobics

(S)(0-3-1)

A combination of step aerobics and dance moves to provide a fat burning/cardiovascular workout.

PHED 124 Weight Loss

(W)(0-3-1)

Introduction to weight loss and the wellness model. Develop a fitness program for basic nutrition and weight control. Lecture portion spent in the field and in the weight room/cardio room learning techniques and skills related to weight control.

PHED 125 Weight Management**Fitness**

(0-3-1)

Continuation of the Weight Loss class. Meant to reinforce commitment to fitness for participants. Includes 40-45 minutes cardio and 15 minutes of intense cardiovascular training and 20-30 minutes low cardiovascular training. No lecture on weight loss with this class.

PHED 126 Body Pump and Core Ball Pilates

(F)(0-3-1)

A strength and endurance training workout involving intermittent cycles of cardio and weight training. Workouts intended to increase a person's metabolic rate as well as anaerobic fitness level.

PHED 130 Rowing

(F,S)(0-3-1)

Learn the fundamentals of rowing in a multi-person racing shell with racing oars and sliding seats. Also covered will be rowing and race terminology, marine safety, and improving fitness. Good swimming skills required.

PHED 131 Scuba: Beginning

(S)(1-3-2)

Entry-level course. 1 hour lecture and 2 pool sessions per week. Post-course students are eligible for NAUI certification dives. Consists of 5 dives over two day period off-campus. No additional charge.

Prerequisite: must pass swim test.

PHED 132 Scuba: Advanced

(S)(1-3-2)

Learn diving in challenging environments. Six dives include night, navigation, and deep

dives and three others (your choice). Dives on weekend's off-campus. Dive gear furnished.

Included is certification to dive Oxygen enriched mixtures (Nitrox).

Prerequisite: PHED 131.

PHED 141 Tai Chi for Circulation

(F,S)(0-3-1)

Learn ancient Chinese techniques to reduce stress, improve balance, and facilitate health. Practice includes various forms utilizing acupuncture points and energy meridians that additionally will help facilitate health of heart and lungs, normalize blood pressure, and control blood sugar.

PHED 142 Tai Chi for Internal**Organs**

(S)(0-3-1)

Learn ancient Chinese techniques to reduce stress, improve balance, and facilitate health. In a relaxed atmosphere, practice of various forms will additionally utilize acupuncture points and energy meridians to facilitate health of internal organs.

PHED 143 Tai Chi and Qigong: Health, Bones, Muscle

(W)(0-3-1)

Learn ancient Chinese techniques to reduce stress, improve balance, and facilitate health. In a relaxed atmosphere, practice of various forms that additionally will help maintain bone density, ward off arthritis, maximize joint flexibility, and strengthen muscles supporting joints.

PHED 144 Tai Chi and Qigong: Neck/Back Strength

(0-3-1)

Learn ancient Chinese techniques to reduce stress, improve balance, and facilitate health. In a relaxed atmosphere, practice of various forms that additionally will strengthen neck and back, and help to prevent injury or heal from previous injuries.

PHED 145 Relaxation and Flexibility

(F)(0-3-1)

Explore Tai Chi and Qigong methods for stress reduction and facilitation of balance and flexibility. Other stress reduction methods include autogenic training, progressive muscle relaxation, and self-hypnosis. Explore the impact of cardiorespiratory exercise and diet on stress management.

PHED 146 Yoga

(F,W,S)(0-3-1)

Class is generally Hatha Yoga, along with basic Ashitanga, and Kundalini Yoga techniques. In yoga a participant can hope to improve their flexibility, strength and balance.

PHED 150 Aikido

(F)(0-3-1)

A Japanese martial art reflecting the circular movements and energy transference found throughout the universe. Provides the necessary skills to train for practical and tough self-defense while building self-confidence, character, self-respect, and respect for others.

PHED 151 Karate

(F,W)(0-3-1)

Dive into the very heart and soul of Karate! Teachings in traditional forms, self-defense, and competitive style point sparring. Great for new and experienced students. Promotes physical activity, increased mobility, and awareness while learning a valuable life skill.

PHED 160 Cross Country Skiing: Beginning

(W)(0-3-1)

Explore clothing, equipment and learn to travel on cross country skis while avoiding winter hazards. Learn basic map and compass skills to avoid getting lost. Two field trips provide experience to use for a lifetime.

PHED 161 Snowshoeing: Beginning

(W)(0-3-1)

Explore clothing, equipment and learn to snowshoe while avoiding winter hazards. Learn basic map and compass skills to avoid getting lost. Two field trips provide an enjoyable and learning recreational experience to use for a lifetime.

PHED 162 Ice Skating

(W)(0-3-1)

Covers basic figure skating technique using U.S. Figure Skating adult teaching guidelines, levels 1 through 4. Skills include proper use of forward and backward edges, basic curves and turns, simple spins and integrated use of upper body and arm movements.

PHED 163 Wilderness Navigation

(S)(0-3-1)

Learn to read a map and utilize a compass. Gain skill to find precise wilderness locations. Learn the dangers of wilderness travel, and deal with those situations. Two field

trips polish skills using map and compass to navigate.

PHED 170 Golf

(S)(0-3-1)

Lecture covers terminology, rules, etiquette, and course management. Practical class will cover putting, chipping, and driving.

PHED 171 Archery: Beginning

(S)(0-3-1)

Students learn basics of shooting a bow & arrow. Safety, form, mechanics, and practical basic skills. Classes meet off-campus. No prior experience required.

PHED 172 Archery: Intermediate

(S)(0-3-1)

Build upon basic skills learned in Beginning Archery. Advanced instruction in shooting, mechanics, and basic repairs offered. Classes meet off-campus.

Prerequisite: PHED 171.

PHED 174 Recreational Basketball

(F,W,S)(0-3-1)

Basketball game played in a recreational environment. Emphasis on free play and team skill development. Most suitable for players with basic basketball skills.

PHED 175 Rugby

(F,W,S)(0-3-1)

Basic rugby skill, practice, and game play. Players of any skill level welcome. Participants should be able to engage in physical contact, strength development, endurance training, team practice, and game play.

PHED 180 Varsity Cross Country

(F,W,S)(0-3-1)

Competitive Cross Country for multi-level distance runners. Trail running, conditioning, strength training, psychological peak performance, nutrition, race tactics, running physiology and injury prevention is included. Participation in intercollegiate competition is included. Varsity athletes only or coaches approval.

PHED 181 Varsity Soccer

(F,W,S)(0-3-1)

Competitive Soccer at the intercollegiate level, including coaching strategies, offensive and defensive strategies, training, conditioning and team organization. Varsity athletes only or coaches approval.

PHED 182 Varsity Track/Field

(F,W,S)(0-3-1)

Competitive Track and Field techniques are covered including training, conditioning and team organization. Competition at the intercollegiate level. Varsity athletes only or coaches approval.

PHED 183 Varsity Men's Baseball

(F,W,S)(0-3-1)

Competitive Baseball on the intercollegiate level, including coaching strategies, offensive and defensive strategies, training, conditioning and team organization. Varsity athletes only or coaches approval.

PHED 184 Varsity Men's Basketball

(F,W,S)(0-3-1)

Competitive Basketball, including coaching strategies, offensive and defensive strategies, training, conditioning and team organization, including intercollegiate competition. Varsity athletes only or coaches approval.

PHED 185 Varsity Women's Basketball

(F,W,S)(0-3-1)

Competitive Basketball, including coaching strategies, offensive and defensive strategies, training, conditioning and team organization, including intercollegiate competition. Varsity athletes only or coaches approval.

PHED 186 Varsity Women's Softball

(F,W,S)(0-3-1)

Competitive Softball including coaching strategies, offensive and defensive strategies, training, conditioning and team organization, including intercollegiate competition. Varsity athletes only or coaches approval.

PHED 187 Varsity Women's Volleyball

(F,W,S)(0-3-1)

Competitive Volleyball at the intercollegiate level including advanced technique analysis, offensive and defensive strategies, training, conditioning, and team organization. Varsity athletes only or coaches approval.

PHED 188 Varsity Sport Strength/Conditioning

(F,W,S)(0-3-1)

This course provides instruction for sports specific conditioning for varsity athletes. This includes strength training, power training, speed and agility training, core training, dynamic flexibility, and specific energy system

training. Varsity athletes only or instructor approval.

PHED 190 Physical Education

(F,W,S)(0-3-1)

Service course. General participation in physical activities to promote sound health.

PHED 201 Sports Seminar - Officiating

(S)(1-3-2)

This course includes rules, mechanics and officiating procedures in sports found in intercollegiate, interscholastic, and intramural programs. Practical experience in officiating will be provided.

PHED 207 Major Sports Seminar

(F,W,S)(1-2-2)

Development of professional competencies in fundamentals of training methods and objectives of major sports.

PHED 255 Introduction to Coaching Theory

(S)(3-0-3)

An introduction to the central principles of coaching. Exploration of coaching as a practice including theories of coaching, motivation, and organization.

PHED 291 Lifeguard Training

(S)(1-2-2)

Basic skills of lifesaving in aquatic programs; American Red Cross Advanced Lifesaving Authorization.

PHED 292 Water Safety Instructor

(S)(1-2-2)

Analysis, methods of instruction, and teaching of aquatic skills; American Red Cross Authorization in Water Safety Instruction.

PHED 355 Coaching in Application

(S)(3-0-3)

Application of the principles of coaching. Application of the theories of coaching across contexts and in various different sports. Prerequisite: PHED 255

PHED 455 Coaching Practicum

(S)(0-6-3)

Practical application of coaching theories and methods in context. 60 hours of directed coaching experience. Prerequisite: PHED 355

(PHIL) Philosophy

PHIL 105 Introduction to Ethics.

(F)(3-0-3) H

Students will become familiar with Kant's moral theory and Utilitarianism and use them to examine the morality of abortion, factory farming, and famine relief, among others. Students will learn how to make rational moral judgments.

Prerequisite: WRI 122 or WRI 227

PHIL 107, PHIL 207, PHIL 307, PHIL 407 Seminar

(Hours to be arranged each term.) H

PHIL 205 Introduction to Logic.

(F,W,S)(3-0-3) H

This course prepares students to critique and assess arguments according to the rules of logic. Students will learn formal and informal methods for assessing deductive, inductive, abductive arguments. Logic is useful for all majors because everything you learn at OIT is based on arguments.

PHIL 215 Ethical Theory

(W)(3-0-3) H

Students will become familiar with some plausible moral theories: Kant's moral theory, Aristotle's moral theory, Utilitarianism, The Social Contract, Feminist Ethics and with some more controversial moral theories: Cultural Relativism, Divine Command Theory, Natural Law Theory, Emotivism.

Prerequisite: WRI 122 or WRI 227

PHIL 305 Medical Ethics

(F)(3-0-3) H

Students will become familiar with Kant's moral theory and Utilitarianism and use them to examine the morality of abortion, paternalism, allocation of medical resources, and the right to die, among others. Students will learn how to make rational moral judgments.

Pre-requisites: WRI 122 and junior standing.

PHIL 315 The Ethics of Emerging Technology.

(F)(3-0-3) H

In this course we will become familiar with genetic engineering, geoenvironment and cognitive enhancement and examine the moral status of each. This course will provide you with the critical thinking skills to make rational ethical decisions concerning emerging technologies.

Prerequisite: WRI 122 or WRI 227

PHIL 325 Environmental Ethics.

(S)(3-0-3) H

Students will become familiar with influential moral theories, including those of Kant and Aristotle and Utilitarianism. Possible topics include: What is nature? Do we have a moral obligation to restore ecosystems? If we have moral obligations to nature, on what grounds?

Prerequisite: WRI 122 or WRI 227

PHIL 331 Ethics in the Professions

(F,W,S)(3-0-3) H

Applied ethics course that focuses on examining ethical issues common to the professions, such as privacy, confidentiality, social responsibility and whistle-blowing. Emphasizes critical thinking and ethical decision-making skills.

Prerequisite: WRI 123 or WRI 227.

PHIL 335 Philosophy of Science.

(W)(3-0-3) H

What is the difference between science and pseudoscience? What is a scientific explanation? What is a law of nature? Is science objective or value-laden? In this course, students will engage with these and other fundamental topics in philosophy of science.

Prerequisite: WRI 122 or WRI 227

PHIL 342 Business Ethics

(F,W,S)(3-0-3) H

Business ethics course that focuses on ethical issues commonly found in business, such as whistle-blowing, discrimination, finance and international manufacturing. Emphasizes critical thinking, critical reading and the importance of personal ethics.

Prerequisites: One previous Humanities course and WRI 122.

PHIL 405 Advanced Logic.

(W)(3-0-3) H

This course will build off the foundation of PHIL 205. Students will deepen their understanding of sentential logic and will learn about predicate logic. We will also prove that both formal systems are sound and complete.

Prerequisite: PHIL 205.

(PHY) Physics

PHY 107, PHY 207, PHY 307, PHY 407 Seminar

(Hours to be arranged each term.)

PHY 201 General Physics

(F)(3-3-4)

An introduction to physics with study of Newtonian mechanics, including kinematics, dynamics, work, energy, power, and hydraulics. All general physics students must register for a laboratory section.

Prerequisite: MATH 112 with grade "C" or better.

PHY 202 General Physics

(W)(3-3-4)

Temperature systems, heat, kinetic theory of gasses, introductory thermodynamics, and the fundamentals of electricity and magnetism. All general physics students must register for a laboratory section.

Prerequisite: PHY 201.

PHY 203 General Physics

(S)(3-3-4)

Wave motion, sound, introduction to geometrical and physical optics, and topics from modern physics. All general physics students must register for a laboratory section.

Prerequisite: PHY 202.

PHY 215 Topics in Astronomy

(F)(2-3-3)

Astronomy including a survey of the solar system, constellations, star characteristics, star groupings, galactic and extragalactic objects, stellar evolution, and instrumentation with emphasis on topics of maximum interest to the students.

Prerequisite: MATH 111.

PHY 217 Physics of Medical Imaging

(F,S)(3-0-3)

An introduction to physics for MIT majors. Topics include: basic mechanics, basic electrostatics, fundamentals of electronics, magnetism, sources and types of radiation, and image formation.

Prerequisite: MATH 112 with grade "C" or better.

PHY 221 General Physics with Calculus

(F,W)(3-3-4)

Basic principles of physics with emphasis on applications of calculus. Newtonian mechanics, including kinematics, dynamics, work, energy, power, and hydraulics. All general physics students must register for a laboratory section.

Prerequisite: MATH 251 with grade "C" or better.

Corequisite: MATH 252.

PHY 222 General Physics with Calculus

(W,S)(3-3-4)

Temperature systems, heat, kinetic theory of gasses, thermodynamics and the fundamentals of electricity and magnetism. All general physics students must register for a laboratory section.

Prerequisites: MATH 252, PHY 221.

PHY 223 General Physics with Calculus

(F,S)(3-3-4)

Wave motion, sound, introduction to geometrical and physical optics, and selected topics from modern physics. All general physics students must register for a laboratory section.

Prerequisite: PHY 222.

PHY 237 Meteorology

(2-3-3)

Principles of atmospheric structure and movement; horizontal and vertical motions; air masses; micrometeorology; atmospheric diffusion in relation to air pollution.

Prerequisite: PHY 202 or PHY 222.

PHY 305 Nanoscience and Nanotechnology

(F)(4-0-4)

Survey of chemical and physical phenomena as applied to nanoscale materials, including metal and semiconductor nanoparticles and carbon nanostructures. Discussion of major synthesis and characterization techniques. Biological and engineering applications of nanoscale materials.

Prerequisites: PHY222 or PHY223, and CHE202 or CHE222

PHY 311, PHY 312, PHY 313 Introduction to Modern Physics

(3-0-3)

An introduction to physics of the 20th century, including selected topics from atomic and nuclear physics and quantum theory with applications in science and industry.

Prerequisite: PHY 203 or PHY 223.

PHY 330 Electricity and Magnetism

(W)(3-0-3)

A study of electromagnetic phenomena leading to and using Maxwell's equations. Topics will include static fields in vacuum and in dielectric media, electric and magnetic potentials, and the energy density of electromagnetic fields.

Prerequisites: MATH 254N, PHY 222.

Corequisite: MATH 253N.

PHY 410 Mathematical Methods: Fourier Optics

(W)(3-0-3)

Linear systems, Fourier transforms, and their use in optics. Topics will include special functions, orthogonal expansions, Fourier series and transforms and spectra of functions, mathematical operators, convolution, autocorrelation, cross correlation, linear systems as filters, and signal processing.

Prerequisite: MATH 254N.

PHY 448 Geometric Optics

(W)(3-3-4)

Reflection and refraction at plane and curved surfaces; imaging properties of lenses; first-order Gaussian optics and thin-lens system layout; matrix optics; ray-tracing software; spherical and chromatic aberrations.

Prerequisite: PHY 223

PHY 449 Radiometry & Optical Detection

(F)(3-3-4)

Fundamentals of radiometry and photometry; detection of light using thermal and photon (photoemissive, photoconductive, and photovoltaic) methods; noise processes; blackbodies; charge transfer devices; spectroradiometry.

Prerequisite: PHY 223, EE 223

PHY 450 Physical Optics

(S)(3-3-4)

Spherical and planar waves; scalar diffraction theory; Fresnel and Fraunhofer diffraction and application to measurement; interference and interferometers; optical transfer functions; coherent optical systems and holography.

Prerequisite: PHY 223

PHY 451 Lasers

(F)(3-3-4)

Laser radiation properties, laser cavities, coherence, atomic spectra, pumping rate, power gain, threshold conditions, beam shape, mode structure; ion, molecular, solid-state, dye, semiconductor, and fiber lasers.

Prerequisites: EE 450 or PHY 450

PHY 452 Waveguides and Fiber Optics

(W)(3-3-4)

Light propagation in fibers and waveguides; termination, coupling, and splicing of fibers; fiber optic communication; optical time

domain reflectometry, fiber amplifiers, and fiber sensors.

Prerequisites: EE 450 or PHY 450

PHY 453 Optical Metrology

(S)(3-3-4)

Modern optical metrology with emphasis on non-destructive testing; Fourier optics; Moiré and polarization methods; classic and holographic interferometry; speckle techniques; fringe analysis.

Prerequisites: EE 450 or PHY 450

PHY 548 Geometric Optics

(F)(3-3-4)

Reflection and refraction at plane and curved surfaces; imaging properties of lenses; first-order Gaussian optics and thin-lens system layout; matrix optics; ray-tracing software; spherical and chromatic aberrations.

Prerequisite: PHY 223

PHY 549 Radiometry & Optical Detection

(W)(3-3-4)

Fundamentals of radiometry and photometry; detection of light using thermal and photon (photoemissive, photoconductive, and photovoltaic) methods; noise processes; blackbodies; charge transfer devices; spectroradiometry.

Prerequisite: PHY 223

PHY 550 Physical Optics

(S)(3-3-4)

Spherical and planar waves; scalar diffraction theory; Fresnel and Fraunhofer diffraction and application to measurement; interference and interferometers; optical transfer functions; coherent optical systems and holography.

Prerequisite: PHY 223

PHY 551 Lasers

(F)(3-3-4)

Laser radiation properties, laser cavities, coherence, atomic spectra, pumping rate, power gain, threshold conditions, beam shape, mode structure; ion, molecular, solid-state, dye, semiconductor, and fiber lasers.

Prerequisites: EE/PHY 450 or EE/PHY 550

PHY 552 Waveguides and Fiber Optics

(W)(3-3-4)

Light propagation in fibers and waveguides; termination, coupling, and splicing of fibers; fiber optic communication; optical time domain reflectometry, fiber amplifiers, and

fiber sensors.

Prerequisites: EE/PHY 450 or EE/PHY 550

PHY 553 Optical Metrology

(S)(3-3-4)

Modern optical metrology with emphasis on non-destructive testing; Fourier optics; Moiré and polarization methods; classic and holographic interferometry; speckle techniques; fringe analysis.

Prerequisites: EE/PHY 450 or EE/PHY 550

(PSCI) Political Science

PSCI 107, PSCI 207, PSCI 307, PSCI 407 Seminar

(Hours to be arranged each term.) SS

PSCI 201 United States Government

(W)(3-0-3) SS

Basic concepts and principles of the American political system.

PSCI 250 Introduction to World Politics

(E,S)(3-0-3) SS

Introduction to international relations and global issues. The rise and demise of the Cold War, international efforts towards arms control, and global environmental and economic problems.

Prerequisite: WRI 122.

PSCI 497 United States Foreign Policy

(S)(3-0-3) SS

The American foreign policy process, recurring themes in U.S. foreign policy, and the content of U.S. policy in such areas as Europe, Latin America, and the Middle East.

Prerequisite: PSCI 250.

(PSG) Polysomnographic Technology

PSG 107, PSG 207 Seminar

(Hours to be arranged each term.)

PSG 211 Fundamentals of PSG and Patient Care

(F,W,S)(3-0-3)

Basic concepts of patient care, including

consideration of physical and psychological needs of the patient and family. Routine and emergency patient care procedures. Infection control procedures utilizing universal precautions. Role of the polysomnographic technologist in patient education. Ethical and legal issues.

PSG 221 Physiology of Sleep

(F,W,S)(3-0-3)

Introduction to sleep architecture and the function of changes in electroencephalograms, electrocardiograms, and electromyograms. Physiology of sleep-induced alterations in pharyngeal muscle tone, autonomic control and polysomnographic staging.

PSG 231 Sleep Disorders Pathology

(W)(4-0-4)

Normal and abnormal sleep disorders integrating the physiological functions of the nervous, respiratory, and cardiovascular systems. Emphasis on basic sleep sciences, physiology, diagnosis and treatment of sleep disorders. Prerequisite: PSG 221.

PSG 246 Sleep Disorders in Women

(W)(3-0-3)

In-depth study of sleep disorders in women exploring: the menstrual cycle; circadian rhythms and shiftworking women; polycystic ovary syndrome; endometriosis, fibromyalgia; breast cancer and fatigue; pregnancy and sleep-disordered breathing; insomnia and other medically related sleep disturbances.

PSG 264 Pediatric/Neonatal Polysomnography

(F,S)(4-0-4)

Presentation of theory and its practical applications in pediatric and neonatal respiratory diseases and other sleep disorders. Includes pathophysiology, etiology, patient testing, scoring and treatment.

Prerequisite: PSG 221 or RPSGT licensed.

PSG 271A Clinical Polysomnographic Technology Part A

(F,S)(2-12-6)

Medical terminology, instrumentation setup and calibration, 10/20 system, patient hooks, recording and monitoring techniques, documentation, event recognition, monitoring, therapeutic intervention, professional issues and patient-technologist interactions related to polysomnographic technology. Part-time students only, requires 18 night-time clinical hours weekly.

Pre-or-corequisite: PSG 211.

PSG 271B Clinical Polysomnographic Technology Part B

(F,W,S)(2-12-6)

Medical terminology, instrumentation setup and calibration, 10/20 system, patient hook-ups, recording and monitoring techniques, documentation, event recognition, monitoring, therapeutic intervention, professional issues and patient-technologist interactions related to polysomnographic technology. Part-time students only, requires 18 night-time clinical hours weekly. Prerequisite: PSG 271A.

PSG 271C Clinical Polysomnographic Technology Part C

(W,S)(2-12-6)

Advanced aspects of polysomnographic technology including recognition of sleep disorders, recording and monitoring, therapeutic interventions, scoring, MSLT, RTSW and neurophysiology interpretation of sleep. Part-time students only, requires 18 daytime clinical hours weekly. Prerequisite: PSG 271B.

PSG 272 Clinical Polysomnographic Technology I

(F,W,S)(2-27-9)

Medical terminology, instrumentation setup and calibration, 10/20 system, patient hook-ups, recording and monitoring techniques, documentation, event recognition, monitoring, therapeutic intervention, professional issues and patient-technologist interactions related to polysomnographic technology. Requires 27 clinical hours weekly at night in the lab.

Pre- or corequisite: PSG 211.

PSG 273 Clinical Polysomnographic Technology II

(F,W,S)(2-27-9)

Advanced aspects of polysomnographic technology including recognition of sleep disorders, recording and monitoring, therapeutic interventions, scoring, Multiple Sleep Latency Test. Repeated Test of Sustained Wakefulness and neurophysiology interpretation of sleep. Requires 27 clinical hours weekly during the day and night. Prerequisite: PSG 272.

PSG 291 Clinical Sleep Educator (3-0-3)

Examination of the sleep technologist's increasing involvement in the identification, treatment and long term monitoring of patients presenting with insomnia, sleep apnea, and poor sleep hygiene. Review of the Clinical Sleep Educator certificate offered by the BRPT.

Prerequisite: PSG 221

(PSY) Psychology

PSY 107, PSY 207, PSY 307, PSY 407 Seminar

(Hours to be arranged each term.) SS

PSY 110 Human Services Careers

(S)(1-0-1) SS

Presentation and discussion of career options of psychology majors.

PSY 201 Psychology

(F,W,S)(3-0-3) SS

Introduction to the principles and applications of psychology. Topics include scientific methodology, learning, memory, cognition, and intelligence.

PSY 202 Psychology

(F,W)(3-0-3) SS

Introduction to the principles and applications of psychology. Topics include the brain and behavior, consciousness, sensation and perception, health psychology, motivation, and emotion.

PSY 203 Psychology

(W,S)(3-0-3) SS

Introduction to the principles and applications of psychology. Topics include social psychology, personality, abnormal psychology, psychotherapy, and development.

PSY 215 Abnormal Psychology I

(F)(3-0-3) SS

Overview of biological, psychological, and social causes of abnormal behavior. Specific topics include models, classification and assessment of abnormal behavior, as well as anxiety, somatoform, dissociative, personality, impulse, alcohol and substance abuse disorders.

Prerequisite: PSY 203 or instructor consent.

PSY 216 Abnormal Psychology II

(W,S)(3-0-3) SS

Overview of legal and ethical issues related to abnormal psychology. Techniques of group and individual therapy. Specific disorders include: sexual and gender identity, mood,

schizophrenia, cognitive, and childhood and adolescence.

Prerequisite: PSY 215 or instructor consent.

PSY 220 Community Psychology

(F,S)(3-0-3) SS

Provides a comprehensive understanding of community mental health, social ecology, and program planning/evaluation at the community level. Focuses on understanding community-based research and practice. Critical thinking regarding community and environmental factors and application of theory to solve community problems.

Prerequisite: PSY 203.

PSY 225 Applied Statistics for the Social Sciences

(W)(4-0-4) SS

Provides an overview of basic statistical techniques in social sciences, including t-test, chi-square, ANOVA, correlation, and regression. Students will engage in hands-on experience analyzing, interpreting, and reporting data. Students will develop skills applying basic statistical tests to answer research questions. Prerequisite: MATH 100 or instructor's approval

PSY 301 Basic Counseling Techniques

(F,S)(3-3-4) SS

Basic counseling and interpersonal skills, including reflective listening, expressing empathy, questioning, and confrontation are taught. Complex skills such as goal setting, documentation, suicide/ homicide crisis intervention, and handling client noncompliance. Laboratory employs CD-ROM and role-play formats.

Prerequisite: PSY 216.

PSY 308 Psychology of Eating

(F,S)(3-0-3) SS

Exploration of eating behavior. Psychological, social, and physiological factors will be examined. Application of empirical data to real world experiences. Typical, healthy, and disordered eating behaviors will be considered.

PSY 311 Human Growth and Development I

(F,W,S)(3-0-3) SS

A biosocial study of human development from conception through middle childhood. Discusses the biological, psychological, and social processes affecting the developing child. Applications to health care, family,

community, and education are discussed.

Prerequisite: PSY 201, 202 or 203

PSY 312 Human Growth and Development II

(W,S)(3-0-3) SS

The psychological study of the continuing development of the human being from adolescence through old age and death. Discusses the biological, psychological, and social processes relevant to this developmental time span. Applications to health care, family, community and education are discussed.

Prerequisite: PSY 201, 202, or 203

PSY 313 Psychological Research Methods I

(F,S)(3-3-4) SS

Overview of the techniques of research in psychology. Emphasis is placed on techniques of quantitative research, including experimental, quasi-experimental, field, and survey research methods. Students are engaged in developing an APA research proposal based on current psychological literature.

Prerequisites: PSY 203 and one of the following: PSY 225, MATH 243 or MATH 361, with a "C" or better.

PSY 314 Psychological Research Methods II

(W)(3-3-4) SS

An in-depth look at advanced research methodology, including complex research design. Students gain experience with research projects by collecting data, analyzing, writing an APA style manuscript, and presenting a conference-style poster.

Prerequisite: PSY 313.

PSY 317 Field and Career Preparation

(F,W,S)(3-0-3) SS

Exploration of careers related to the field of psychology. Processes and skills needed for career search and placement. Externship process and opportunities will be discussed.

PSY 321 Theories of Personality I

(F)(3-0-3)

In-depth coverage of personality theorists/theories, such as Freud, Adler, Horney, Erikson, and the Five Factor Theory. Applications of various theoretical concepts to case studies and to people in their personal lives.

Prerequisite: PSY 201, 202, or 203

PSY 322 Theories of Personality

(W)(3-0-3) SS

In-depth coverage of personality theorists/theories such as Maslow, Skinner, Rogers, Bandura, Sociological, and Cultural. Applications of various theoretical concepts to case studies and to people in their personal lives.

Prerequisite: PSY 201, PSY 202 or PSY 203.

PSY 330 Social Psychology I

(F,W)(3-0-3) SS

Surveys behavior and experience in a social context. Topics include the self in the social world, attribution, social cognition, affiliation and romantic relationships. Theory, research and application discussed.

Prerequisite: PSY 201 or PSY 203.

PSY 331 Social Psychology II

(W,S)(3-0-3) SS

Surveys behavior and experience in a social context. Topics include social influence, attitudes and persuasion, aggression, group dynamics, altruism and stereotyping/prejudice/discrimination. Theory, research and application discussed.

Prerequisite: PSY 201 or 203

PSY 334 Behavior Modification I

(F)(3-3-4) SS

Measurement of behavior and key concepts of operant learning are covered, e.g., reinforcement, extinction, punishment, stimulus control and shaping, among others. Laboratory exercises are interactive computer simulations of these concepts. First in five course sequence approved by The Behavior Analyst Certification Board, Inc.® as meeting the coursework requirements for eligibility to take the Board Certified Behavior Assistant Analyst Examination®. Applicants will have to meet additional requirements to qualify.

Prerequisite: PSY 203

PSY 335 Behavior Modification II

(W)(3-3-4) SS

Principles learned in PSY 334 are applied to the study of human behavior. Complex techniques and new learning concepts found in the "real world" are also covered. Treatment plans for actual human problem behaviors are created in the laboratory. Second in five course sequence approved by The Behavior Analyst Certification Board, Inc.® as meeting the coursework requirements for eligibility to take the Board Certified Behavior Assistant Analyst Examination®. Applicants will have to meet additional requirements to qualify.

Prerequisite: PSY 334

PSY 336 Health Psychology I

(F)(3-0-3) SS

The application of psychological theories to the understanding of the relationship between health, the environment, and behavior. This course focuses on the mind-body connection, stress, realities of healthcare delivery, health behavior change models, and research methods in health psychology.

Prerequisite: PSY202 or instructor approval

PSY 337 Health Psychology II

(W)(3-0-3) SS

The application of psychological theories to understand relationships between health, the environment, and behavior. Focuses on prevention of disease/negative health behaviors, and promotion of health and well-being. Topics include substance abuse, nutrition, exercise, chronic illness, sex, and the built environment.

Prerequisite: PSY 336.

PSY 339 Biopsychology

(F,W)(3-0-3) SS

Anatomical and physiological basis of behavior patterns presented from genetic, developmental, evolutionary and functional evidence. Discussions of mind-body relationships, senses, sleep, motor activity, emotions, and reproduction.

Prerequisite: PSY 202 or BIO 232 or instructor consent.

PSY 341 Psychoactive Drugs I: Psychiatric Drugs

(W)(3-0-3) SS

Students will investigate the physiological, behavioral, social, and societal aspects of psychiatric drugs, including anti-anxiety, anti-depressant, and anti-psychotic drugs.

Prerequisite: PSY 202

Pre- or corequisite: PSY 216

PSY 342 Psychoactive Drugs II: Abused Drugs

(S)(3-0-3) SS

Students will investigate the physiological, behavioral, social, and societal effects of abused drugs including alcohol, hallucinogens, marijuana, opiates, and stimulants.

Prerequisite: PSY 341 or PSY 202 and instructor approval.

PSY 345, Educational Psychology I

(W,S)(3-0-3) SS

Introduction to psychological concepts, theories, and methodologies as applied to education. Focus will be on

the major psychological views of learning and how these can be applied to create effective strategies and environments for teaching and learning.
Prerequisite: PSY 201, 202 or 203.

PSY 346, Educational Psychology II
(S)(3-0-3) SS

Exploration of psychological principles and theories of teaching and learning. Focus will be on learner motivation, differences, needs, culture, and diversity. How to shape supportive learning environments and form comprehensive teaching will be considered, as will assessment of learning.
Prerequisite: PSY 201, 202 or 203

PSY 347 Organizational Behavior
(F,W,S)(3-0-3) SS

Psychology applied to business organization and operations as they affect employees, customers, and the community with particular interest on group processes.
Prerequisite: Junior standing or instructor consent.

PSY 351 Cognitive Restructuring I
(W)(3-3-4) SS

Philosophy behind criminal thinking errors, which influence their thought patterns. Laboratory component includes participation in client groups and casework.
Prerequisite: PSY 301 or PSY 334.

PSY 355 Evolutionary Psychology
(S)(3-0-3) SS

Examination of biological determinants underlying human behavior. Discusses family relations, aggression, crime, mating and other social aspects with regard to adaptation and fitness.
Prerequisite: BIO 103, or BIO 213, or PSY 203, or instructor consent.

PSY 356 Military Psychology
(Su)(3-0-3) SS

Examination of the mental health and environmental issues facing current and former service members and Their families by exploring military culture, theory, assessment, and evidence based interventions.
Prerequisite: PSY 201, 202, or 203.

PSY 358 Psychology of Gender
(S)(3-0-3) SS

Psychological examination of the functioning, specialization, self-concept, and roles

of women and men. Issues that women and men face in the gendered world are critically analyzed scientifically and experientially.
Prerequisite: PSY 201, PSY 202, or PSY 203.

PSY 360 Organizational Psychology
(F)(3-0-3) SS

Psychology applied to human relations problems in the work world. Specific topics include job satisfaction, motivation, leadership, attitudes and effects of stress on employees and job performance.
Prerequisite: PSY 201.

PSY 361 Industrial Psychology
(W)(3-0-3) SS

Application of psychological principles, theories and behavioral techniques applied to human relations, problems in industrial situations.
Prerequisite: PSY 201, PSY 202 or PSY 203.

PSY 364 Environmental Psychology
(S)(3-0-3) SS

An interdisciplinary look into the human-environment interaction in regards to sustainability, conservation, and the natural and built environments. Students will apply psychological theory to understand the role of human behavior, attitudes, policy, and ethics in sustainability and conservation efforts.
Prerequisite: PSY 201.

PSY 371 Human Sexuality I
(W)(3-0-3) SS

Social, cultural, psychological and physiological influences on human sexuality are examined. Topics include: theory and research, gender, anatomy and functioning, and human relationship components, including love and communication.
Prerequisite: PSY 201, PSY 202, or PSY 203.

PSY 372 Human Sexuality II
(S)(3-0-3) SS

Social, cultural, psychological and physiological influences on human sexuality are examined. Topics include: sexual orientation, pregnancy, contraceptive practices, sexual dysfunctions, sexually transmitted infections, paraphilias, sexual assault, media images, the sale of sex.
Pre- or corequisite: PSY 371.

PSY 375 Organizational Behavior Management
(S)(3-0-3) SS

Introduction to research and practice in Organizational Behavior Management (OBM).

Topics include performance management, behavioral systems analysis, process mapping, scientific research in organizational change, and career options for organizational consultants.
Prerequisite: PSY 201

PSY 376 Foundations of Sport Psychology
(Su)(3-0-3) SS

Introduction to the foundations of psychology in the sport and physical activity domain. Focus will be on current theories, empirical research, and practices in the field of sport and exercise psychology.
Prerequisite: PSY 201, 202, or 203.

PSY 401 Advanced Counseling Techniques
(W)(3-3-4) SS

Major schools of psychotherapy are discussed. Students practice related techniques in the laboratory following demonstration and instruction. Group therapy techniques are emphasized with associated laboratory work using interactive CDROM, group therapy videotapes, and a Web site corresponding to readings.
Prerequisite: PSY 301.

PSY 410 Organizational Change and Development
(F,W,S)(3-0-3) SS

Theories and processes necessary to understand and implement change within organizations. Focuses on impact of technological change in organizations and on skill development in planning, implementing and evaluating change.

PSY 416 Abnormal Behavior of Children and Adolescents
(S)(3-0-3) SS

Highlights differences between children and adults in their expression of emotional and interpersonal problems. Language/learning disabilities, problems of attention deficit, school refusal and separation anxiety, depression, and eating. Description of symptoms and treatments are emphasized.
Prerequisites: PSY 215, PSY 216, PSY 311, PSY 312.

PSY 420 Applied Psychology Externship
(F,W,Su)(4, 8, 12 or 16 credit hours) SS

Opportunities to work under supervision in applied settings related to students' career interests. Students apply the knowledge they

acquired in their classes and gain experience working in the field.

Prerequisites: PSY 301 with grade "C" or better and PSY 317 with grade "B" or better. Approval of the externship coordinator and completion of at least 120 hours of college credit.

PSY 421 Senior Project I

(F)(1-6-3) SS

First term of a three-term comprehensive project in applied psychology. Focus on refining a research project, literature review and formulation of research question.

Prerequisite: PSY 313.

PSY 422 Senior Project II

(W)(1-6-3) SS

Second term of a three-term comprehensive project in applied psychology. Focus on development of research methodology and pilot testing of project.

Prerequisite: PSY 421.

PSY 423 Senior Project III

(S)(1-6-3) SS

Third term of a three-term comprehensive project in applied psychology. Focus on data collection, writing of research report and oral presentation of project.

Prerequisite: PSY 422.

PSY 425 Motivational Interviewing

(F)(3-0-3) SS

Motivational interviewing is a highly effective (evidence based) approach to enhance behavior change in psychotherapy, substance abuse counseling, dentistry, education, various medical professions and business. This course will overview the theory, process, skills and implementation of motivational interviewing.

Prerequisites: PSY 301 or instructor consent.

PSY 428 Animal Behavior

(S)(3-0-3) SS

The biological foundations of animal behavior are presented from an ethological and comparative psychology perspective. Emphasizes the evolution, development, and physiological basis of behavior patterns and presents topics on learning, perception, orientation, communication, and social behavior. (Cannot be taken for graduation credit by students who have taken BIO 428.)

Prerequisite: PSY 202 or BIO 213.

PSY 431 Family Therapy

(3-0-3) SS

Basic differences between functional and

dysfunctional families. Theoretical underpinnings of family therapy, an emphasis on particular theoretical models, different family populations including single parent families, blended families and culturally diverse families.

Prerequisite: PSY 301.

PSY 432 Group Therapy

(3-3-4) SS

Theory and application of group therapy techniques. Historical and current applications of group treatment, special populations and multicultural considerations.

Prerequisite: PSY 301.

PSY 434 Advanced Behavior

Modification I

(W)(4-0-4) SS

Ethical principles and issues in Applied Behavior Analysis and behavioral assessment methods and techniques, including measuring behavior and analyzing data. Third in five course sequence approved by The Behavior Analyst Certification Board, Inc.® as meeting the coursework requirements for eligibility to take the Board Certified Behavior Assistant Analyst Examination®. Applicants will have to meet additional requirements to qualify.

Prerequisite: PSY 313.

Pre- or corequisite: PSY 335.

PSY 435 Advanced Behavior

Modification II

(S)(4-0-4) SS

Application of principles and techniques of Applied Behavior Analysis to change behavior. Fourth in five course sequence approved by The Behavior Analyst Certification Board, Inc.® as meeting the coursework requirements for eligibility to take the Board Certified Behavior Assistant Analyst Examination®. Applicants will have to meet additional requirements to qualify.

Prerequisite: PSY 434.

PSY 441 Youth Mentorship I

(F)(2-3-3) SS

Applied learning experience working with youth. Enrolled students are engaged as mentors for youth, utilizing skills in guiding social, academic, emotional, and cognitive development. May be repeated for credit.

Prerequisite: Instructor approval required

PSY 442 Youth Mentorship II

(W)(2-3-3) SS

Applied learning experience working with youth; continuation from PSY 441. Enrolled

students are engaged as mentors for youth, utilizing skills in guiding social, academic, emotional, and cognitive development. May be repeated for credit.

Prerequisites: PSY 441 and Instructor approval required

PSY 443 Youth Mentorship III

(S)(2-3-3) SS

Applied learning experience working with youth; continuation from PSY 442. Enrolled students are engaged as mentors for youth, utilizing skills in guiding social, academic, emotional, and cognitive development. May be repeated for credit.

Prerequisites: PSY 442 and Instructor approval required

PSY 445 Oregon Tech Relationship Building Program

(F,W,S)(variable 1-3) SS

This course will provide an orientation to and ongoing training for family mentors in the Oregon Tech Relationship Building Program. Program related projects will be assigned based on number of credits (1-3) selected. This course can be repeated for credit.

Prerequisite: PSY 301 or instructor permission

PSY 446 Psychological Trauma

(F)(3-0-3) SS

Explores and introduces student to psychologically traumatic experiences in terms of definition, impact and reactions, including assessment and treatment of trauma-related psychological problems. Special focus on post-traumatic stress disorder.

Prerequisites: PSY 301.

PSY 455 Cognitive Psychology

(F)(3-0-3) SS

The scientific study of mental process and how the mind works (or fails to work). Topics include memory, knowing, decision-making, attention, morality, and theories of mind. Students will debate current topics in the field and learn practical applications for cognitive research.

Prerequisite: PSY 201

PSY 456 Performance Management

(S)(3-0-3) SS

Application of principles and techniques of Applied Behavior Analysis to change behavior, focus on implementation, management, and supervision of behavior change programs and systems in business, industry, and human services. Fifth in five course sequence ap-

proved by The Behavior Analyst Certification Board, Inc.® as meeting the coursework requirements for eligibility to take the Board

Certified Behavior Assistant Analyst Examination®. Applicants will have to meet additional requirements to qualify.

Prerequisite: PSY 434

PSY 475 Capstone in Applied Psychology

(F,W,S)(3-0-3) SS

Provides students the opportunity to synthesize material learned throughout the degree program, create innovative projects, and evaluate new ideas related to higher level topics in applied psychology. Topics vary by term. May be repeated for credit.

Prerequisite: Senior standing or instructor approval

PSY 480 Theories of Learning

(S)(4-0-4) SS

The basics of the major learning theories as they apply to operant and respondent conditioning, social learning, and memory.

Prerequisite: PSY 335.

PSY 485, Education Assistantship

(F,W,S)(3-0-3) SS

Hands on exploration of educational functions with a wide range of possible ages and abilities; will involve tutoring and mentoring with additional specific duties dependent on the goals of each student. May be repeated for credit.

Prerequisite: Requires Instructor Approval

PSY 497 Special Projects/Training

(F,W,S)(Variable Credit 1 - 6) SS

Students may enroll for credit in special programs offered by external agencies, approved by the department, leading to the development of specialized skills. Programs may include training to work with special populations. May be taken twice for credit.

Prerequisite: Senior standing in Applied Psychology and permission of HSS department chair.

PSY 499 Independent Study

(Variable Credit 1-6) SS

Intensive self-study of a topic in psychology of the student's choosing. Study guided by any professor in the Applied Psychology program. May be repeated, with different topics, up to three times.

Prerequisite: Senior standing in Applied

Psychology and permission of HSS department chair.

PSY 500 Life Span Development

(F)(3-0-3)

Study of principles of human development with emphasis on the contributions of biological, social, psychological, and multicultural influences as applied to an understanding of cognitive, emotional, social, and physical development across the lifespan.

PSY 505 Law, Ethics & Professional Development

(F)(3-0-3)

Examines all aspects of therapy that involve statutes, regulations, principles, values and ethics of Marriage and Family Therapists with a special emphasis on the legal and ethical considerations of marriage and family therapy.

PSY 512 Systems Theory

(W)(3-0-3)

In-depth analysis of Systems Theory in family dynamics. Emphasis placed on structural, strategic, and solution focused applications to counseling.

PSY 513 Couples Theory

(S)(3-0-3)

Overview of the fundamental theoretical foundations of couples therapy, including systemic, communication, interactional theories of behavior as it relates to couples.

Prerequisite: PSY 512

PSY 521 Individual Counseling Techniques

(S)(3-0-3)

Evidence-based counseling interventions including theory and application from the primary schools of psychotherapy including cognitive-behavioral, systems theory, and humanistic.

Prerequisite: PSY 505

PSY 522 Individual Counseling Techniques II

(F)(3-0-3)

Advanced evidence-based counseling interventions including application of interventions from the primary schools of psychotherapy including cognitive-behavioral, systems theory, and humanistic.

Prerequisite: PSY 521

PSY 525 Family Therapy I

(F)(3-0-3)

Examines theories and techniques of family

therapy including various models of family therapy. This course will offer opportunities for practice of the techniques through role playing and review of therapy sessions.

Prerequisite: PSY 512

PSY 526 Couples Therapy

(F)(3-0-3)

Examines issues related to therapeutic theories and treatment strategies with couples, including marriage, partnership, divorce, parenting and remarriage.

Prerequisite: PSY 513

PSY 530 Research Methods

(W)(3-3-4)

Fundamentals of methods for conducting research including experimental designs and non-experimental designs. Includes program evaluation, clinical studies, ethics, and statistical analysis. Emphasis on ability to critically evaluate research studies and provide a foundation for conducting research.

Prerequisite: Undergraduate statistics class with a C or better

PSY 535 Treating Diverse Populations

(W)(3-0-3)

Examines the cultural context of relationships, issues, trends in a diverse society, including culture, ethnicity, nationality, age, gender, sexual orientation, spirituality, religion, larger system and social context. Strengths and limitations of models of treatment as they relate to a different cultural, economic and ethnic groups.

Prerequisite: PSY 505

PSY 565 Group Counseling

(W)(3-0-3)

Theoretical understanding of group dynamics and group process. Evidenced based group interventions for psychoeducational and process groups.

Prerequisite: PSY 522

PSY 566 Child & Adolescent Therapy

(S)(3-0-3)

Specific emphasis on treatment of children and adolescents. Course materials will cover a variety of childhood disorders and evidence-based interventions including individual and family interventions.

Prerequisites: PSY 500, PSY 521

PSY 575 Treatment of Substance Abuse

(S)(3-0-3)

Overview of assessment and treatment of substance disorders including cognitive behavioral, group and family interventions.

Prerequisite: PSY 521

PSY 598 Practicum

(S)(4-0-4)

Supervised practical experience across one practicum experience utilizing role playing, co-therapy and videotaping.

Prerequisite: Approval of internship coordinator

PSY 599 Internship

(F,W,S)(8)

Supervised practical experience across 3 terms for a total of 700 hours in preparation for supervised practice, 280 of direct client contact and the remaining hours in supervisory and training activities and administrative duties related to the profession.

Prerequisite: Approval of internship coordinator

(RCP) Respiratory Care Program**RCP 100 Matriculation**

(F)(2-0-2)

A study into the evidence-based and political pressures driving new developments in respiratory care. Considerations and planning for the students emerging role in health care. Online version tailored to degree completion students.

Prerequisite: None

RCP 107, RCP 207, RCP 307, RCP 407 Seminar

(Hours to be arranged each term.)

RCP 120 Interventions in Gas Exchange

(F,W,S)(4-0-4)

An introduction to the effects of ineffective breathing on carbon dioxide removal and oxygen delivery. Basic pulmonary mechanics are described. The vascular effects of hypoxemia are fully explored. Oxygen therapy and Continuous Positive Airway Pressure are introduced.

RCP 221 Introduction to Patient Assessment

(S)(0-3-1)

Acquisition and interpretation of the patient history, physical examination, auscultation, vital signs, laboratory data including arterial blood gases and dysrhythmia recognition. Collaborative activities include the acquisition, analysis and communication of findings.

Prerequisite: RCP 236.

RCP 223 Emergent Chest Radiographic Interpretation

(S)(2-0-2)

The evaluation of the chest radiograph in the intensive care setting. Students learn to identify structures and fissures as well as the significance of silhouette sign, blunted costophrenic angles, air bronchograms and hyperlucency. The identification of pneumothorax, infiltrates, and the correct placement of tubes is required.

Prerequisite: RCP 236.

RCP 231 Pulmonary Physiology

(F)(3-3-4)

Pulmonary physiology including mechanics of ventilation, gas diffusion, acid-base regulation, oxygenation, and the physiologic advantage of structure. Gas laws and surface tension as applied to the understanding of clinical problems.

Prerequisite: BIO 233.

RCP 235 Arterial Blood Gases

(F)(3-0-3)

Chemistry and classification of acid-base balance including determination of compensation and pathophysiologic causes. Assessment of partial pressures of oxygen, saturation and total oxygen delivery.

Prerequisite: Acceptance into Respiratory Care Program or instructor consent.

RCP 236 Cardiopulmonary Dynamics

(W)(2-3-3)

Exploration of pulmonary mechanics as measured by spirometry. Cardiovascular hemodynamics including cardiac electrophysiology, rhythm recognition and the measurement and interpretation of Systemic Vascular Resistance and Pulmonary Vascular Resistance, Central Venous Pressures, Pulmonary Artery and Pulmonary Capillary Wedge Pressures.

Prerequisite: Acceptance into Respiratory Care Program or instructor consent.

RCP 241 Respiratory Gas Therapeutics

(W)(3-3-4)

Physical and chemical applications of medical gases and humidity therapy to patient care. The transportation, regulation and dissemination of compressed gases. Clinical decision-making strategies for Oxygen titration.

Prerequisite: Admission to Respiratory Care Program.

RCP 252 Cardiopulmonary Pharmacology

(S)(4-0-4)

A study of the administration, pharmacokinetics, administration and actions of medications. Emphasis is placed on bronchodilators, steroids, mukolytics and antileukotriene agents. Vasoactive, antiarrhythmics, diuretics, sedatives, antimicrobials and neuromuscular blocking agents are introduced.

Prerequisite: CHE 360.

RCP 326 Disaster Preparedness

(F,W,S)(2-0-2)

Preparation for unusual biological disasters. Case-based study of ebola, anthrax, SARS, influenza, bird flue, tuberculosis, emergency room violence and unrest, evacuation and loss of services caused by earthquakes, hurricanes, floods and fire.

Prerequisite: RCP 235

RCP 335 Exercise Physiology and Education

(F)(2-0-2)

Introduction to the physiology of exercise, exercise in disease and health and stress testing. Concepts of age appropriate pulmonary rehabilitation and asthma education are described.

Prerequisite: RCP 235.

RCP 336 Hyperinflation Therapies

(F,S)(1-3-2)

Study and evidence-based application of PEEP, CPAP, bi-level ventilation, IPPB, and incentive spirometry. Flutter valve, PEP, high frequency chest wall oscillation and other methods of improving bronchial hygiene and lung volume.

Prerequisite: RCP 241.

RCP 337 Pulmonary Pathology

(F)(4-0-4)

Case-based approach to the understanding, evaluation and treatment of pulmonary disease. Recognition of obstructive and restrictive disease patterns as well as the

classification of acid-base and oxygenation disorders. Classification, application and pharmacodynamics of common pulmonary medications are discussed.
Prerequisite: RCP 235.

RCP 345 Cardiopulmonary Diagnosis and Monitoring

(W)(2-3-3)

Collaborative investigation, practice, calibration and interpretation of spirometry, body plethysmography, diffusion capacity, helium dilution, seven minute nitrogen washout, cardiopulmonary stress testing, 12 lead ECG acquisition, dysrhythmia recognition, arterial blood gas instrumentation.
Prerequisite: RCP 337.

RCP 350 Introduction to Clinical

(S)(1-24-9)

Orientation to clinical practice in hospitals. Requires successful criminal background check, drug screening, completion of training in computer charting and compliance with Health Insurance Portability and Accounting Act (HIPAA). Competence developed in the area of basic patient assessment, oxygen therapy, aerosol therapy and mechanical ventilation.

Prerequisite: RCP 241.

RCP 351 Mechanical Ventilation I

(F)(3-3-4)

Study of an array of artificial airways. Includes laboratory practice in intubation, endotracheal suctioning and bag-mask-valve ventilation. Study and practice of mechanical ventilation circuits, classes of mechanical ventilators and modes.

Prerequisite: RCP 235.

RCP 352 Mechanical Ventilation II

(W,S)(3-3-4)

Description and analysis of the adult patient-mechanical ventilator system including the initiation, assessment, management and discontinuance.

Prerequisite: RCP 351.

RCP 353 Mechanical Ventilation III

(S)(3-3-4)

Advanced topics in mechanical ventilation including transport, dual modes, neonatal and pediatric mechanical ventilation.

Prerequisite: RCP 352.

RCP 366 Clinical Simulation

(S)(3-0-3)

The practice and measurement of critical

thinking in the context of computer branching logic simulations. Students use organized sequential topical examinations to review and measure retention of respiratory care content. Passage of secure national review examination required.

Prerequisite: RCP 337.

RCP 386 Critical Care I

(S)(4-0-4)

Analysis and application of critical care techniques with an emphasis in cardiovascular management and assessment. Cardiovascular catheters and hemodynamics, advanced rhythm recognition, and the essentials of advanced cardiac life support.

Prerequisite: RCP 337.

RCP 387 Critical Care II

(F,W)(2-0-2)

Advanced techniques during intubation. Assessment of the difficult airway including Mallampatti classification and thyromental distance. Continued practice and an extension of hemodynamic, pharmacology and imaging knowledge. Students practice anticipating care based on nutritional status.

Prerequisite: RCP 241.

RCP 388 Advanced Neonatal Respiratory Care

(F)(3-3-4)

Survey of perinatal physiology with an emphasis on mechanical ventilation, the application of oxygen, medications, positive pressure, resuscitative efforts and evaluations as applied to the neonatal and pediatric patients. Instruction in neonatal resuscitation meets the standards established by the American Academy of Pediatrics.

Prerequisite: RCP 241.

RCP 389 International Neonatology

(3-3-4)

Advanced topics in neonatal and pediatric respiratory care including transport, stabilization and care in resource limited international settings.

Prerequisite: RCP 241.

RCP 440 Case Management I

(F,W,S)(3-0-3)

Current clinical cases used as the basis for scholarly research and discussion. Students design a research-based senior project in the field of respiratory care, including interviews, research, literature review and formal presentation.

Prerequisite: Completion of all academic

coursework in the Respiratory Care Program prior to the senior year.

RCP 441 Case Management II

(F,W,S)(3-0-3)

Current clinical cases used as the basis for scholarly research and discussion. Students continue work on senior project in the field of respiratory care, including interviews, research, literature review and formal presentation. Prerequisite: RCP 440.

RCP 442 Case Management III

(F,W,S)(3-0-3)

Current clinical cases used as the basis for scholarly research and discussion. Students complete work on senior project in the fields of respiratory care, including formal presentation of the project.

Prerequisite: RCP 441.

RCP 450, RCP 451, RCP 452 Clinical Care I, II, III

(450-Su)(1-24-9)(451-F,W)(1-24-9)(452-W)(0-36-12)

Continued development of respiratory care skills, mechanical ventilation and neonatal intensive care, expanded functions and observations in specialty areas.

Prerequisite: RCP 450 for RCP 451, RCP 451 for RCP 452.

RCP 460 Advanced Life Support

(S)(0-6-2)

Students become certified or recertified in professional life support classes such as Basic Life Support, Advanced Cardiac Life Support, Neonatal Life Support, Pediatric Life Support. Clinical simulations and other credentialing exam preparation included.

Prerequisite: RCP 252

RCP 486 Extreme Physiology

(F,W)(2-0-2)

Physiologic adaptations to gas exchange and transport which occurs during the challenges of neonatal transition, exercise, high altitude and high-pressure environments.

Prerequisite: RRT credential and admission to degree completion program.

RCP 487 Expert Mechanical Ventilation

(F,W,S)(2-0-2)

Recognition of levels of quality in mechanical ventilation. Practicing clinicians balance experience with current evidence-based recommendations for mechanical ventilation in order to develop a hierarchy of quality care.

Includes selection of new modes, patient-ventilator synchrony, the reduction of medical errors and ventilator associated pneumonia. Prerequisite: RRT credential and admission to degree completion program.

RCP 488 Respiratory Care Innovations

(F,S)(2-0-2)

Exploration of new opportunities to improve access to respiratory care. Reduction of disease through the expansion of respiratory care. Student projects focused on networking among students and faculty and across institutional, professional and nonprofit lines to implement improvements in health and education.

Prerequisite: RRT credential and admission to degree completion program.

(RDSC) Radiologic Science

RDSC 105 Radiation Protection and Radiographic Quality Control

(S)(3-0-3)

Principles of radiation protection and radiographic quality control for veterinary x-ray operators in accordance with Oregon Administrative Rules. Students majoring in Radiologic Science are not eligible.

RDSC 107, RDSC 207, RDSC 307, RDSC 407 Seminar

(Hours to be arranged each term.)

RDSC 201 Imaging Techniques I

(F)(3-3-4)

Demonstration and practice with the phenomena and causes of image formation and visualization. The context includes studies of effects of technique-factor changes, effects of the use of various accessories and effects of chemicals in film processing. Causes of radiographic artifacts are discussed and explored. Includes the study of interactions of radiation and matter.

Prerequisite: MIT 103 with grade "C" or better.

RDSC 202 Imaging Techniques II

(W)(3-3-4)

Radiographic principles and principles of radiographic quality. Study of theory and practice in methods of protection against ionizing radiation.

Prerequisite: RDSC 201 with grade "C" or better.

RDSC 205 Patient Care

(W)(3-3-4)

Basic concepts of patient care, including consideration of physical and psychological needs of the patient and family. Routine and emergency patient care procedures. Infection control procedures utilizing Universal Precautions. Role of the radiographer in patient education.

Prerequisite: MIT 103.

RDSC 210 Radiographic Positioning I

(W)(3-3-4)

Demonstration and practice of the routine and special radiographic positions of bones of the upper and lower extremities excluding the shoulder and pelvic girdles.

Prerequisites: RDSC 201 and RDSC 235 with grade "C" or better.

RDSC 211 Radiographic Positioning II

(S)(3-3-4)

Demonstration and practice of routine and special radiographic positions of the axial skeleton, shoulder, and pelvic girdles.

Prerequisites: RDSC 202, RDSC 210, and RDSC 235 with grade "C" or better.

RDSC 233 Contrast Media Procedures

(S)(3-3-4)

Routine radiographic examinations of the urinary system, gastrointestinal biliary system, respiratory system, and nervous system, using various contrast medias and filming techniques. All radiographically significant anatomy, physiology, pathology, terminology, and topography, including all contrast studies of these systems.

Prerequisites: RDSC 202, RDSC 210, RDSC 235 with grade "C" or better.

RDSC 235 Equipment Operation and Maintenance

(F)(3-0-3)

Basic components and operation of radiographic, fluoroscopic, and mobile units. Evaluation, calibration, and maintenance of radiographic equipment and accessories.

RDSC 272 Radiation Protection

(S)(3-0-3)

Basic properties, sources, units of measurement, dosimetry, and biological effects of radiation. Methods of personnel protection and minimizing patient exposure. NCRP

recommendations for protective devices and personnel monitoring.

Prerequisites: RDSC 201 and RDSC 235 with grade "C" or better.

RDSC 301 Radiographic Positioning III

(F)(3-3-4)

Demonstration and practice of routine and special radiographic positions of the skull, facial bones, and paranasal sinuses.

Prerequisites: RDSC 211 and RDSC 233 with grade "C" or better.

RDSC 320 Surgical, Trauma and Mobile Radiography

(F)(3-3-4)

Routine radiographic examinations of the reproductive, muscular, nervous, skeletal and circulatory systems. Also including emergency and surgical procedures, using various contrast media and filming techniques. The comprehensive study of all radiographically significant anatomy, physiology, pathology, terminology, and topography including all contrast studies of these systems. Control of microorganism by physical and chemical means is incorporated as necessary.

RDSC 326 Cardiovascular/Interventional Technology

(S)(3-3-4)

Demonstration and practice of special radiographic examinations of nervous and vascular systems including use of serial film changers and pressure injectors, and other necessary equipment. Also includes related nursing procedures.

Prerequisites: RDSC 211, RDSC 233, and RDSC 320 with grade "C" or better.

RDSC 350 Bones: The Interactive Anatomy and Position Course

(F,W)(2-0-2)

A sequential review of osteology and positioning designed for the medical imaging student who has completed the positioning sequence, or the graduate seeking continuing education credit.

Prerequisites: RDSC 210, RDSC 211, RDSC 301, or Registered Radiologic Technologist.

RDSC 354 Mammography

(S)(3-3-4)

An in-depth analysis of mammographic positioning, exposure techniques, quality control, film critiquing, and radiation safety. Includes mock registry exam.

Prerequisite: RDSC 301.

RDSC 355 Computed Tomography

(F)(3-3-4)

X-ray physics, scanner components, and data acquisition of computed tomography. Image reconstruction, manipulation, and artifacts. CT patient care and imaging procedures of the head, neck, spine, chest, abdomen, pelvis, and musculoskeletal system. Laboratory simulation is included.

Prerequisite: BIO 335.

RDSC 356 Magnetic Resonance

(W)(3-3-4)

Physics and principles used in the production of magnetic resonance images and spectroscopy. Static magnetic fields, gradient magnetic fields, secondary coil fields, nuclear magnetic resonance (NMR), spatial domain, frequency domain, computer data acquisition, relaxation times, pulse sequence diagrams. Laboratory simulation is included.

Prerequisites: BIO 335 and PHY 201 or PHY 217 all with grade "C" or better.

RDSC 365 Advanced Quality Assurance/Quality Control

(S)(3-3-4)

Principles of diagnostic radiographic quality assurance systems including: quality control testing, equipment calibration, preventive maintenance, and government regulations. Laboratory experiments involve QC tests and measurements.

Prerequisites: RDSC 202, RDSC 272.

RDSC 366 Radiographic Pathology

(W)(3-0-3)

An overview of common pathological conditions encountered in the clinical setting, for RDSC students. Pathology is categorized by body systems. The students will learn the pathology as they relate to: signs and symptoms, etiology, imaging diagnosis and prognosis and treatment.

RDSC 388 Externship Preparation

(S)(2-0-2)

Presentation of key concepts related to Radiologic Science externship and required in-services. Focus is on patient care and interpersonal scenarios the externship student will likely face while in the clinical environment. Review and discussion of the RDSC Externship Handbook. This course is a mandatory course that must be completed prior to externship.

Prerequisite: RDSC 356.

RDSC 410 Radiologic Science Externship

(F,W,S)(0-40-15)

Students must complete four terms (12 months) of clinical experience in both general radiography and special imaging modalities, to include computed tomography, magnetic resonance imaging, ultrasound, nuclear medicine and/or cardiovascular interventional technology at an affiliated clinical site. Students will complete all phases of general radiography and a maximum of 12 weeks in the special imaging modalities. Students under the direct supervision of qualified radiographers and radiologists.

Prerequisites: All academic coursework in the Radiologic Science curriculum.

RDSC 411 Special Radiologic Science Externship

(F,W,S)(0-40-15)

This one-term (three-month) practicum is designed to develop the skills of the student in the special imaging modalities, i.e., computed tomography, magnetic resonance imaging, ultrasound, nuclear medicine and special radiographic procedures. The student is sent to an affiliated hospital that has the required special imaging equipment to give the hands-on experience to develop competency in each of three areas chosen by the student. The student will spend one month in each selected area.

Prerequisites: The student must have completed all academic coursework in the Medical Imaging program with grade "C" or better and be a Registered Technologist.

RDSC 411A, RDSC 411B Special Radiologic Science Externship

(411A-F,W, 0-18-7)(411B-W, 0-22-8)

This two-term practicum is designed to develop skills of the degree completion student in special imaging modalities of computed tomography, magnetic resonance imaging, cardiovascular/interventional technology, mammography, quality assurance, nuclear medicine technology, or sonography. The student selects a local hospital or medical center that has the necessary equipment. Upon approval of the facility, the student begins a supervised experience to develop competencies in each of three chosen areas.

Prerequisites: Be an ARRT registered technologist in good standing, and have completed all the academic coursework in the Medical Imaging curriculum with grade "C" or better.

RDSC 471 Clinical Imaging Education I

(S)(1-0-1)

Development and application of clinical education objectives relating to medical imaging technology. Instruments used to evaluate student clinical performance and competence.

Prerequisite: RT(R) (ARRT).

(REE) Renewable Energy Engineering**REE 107, REE 207, REE 307, REE 407 Seminar**

(Hours to be arranged each term.)

REE 201 Introduction to Renewable Energy

(F,W,S)(3-0-3)

An introduction to renewable energy. Topics include photovoltaics, solar thermal systems, green building, fuel-cells, hydrogen, wind power, waste heat, biofuels, wave power, tidal power and hydroelectric. Discussions of economic, environment, politics and social policy are integral components of the course.

Prerequisite: MATH 111.

REE 243 Electrical Power

(F,S)(3-3-4)

Fundamentals of electrical power. Power systems components and equipment. Fundamental analysis and design of electrical power systems.

Prerequisites: EE 223; MATH 252; PHY222

REE 253 Electromechanical Energy Conversion

(F,S)(2-3-3)

Motoring and generating principles for direct current, synchronous, and induction Machines. Analysis and design of motor and generator power and control circuits.

Prerequisite: EE 223; MATH 252; PHY222

REE 331 Fuel Cells

(F,S)(2-3-3)

Introduction to fuel cell technologies: PEM, PAFC, AFC, SOFC, MCFC and DMFC systems. Fuel cell components and systems; field flow plates, electrolytes, electrode materials, electrode catalysts, on-board reformers. Portable devices, utility-scale power production, transportation systems. Fuel types and fuel storage.

Prerequisites: CHE 260 and PHY 222.

REE 333 Batteries

(W)(2-3-3)

This course covers fundamentals of the most important battery types including alkaline, zinc-air, lead-acid, nickel-cadmium, nickel-metal hydride, lithium ion and lithium polymer. Applications include stationary, transportation and portable batteries. The lab deals with battery system design, testing and prototype assembly.

Prerequisite: CHE 260.

REE 335 Hydrogen

(S)(2-3-3)

This course will cover hydrogen production, storage, distribution and use. Specific energy scenarios such as renewable hydrogen cycles will be explored focusing on transportation applications. The concept of hydrogen economy will be discussed in the context of global energy crisis. Prerequisite: CHE 260.

REE 337 Materials for RE Applications

(F,W)(3-0-3)

Electrical, mechanical, thermal, chemical, optical, and processing properties of materials in renewable energy systems; solid-state device characteristics and their material properties. Engineering applications.

Prerequisites: CHEM 202 and CHEM 205 or CHE 222; PHY 223.

REE 344 Nuclear Energy

(3-0-3)

Introduction to nuclear energy. Atomic and nuclear physics; the interaction of radiation and matter. Nuclear reactor operation; reactor components, nuclear cycles, neutron diffusion and moderation. Reactor shielding. Fuel reprocessing and waste disposal. Reactor licensing and safety. Economics and environmental concerns.

Prerequisites: CHE 202 and CHE 205 or CHE 222; PHY 223.

REE 345 Wind Power

(S)(3-0-3)

Introduction to power production from wind resources. Historical uses of wind resources. The Earth's wind systems. Physics of wind power. Vertical and horizontal axis turbines. Aerodynamics of wind turbines. Large-scale turbine farms and siting. Commercial development, economics and environmental impacts.

Prerequisites: REE 253 or MECH 326. PHY 222.

REE 346 Biofuels and Biomass

(F,W)(2-3-3)

Introduction to power production from biomass resources. Historical uses of biomass resources. Biomass as a solar energy store; forestry and agricultural sources, crop wastes. Recycled sources; municipal solid wastes, landfill gas. Gaseous fuels; anaerobic digestion, gasification, liquid fuels, fermentation, hydrolysis, transesterification.

Prerequisites: CHE 202, or CHE 222, PHY 222.

REE 347 Hydroelectric Power

(S)(3-0-3)

Introduction to hydro-resource power production. Hydro-power in history. Physics of hydrology. Power, head, flow-rate. Turbine hydrodynamics; Francis, Kaplan, Pelton, Turgo, cross-flow. System components: generators, governors, penstocks, spillways, valves, gates, trashracks. Large-scale and microhydroelectric systems. Pumped storage. Economic, environmental considerations.

Prerequisite: MECH 318.

REE 348 Solar Thermal Energy Systems

(F)(3-0-3)

Introduction to solar thermal energy systems for residential, commercial and industrial applications. Solar radiation; topics in heat transfer; flat plate and concentrating collectors; non-imaging optics; applications including water heating, building heating, cooling, industrial process heat, distillation, solar thermal power systems.

Prerequisites: MECH 323, ENGR 355.

REE 412 Photovoltaic Systems

(F,W,S)(3-0-3)

The solar resource, sun charts, site assessments. Grid-connected and stand-alone systems. Module and array performance. PV system components including batteries, modules, charge controllers, maximum power point trackers, inverters. Economic considerations including investment tax credits, present-value analysis, IRR. Advanced PV materials.

Prerequisite: EE 343 or REE 337.

REE 413 Electric Power Conversion Systems

(S)(2-3-3)

Power electronics devices in energy applications. DC-DC MPPT and charge controllers. Advanced inverter controls and applications. FACTS and HVDC systems and equipment.

Prerequisites: EE 419, REE 243

REE 425 Electricity Markets and Modeling

(S)(3-0-3)

Introduction to restructured electricity markets. Students gain knowledge of theory, structures, successes and failures of markets, market participant behavior, risk and uncertainty, and basic simulation and optimization modeling for market analyses.

Prerequisites: MATH 111 and ECO 201 or ECO 202.

REE 427 Greenhouse Gas Accounting/Footprints

(S)(3-0-3)

Course topics include US and international greenhouse gas (GHG) management policies. GHG assessment methods and tools, emissions trading programs, climate risk and risk management, data and information sources, measurement standards and protocols and related sustainability concepts and policies. Course also listed as ENV 427 (cannot be used for graduation credit by students who have taken ENV 427).

Prerequisites: Junior or senior standing, MATH 361 or MATH 465; WRI 227.

REE 431 Geothermal Heat Pump Design

(W)(3-0-3)

Theory/design of geothermal heat pump applications, emphasis ground heat exchanger simulation and design. Closed-loop, open-loop, and hybrid geothermal heat pump systems will be examined. Exposure

to the development and use of geothermal design and simulation tools.

Prerequisite: MECH 323

REE 439 Building Energy Auditing and Management

(W)(3-0-3)

Evaluating building thermal/electric/process loads, including lighting, hot water, HVAC and central plant systems, industrial refrigeration and motors. Opportunities for managing energy use through controls and operations/maintenance strategies. Roles of commissioning, energy auditing, renewables and economic analysis in reducing energy use.

Prerequisite: MECH 433.

REE 451 Geothermal Energy and Direct Use Applications

(F)(3-0-3)

Introduction to basic geothermal energy sources and generation. Basic geothermal energy applications including direct use, heat pumps and power generation. Geothermal reservoir, site analysis, exploration and drilling. Direct use application system design (HVAC) and equipment.

Prerequisite: ENGR 355 Thermodynamics.

REE 453 Power System Analysis

(F)(3-0-3)

Faults: symmetric, unsymmetric. Modeling system components using positive, negative, zero sequence networks. System admittance matrices. Load flow computational methods such as Gauss-Seidel, Newton-Raphson. Power system transients. Voltage, frequency stability. Power system stabilization. Power system analysis using software, emphasizing renewable resources.

Prerequisites: ENGR 267, REE 243.

REE 454 Power System Protection and Control

(W)(3-0-3)

Protection systems overview; protective devices; coordination and sequencing of relays; grounding practices; impedance protection. Methods of power systems operation and control; load-frequency control, automatic generation control. Modeling power system protection and control using power system analysis software, emphasizing renewable resources.

Prerequisite: REE 453.

REE 455 Energy-Efficient Building Design

(S)(3-0-3)

Principles of integrated, energy-efficient building design. Interpretation/application of codes, standards. Use of software tools for modeling, simulation of building energy systems. Daylighting, natural ventilation, architectural features of passive solar buildings. Inclusion of renewable resources and net-zero designs. Life-cycle economic analysis.

Prerequisite: MECH 323.

REE 463 Energy Systems Instrumentation

(F,W,S)(2-3-3)

Application of electrical and mechanical sensors, data acquisition and logic controllers as applied to energy systems. Determination of physical parameters necessary for control and data-logging. Methods of calibration and correction.

Prerequisite: EE 321.

REE 465 Renewable Energy Transportation Systems

(W)(3-0-3)

Renewable energy transportation systems including fuel cells, hybrid gasoline-electric engines, electric vehicles, bio-diesel, flex-fuel vehicles, high-efficiency diesel engines, gas turbine prime-mover systems. Topics include fuel-air mixing, fuel storage, fuel delivery, cooling, fuel leak detection, chemical safety, and electrical power control systems.

Prerequisites: REE 253 or MECH 326. MECH 323.

REE 469 Grid Integration of Renewables

(S)(3-0-3)

Issues unique to connecting renewable energy generation to the grid, Microgrids, Stability, transient and harmonic effects. Interconnect agreements and requirements, Standards development. SCADA and smart grid concepts, System optimization.

Prerequisite: REE 454.

REE 471 Geothermal Power Plant Design

(S)(3-0-3)

Introduction to geothermal reservoir pressure, temperature and flow models and analysis. Basic geothermal power plant equipment and design for dry steam, single/double flash and binary cycle power plants. Plant thermodynamic analysis/efficiency using Rankine/Kalina cycles. Plant environmental, economic and social impacts.

Prerequisite: ENGR 355

REE 511 Research Methods & Innovation I

(F)(3-0-3)

Fundamental concepts of scientific research. An introduction to the concepts underlying peer-reviewed research, evaluating the relevance and impact of sources, conducting literature reviews, evaluating published findings, using research productivity tools, using statistical methods, designing research studies, and writing scholarly articles.

REE 512 Research Methods & Innovation II

(W)(3-0-3)

Intellectual property (IP) development, evaluation, and strategy. IP fundamentals, patent fundamentals, conducting patentability searches, evaluating the patentability potential of an invention, drafting invention disclosures for patent applications, assessing

the value of a patent or patent portfolio, and IP licensing fundamentals.

REE 513 Research Methods & Innovation III

(S)(3-0-3)

Strategy and innovation concepts with a focus on technology commercialization. Business strategy frameworks, financial analysis, strategic marketing, operations management, business models, project management, business law, and entrepreneurship.

REE 515, REE 516, REE 517 Energy Engineering I, II, III

(515-F)(3-0-3) (516-W)(3-0-3) (517-S)

(3-0-3)

Three-term sequence in energy engineering. For a variety of renewable and conventional means of energy production, storage, and distribution, students gain a robust understanding of resources, energy conversion technology, integration with existing systems, regulatory contexts, business environment, and future trends.

REE 521 Production of Biomass & Biofuels

(3-0-3)

The use of recently living plant or animal materials as sources of fuels, chemicals or industrial products. Sourcing and production. Biomass chemistry; lignocellulosics, fats, oils, saccharides, polysaccharides, proteins, and extractables. Chemical modification of biomass to produce fuels, polymers, industrial chemicals.

REE 523 Hydrogen Production and Storage

(3-0-3)

An overview of primary technologies, economic aspects, and social policy issues related to development of hydrogen systems and hydrogen economy, including water electrolysis, reformer technologies, and hydrogen storage.

REE 525 Solid-State Physics of Photovoltaic Materials

(3-0-3)

Principles of PV; electrons and holes in semiconductors; junction analysis. Survey of available semiconductors and materials choices for photovoltaic design. Principles of important photovoltaic devices. Monocrystalline, polycrystalline, and thin film solar cells. Strategies for high efficiency. Photovoltaic materials and phenomena.

REE 527 Wind Power Generators

(3-0-3)

Wind energy as a power source. AC machines, particularly three-phase induction and synchronous generators for wind power generation. Equivalent circuit models. Wound-rotor, permanent magnet, multi-pole, and switched-reluctance generators. Power and torque control.

REE 529 Power System Analysis

(3-0-3)

Faults: symmetric, unsymmetric. Modeling system components using positive, negative, zero sequence networks. System admittance matrixes. Load flow computational methods such as Gauss-Seidel, Newton-Raphson. Power system stabilization. Power system analysis using software, emphasizing renewable resources. Requires background in power systems.

REE 531 Ground-Source Heat Pumps

(3-0-3)

Heat pump design and operation. Heat pump cycles. Refrigerant selection. Ground-loop design. Heat transfer issues pertaining to geothermal energy. System design and integration. Temperature and materials issues unique to geothermal heat pumps.

REE 533 Heating, Ventilation and Air Conditioning

(3-0-3)

Heating, ventilating, and air conditioning. Application of laws and principles of thermodynamics to analysis, design, and control of mechanically-controlled environments for human comfort, animal health, and food preservation. Teaches computation of heating and cooling loads, humidity control, heating, and refrigeration.

REE 535 Fuel Cell Fundamentals

(3-0-3)

Basic science and technology of fuel cells, electrode processes, electrolyte types, catalysts, and balance of plant components.

REE 537 Sustainability of Energy Systems

(3-0-3)

Comprehensive examination and classification of the local, regional, and global environmental and social aspects of energy use including lifecycle assessments. Impacts

of global and national politics on energy use decisions.

REE 539 Hydraulics & Fluid Mech. of Hydropower

(3-0-3)

Open-channel hydraulics, including watershed hydrology, sediment transport and bed load movement, reservoirs, hydrostatics, dredging, spillways, stilling basins, and hydraulic jumps. Advanced fluid mechanics. Types of turbines. Modeling and unit optimization. Background in fluid mechanics required.

REE 541 Utilization Strategies of Bioenergy

(3-0-3)

Strategies for sustainable energy production from biomass. Direct combustion. Fermentation processes. Anaerobic digestion systems. Thermochemical processes; gasification, liquefaction. Chemical synthesis pathways.

REE 543 Materials for Electrochemical Processes

(3-0-3)

Materials used for batteries, fuel cells, electrolyzers, and supercapacitors; their classification, selection and properties, including nanocatalysts, polymer electrolytes, ceramic and plastic packaging materials, and metals.

REE 545 Applied Photovoltaics

(3-0-3)

The characteristics of sunlight. Solar cell behavior, properties, and design. Cell interconnection and module fabrication. Designing stand-alone and grid-connected photovoltaic systems. Special-purpose photovoltaic applications. Concentrator and hybrid solar thermal and photovoltaic systems. Advanced photovoltaic systems.

REE 547 Electric Power Conversion

(3-0-3)

Electric power conversion for wind generators. Review of power switching devices. Rectifiers, DC-DC converters, inverters. Pulse-width modulation. Converter topologies. Doubly-fed induction generators. Reactive power compensation.

REE 549 Power System Protection & Control

(3-0-3)

Protection systems overview; protective devices; coordination and sequencing of relays;

grounding practices; impedance protection. Methods of power systems operation and control; load-frequency control, automatic generation control. Modeling power systems protection and control using power system analysis software, emphasizing renewable resources. Prerequisite: REE 529

REE 551 Advanced Geothermal Energy

(3-0-3)

Classification of geothermal resources. Basics of geothermal wells and drilling. Resource capacity estimation and measurement. System design and integration. Applications such as aquaculture, greenhouses, and district heating.

REE 553 Energy Systems Management and Auditing

(3-0-3)

Evaluating building thermal/electric/process loads, including lighting, hot water, HVAC and central plant systems, industrial refrigeration and motors. Opportunities for managing energy use through controls and operations/maintenance strategies. Roles of commissioning, energy auditing, renewables and economic analysis in reducing energy use.

REE 555 Stationary Fuel Cells

(3-0-3)

Advanced treatise of fuel cell systems for large, stationary applications with detailed examination of polymer electrolyte membrane, alkaline, phosphoric acid, molten carbonate, and solid-oxide systems, their design, performance, lifetime and reliability, modeling, and economics.

REE 557 Costing Renewable Energy

(3-0-3)

Renewable energy in micro- and macroeconomic contexts. Review and discussion of current energy market structures, prices, effects of inflation and incentives, affordability, costs of supply reliability, investment criteria, and modeling market trends.

REE 559 Development of Hydropower Projects

(3-0-3)

Mechanical and electrical equipment, including flow control elements, generators, transformers, protection and control equipment, and governors. Transient responses and stability. The engineering, procurement and construction process for hydropower projects. Commissioning and documentation.

REE 561 Process Design and Economic Evaluation for Biomass Energy Systems

(3-0-3)

Process engineering methods, including development of process and instrumentation diagrams (P&ID); equipment selection and sizing; cost estimation, economic evaluation; and, fundamentals of chemical process safety.

REE 563 Batteries

(3-0-3)

Comprehensive overview, integration characteristics, and performance comparison of battery systems for transportation and stationary applications, including lead-acid, nickel metal hydride, nickel cadmium, sodium-sulfur, lithium polymer, and lithium ion.

REE 565 Semiconductor Process Engineering

(3-0-3)

Semiconductor process technology: crystal growth, silicon oxidation, photolithography, etching, diffusion, ion implantation, film deposition. Process integration, manufacturing, and metrology. Future trends and challenges.

REE 567 Wind Energy Systems Integration

(3-0-3)

Wind system electric power integration, protection, and control. System components, including generators, transformers, and switching stations. Network stability. Energy sector regulation and markets. Forecasting and integration of wind power systems.

REE 569 Grid Integration of Renewables

(3-0-3)

Issues unique to connecting renewable energy generation to the grid. Microgrids. Stability, transient, and harmonic effects. Interconnect agreements and requirements. SCADA and smart grid concepts. System optimization. Prerequisite: REE 549

REE 571 Geothermal Power Generation

(3-0-3)

High-enthalpy resources suitable for electric power generation. Energy transfer and conversion. Plant design and integration. Advanced design such as absorption power cycles.

REE 573 Energy-Efficient Building Design

(3-0-3)

Principles of integrated, energy-efficient building design. Interpretation/application of codes, standards. Use of software tools for modeling, simulation of building energy systems. Daylighting, natural ventilation, architectural features of passive solar buildings. Inclusion of renewable resources and net-zero designs. Life-cycle economic analysis.

REE 575 Transportation Fuel Cells

(3-0-3)

Detailed assessment of advances, prospects, and economics of polymer electrolyte membrane fuel cell, operational characteristics, durability, manufacturing, and fuel storage options in the automotive applications.

REE 577 Renewable Energy Integration

(3-0-3)

Discussion based-class on the integration of renewable energy into the established electric grid, focusing on energy availability, reliability, options for integration, matching demand, and balancing economic options on global, regional, and local scales.

REE 579 Economic, Regulatory, and Environmental Aspects of Hydropower

(3-0-3)

Duration curves and generation studies. FERC permitting and licensing, including compliance. Power sales contracts and bundled services. Environmental impact assessments. Project financing, management, and operations requirements. Optimization of integrated hydropower systems.

REE 581 Energy Storage Fundamentals

(F)(3-0-3)

The survey course will examine energy storage fundamentals; applications and trends for pumped hydro, compressed air, flywheels, superconducting magnetic energy storage, gravitational mass, supercapacitors, batteries, fuel cells, and thermal systems.

REE 582 Introduction to Batteries

(W)(3-0-3)

The course provides introduction to field of batteries and discusses electrochemical fundamentals and general properties of batteries

such as energy density, specific power, charging and discharging, temperature effects, aging, and self-discharge.

REE 583 Introduction to Fuel Cells

(S)(3-0-3)

This overview course will introduce students to fundamental fuel cell principles, history, classification, thermodynamics, efficiency and causes of voltage losses, reaction kinetics, electrode performance and catalyst design, and fuel cell components and their impact on performance.

REE 591 Hydrogen Production and Storage

(F)(3-0-3)

The course will discuss the basics of hydrogen production and storage, the concept of hydrogen economy, conventional hydrogen generation, electrochemical and photochemical technologies, principles of hydrogen storage and novel storage materials.

REE 592 Advanced Batteries

(W)(3-0-3)

This course will examine technology and trends in battery chemistry, manufacturing, pack assembly, characterization, safety, economics and applications for battery systems including lead acid, nickel-based, lithium ion, lithium polymer, metal air and flow batteries.

REE 593 Advanced Fuel Cells

(S)(3-0-3)

This course provides an in-depth analysis of the current trends, fuel processing, novel materials, applications, safety, and characterization for polymer electrolyte membrane, alkaline, phosphoric acid, molten carbonate, solid oxide, and direct methanol fuel cells.

(SEM) System Engineering and Technology Management

SEM 421 Systems Engineering

(F)(4-0-4)

Foundations of Systems Engineering; Structure of Complex Systems; System Development Processes and Frameworks; Systems Engineering Management; System Needs Analysis; System Design & Development; System Engineering Validation, Reliability,

Availability, Maintainability and Deployment; Human Factors Engineering.
Prerequisites: MATH321; MATH341 or EE430

SEM 422 Advanced Systems Engineering
(W)(4-0-4)

Advanced concepts in systems science and systems engineering; modeling and mathematical methods for systems engineering; system simulation tools; optimization and decision analysis; case studies involving practical systems engineering integration of hardware, software, information, and human factor systems.
Prerequisite: SEM421

SEM 425 Advanced Engineering Management
(S)(4-0-4)

Competitive Strategic Frameworks (Porter, RBV, Delta); Strategic Execution Framework; Project Management (PMBOOK); Financial Management; New Product Development; Case Studies.
Prerequisite: MGT345

(SOC) Sociology
SOC 107, SOC 207, SOC 307, SOC 407 Seminar
(Hours to be arranged each term.) SS

SOC 201 Classical Sociological Theory
(W)(3-0-3) SS

Introduction to the early development of sociological theory. Works by Marx, Weber, Durkheim, Parsons and Goffman will be discussed in terms of their contribution to the discipline of sociology.

SOC 202 Contemporary Sociological Theory
(S)(3-0-3) SS

Theories on the social construction of self, social and population structures, gender inequality, global capitalism and deviance are explored in the context of contemporary social issues.
Prerequisite: SOC 201

SOC 204 Introduction to Sociology
(F,W,S)(3-0-3) SS

Survey of human relationships and interaction of organized groups and institutions in modern society. Emphasis on attitudes, values, beliefs, customs and change within

our complex social structure.

SOC 205 Current Health Issues
(W)(3-0-3) SS

An introduction to the most pressing health issues in contemporary society, including aging, healthcare reform, cost of healthcare, and amenable mortality.

SOC 206 Social Problems
(F)(3-0-3) SS

A sociological exploration of contemporary social problems, including crime, illness, poverty, unemployment, immigration, gender inequality, LGBT issues, and the environment.

SOC 210 Marriage and Family Living
(3-0-3) SS

Personal problems of the married couple in everyday living with an emphasis on adult lifestyles, relationships, sexual roles and attitudes, family planning, family finances, and divorce and remarriage.

SOC 225 Medical Sociology
(F,W,S)(3-0-3) SS

Introduction to medical sociology and social-epidemiological research, covering social causes and consequences of health and illness, the practitioner-patient relationship, health behavior, and health care organization.

SOC 235 Introduction to Sustainability
(S)(3-0-3) SS

An introduction to the history, theory and practice of sustainability. The focus is on human-environment interactions, highlighting how human agency can jeopardize our collective future, and how harm can be avoided through appropriate social, political, and legal action.

SOC 301 Social Science Research Methods
(F)(3-3-4) SS

Introduction to theory and methods of research in the social sciences, and interpretation of social science research.
Prerequisites: SOC 204, SOC 225

SOC 302 Social Science Research Methods II
(W)(3-3-4) SS

Continuation of SOC 301 Social Science Research Methods: data collection, analysis,

and development of social science research papers.
Prerequisite: SOC 301

SOC 304 Criminology
(W,S)(3-0-3) SS

Analysis of criminal behavior from theft to homicide. Discussion of the definition of criminal behavior, varieties of crime and the criminal justice system.
Prerequisite: SOC 204.

SOC 305 Rural Health
(F,W,S)(3-0-3) SS

Advanced introduction to rural population health and health care. Topics include rural population health and health behavior, economic and social/structural issues, and health care delivery and reform.
Prerequisite: SOC 225.

SOC 315 Juvenile Delinquency
(F)(3-0-3) SS

Introduction to trends and sociological theories of juvenile delinquency.
Prerequisite: SOC 204.

SOC 325 Global Population Health
(F,W)(3-0-3) SS

Introduces demographic methods and theories of population health, in addition to trends in fertility, mortality, morbidity, and aging both in the U.S. and internationally.
Prerequisite: SOC 204, or SOC 225, or MATH 111.

SOC 335 Health Inequality and Cultural Competency
(F,W,S)(3-0-3) SS

Introduction to health inequality based on systematic social research. Provision of basic training on cultural competency and under-represented populations' engagement with the health care system.
Prerequisite: SOC 225

SOC 405 Program Planning and Evaluation
(W)(3-0-3) SS

In this course, health behavior and behavior change theories are introduced, critiqued, and utilized to provide theory-based examples of population health interventions.
Prerequisites: SOC 204, SOC 225

SOC 421 Senior Project Preparation
(S)(2-0-2) SS

Selection of senior capstone research project and/or selection of externship site and goals

for externship experience that meets industry needs.

Prerequisite: Population Health Management majors with senior status only.

(SPAN) Spanish

SPAN 101, 102, 103 First Year Spanish

(101-F)(102-W)(103-S)(4-0-4)

An introduction to elementary Spanish. A three-term sequence for beginners. Emphasis on vocabulary building, listening comprehension, phonetics, oral practice, and elements of grammar. Elementary readings and writings will be required.

Prerequisite: Taken in sequence or instructor consent.

SPAN 107, SPAN 207, SPAN 307, SPAN 407 Seminar

(Hours to be arranged each term.)

SPAN 201, 202, 203 Second Year Spanish

(201-S)(202-W)(203-S)(4-0-4) H

Intensive introduction to the language.

Course aims at progressive development of fluency through extensive exposure to the language in real situations. Comprehension-based approach.

Prerequisite: SPAN 103 or instructor consent. SPAN 201, SPAN 202, SPAN 203 taken in sequence or instructor consent.

(SPE) Speech

SPE 107, SPE 207, SPE 307, SPE 407 Seminar

(Hours to be arranged each term.)

SPE 111 Public Speaking

(F,W,S)(2-2-3) C

Public speaking with emphasis on content, organization, and speaker adjustments to various situations; dynamics of the speaker/listener interaction; and appropriate language usage. Includes informative, demonstrative, and persuasive speeches.

SPE 314 Argumentation

(S)(2-2-3) C

Examines argumentation as part of human interaction and inquiry. Explores arguing to gain adherence as a way of reasoning. Practice in public speaking, debate, ethics and critical thinking.

Prerequisite: SPE 111.

SPE 321 Small Group and Team Communication

(F,W,S)(2-2-3) C

Provides instruction and experience in decision making through group processes designed to develop competent team leaders and participants. Participation in and evaluation of a variety of group communication exercises.

Prerequisite: SPE 111.

(STAT) Statistics

STAT 412 Regression and Time Series

(F)(4-0-4)

Examines an introduction to regression analysis with a focus on multiple linear regression. Topics

include statistical inference, goodness of fit, diagnostics, criteria for choosing covariates, categorical predictors, and an introduction to analysis of time series data.

Prerequisite: Math 362

STAT 413 Categorical Data Analysis

(F)(4-0-4)

Introduces analysis techniques for categorical data. Measures of stochastic superiority, odds ratios, techniques for Likert data, Models for frequency arrays, goodness-of-fit tests, two-, three-, and higher-way tables, latent and logistic models will be presented.

Prerequisite: MATH 362

STAT 414 Statistical Methods in Epidemiology

(W)(4-0-4)

Examines the methods used in epidemiologic research, including the design of epidemiologic studies and the collection and analysis of epidemiological data.

Prerequisite: Math 361

STAT 415 Design and Analysis of Experiments

(F)(4-0-4)

Examines the principles of experimental design; construction and analysis of completely randomized design, randomized block design and Latin square designs; covariates; factorial treatments, split plotting; random effects and variance components

Prerequisite: MATH 362

STAT 431 Sampling Methods

(F)(4-0-4)

Construction of sampling frames; estimation of means, total and proportions; sampling designs including simple random, stratified, cluster, systematic, multistage and double sampling; ratio and regression estimators; source of errors in surveys; capture and recapture methods;

Prerequisites: MATH 361, 362

(VAS) Vascular Technology

VAS 107, VAS 207, VAS 307, VAS 407 Seminar

(Hours to be arranged each term.)

VAS 214 Vascular Anatomy

(F)(3-3-4)

Detailed consideration of the gross and microscopic anatomy of arteries and veins throughout the human body. Laboratory includes cadaver dissection, anatomical models, and an introduction to instrumentation and basic ultrasound scanning techniques.

Prerequisite: MIT 103 with grade "C" or better.

VAS 225 Patient Management Practices

(S)(2-3-3)

Current issues in the practice of vascular technology with emphasis on basic concepts of patient care, infection control procedures, and the technologist's responsibility to the patient, the patient's family, and the vascular technology profession.

Prerequisite: VAS 246 with grade "C" or better.

VAS 245 Peripheral Venous Disease

(S)(3-3-4)

Investigation to the pathophysiology of venous disease with emphasis on theoretical and practical considerations of diagnostic methods of venous testing. These include clinical assessment, plethysmography, and duplex imaging of lower extremity veins.

Prerequisite: VAS 246.

VAS 246 Peripheral Arterial Disease

(W)(3-3-4)

Investigation of the pathophysiology of arterial occlusive disease with emphasis on the theoretical and practical considerations of diagnostic methods of arterial testing.

These include clinical assessment, physiological evaluation and duplex imaging of lower extremity arteries.

Prerequisite: VAS 214.

VAS 335 Radiographic Vascular Anatomy

(W)(3-0-3)

Survey of medical imaging modalities ancillary to vascular sonography including angiography, digital subtraction angiography, computerized tomography and magnetic resonance angiography. Student teams will prepare case studies comparing the efficacy of these imaging modalities.

Prerequisite: VAS 214 with grade "C" or better.

VAS 337 Survey of Echocardiography

(W)(2-3-3)

A survey of basic echocardiography with emphasis on normal cardiac anatomy and abnormal disease states. Standard sonographic imaging techniques of adult echocardiography, including instrumentation and protocols.

Prerequisites: BIO 220

VAS 365 Abdominal Vascular Disease

(F,W,S)(3-3-4)

Diagnostic methods of abdominal and visceral vascular disease testing. Includes aorto-iliac, renal artery and kidney, mesenteric system, liver system, and transplantations. Laboratory emphasizes advanced instrumentation and scanning techniques, patient interviews, clinical signs and symptoms, physical assessment and findings.

Prerequisite: VAS 246.

VAS 366 Special Circulatory Problems

(F,W,S)(3-3-4)

Diagnostic methods of testing the efficacy of vascular surgical procedures and interventions. To include arterial bypass grafts, organ transplants and dialysis access grafts. Venous and arterial mapping, upper extremity venous and arterial disease testing, IVUS, pseudoaneurysm treatment and compartment syndrome will also be covered.

Prerequisite: VAS 365.

VAS 367 Cerebrovascular Disease

(S)(3-3-4)

Theoretical and practical considerations of diagnostic methods of testing arterial and venous diseases affecting the vasculature of

the head and neck including the intracerebral vessels. Laboratory includes advanced instrumentation and scanning techniques, and instruction on patient interviewing, clinical signs and symptoms, physical assessment and findings.

Prerequisites: VAS 366, VAS 375.

VAS 375 Survey of Abdominal Sonography

(F)(3-0-3)

A survey of basic abdominal sonography with emphasis on normal abdominal anatomy and abnormal disease states. Standard sonographic imaging techniques of general abdomen, instrumentation, and abdominal protocols.

Corequisite: VAS 365.

VAS 385 Vascular Laboratory Management

(F,W,S)(3-0-3)

Focus on human resource skills as necessary to manage a vascular laboratory. Includes the interview process, hiring and firing, as well as employee performance evaluation. Other topics will include reimbursement, licensure, accreditation and other management issues.

Corequisite: VAS 388.

VAS 388 Externship Preparation

(S)(3-0-3)

Review and summarization of key concepts in Vascular Technology. Focus is on patient care and interpersonal scenarios the externship student will likely face while in the hospital environment or independent vascular lab. Review and discussion of the Vascular Technology Externship Handbook.

Prerequisites: VAS 366, VAS 375 with grade "C" or better.

Corequisites: VAS 367, VAS 385.

VAS 420 Vascular Technology Externship

(F,W,S)(0-40-15)

All B.S. students complete four terms (12 months) of clinical experience in Vascular Technology at an affiliated clinical site.

Students work under the direct supervision of Registered Vascular Technologists and provide monthly log sheets and evaluation forms. Students prepare clinical case studies each term.

Prerequisites: All academic coursework in the Vascular Technology curriculum.

VAS 420A, 420B Special Vascular Technology Externship

(420A-F,S,, 0-22-8)(420B-F,W,S, 0-18-7)

This two-term special externship is designed for the degree completion student. Students working in a clinical vascular setting will prepare clinical case studies as well as rotate through special imaging modalities.

Prerequisites: Be an ARDMS or CCI Registered Vascular Technologist in good standing, and have completed academic coursework in the Medical Imaging curriculum with grade "C" or better.

(WRI) Writing

WRI 107, WRI 207, WRI 307, WRI 407 Seminar

(Hours to be arranged each term.)

WRI 115 Introduction to Writing

(F,W)(3-0-3)

Focuses on sentence structure, paragraph coherence, and essays. Regular writing and feedback develop student competency in college level writing. May not be used to meet general education requirement or graduation credit.

Prerequisites: Writing ability as demonstrated by SAT/ACT score and/or writing sample.

WRI 121 English Composition

(F,W,S)(3-0-3) C

Introduces critical reasoning and analysis. Explores connections between thesis, structure, tone and purpose; includes writing process, rhetorical strategies applications. Focuses on academic reading, writing and research skills.

Prerequisite: Writing ability as demonstrated by SAT/ACT score and/or writing sample.

WRI 122 Argumentative Writing

(F,W,S)(3-0-3) C

Designed to develop skills in ethical argument, research, critical thinking. Multipage papers, including argumentative research paper, required. Focuses on writing process with attention to audience, effective style, overall rhetorical effect.

Prerequisite: WRI 121 with grade "C" or better.

WRI 123 Research Writing

(S)(3-0-3) C

Focuses on the formal research paper, including research techniques and process of developing a longer document.

Prerequisite: WRI 122.

Pre- or corequisite: SPE 111.

WRI 214 Business Correspondence

(F)(3-0-3) C

Focuses on theories and strategies governing written correspondence. Designed to equip the student to perform effectively in a variety of business writing situations; major emphasis on practical applications.

Prerequisites: WRI 122 or equivalent.

WRI 227 Technical Report Writing

(E,W,S)(3-0-3) C

Focuses on techniques of gathering, organizing, and presenting technical information and graphics. Requires technical reports derived from realistic situations in the student's major.

Prerequisite: WRI 122.

Pre- or corequisite: SPE 111.

WRI 305 Writing for the Marketplace

(As required)(3-0-3)

Designed to introduce the basics of professional writing – fiction, personal experience, and technical articles, etc. for publication, including marketing and manuscript preparation. Each student must submit at least one article or story (8 pages or more) for publication during the term.

WRI 327 Advanced Technical Writing

(E,W,S)(3-0-3) C

Processes involved in technical writing and methods of preparing technical data; offers a variety of writing problems to provide opportunities for the student to develop precision in statement and in graphic presentation.

Prerequisite: WRI 227.

WRI 328 Technical Journalism

(E,W,S)(2-3-3) C

Production of a weekly newspaper (The Edge). Includes journalistic writing, design, layout, and production, as well as proposals, memos, business correspondence, and recommendation reports. May substitute for WRI 327 with approval of student's major department.

Prerequisites: WRI 227 and consent of instructor and advisor.

WRI 350 Documentation Development

(W)(3-0-3) C

Provides students with basic tools for preparing documentation. Focuses on usability of documentation and includes planning and scheduling, audience evaluation, use of

appropriate examples and illustrations, style, editing technique, organization and research.

Prerequisite: WRI 227.

WRI 410 Proposal and Grant Writing

(S)(3-0-3) C

Provides theory and skills in proposal writing for seeking funding from public and private agencies and for preparing proposals in business and industrial settings. Focuses on the process of preparing proposals, including analyzing audiences, conducting research, organizing, writing, and editing.

Prerequisite: WRI 227.

WRI 415 Technical Editing

(W)(3-0-3)

Focuses on the role of the technical editor in business and industry. Examines the publishing process, the dynamics of the editor/writer relationship, and mechanics and techniques of proofreading and copyediting. Provides considerable practice in copyediting and proofreading manuscripts.

Prerequisite: WRI 227 or appropriate work experience.

WRI 420 Document Design

(S)(3-0-3)

Applies publishing and graphic arts principles to the preparation of professional publications and presentation materials. Includes typography, design principles, the use of graphical elements, and integration of text and graphics.

Prerequisites: SPE 111, WRI 227.

WRI 521 Writing at the Graduate Level

(S)(3-0-3)

Focuses on developing professional-level writing skills to produce a master's thesis/project documentation. Includes structure, methodology, and emphasizes adherence to OIT manual and appropriate reference style. By end of term, students will have written a detailed prospectus and literature review.

Administrative Offices

Academic Agreements

Dow E213
(541) 885-1844
academicagreements@oit.edu
www.oit.edu/academic-agreements

Oregon Tech's Office of Academic Agreements cultivates and maintains partnerships with area high schools, community colleges, and universities that result in increased access and smooth transitions for students. The office forges meaningful relationships with educational partners by connecting faculties, coordinating partnerships, participating in pathways and other local and statewide advisory boards and providing internal and external communication and promotion of partnerships. The office develops dual enrollment agreements with college and university partners, coordinates dual credit and other programs with high schools locally and statewide, manages and coordinates articulation agreements, and develops and manages other academic agreements.

Information about the work of the Academic

Agreements Office, Dual Enrollment with colleges and universities, dual credit with high schools and specific articulation agreements can be found on the web page or by contacting the office.

High School Programs for College Credit

(541) 885-1844 Klamath Falls
(503) 821-1297 Wilsonville
www.oit.edu/youth-programs

Advance Credit Program

The Advance Credit Program (ACP) is a partnership between Oregon Institute of Technology and the participating high school to offer qualified high school students the opportunity to receive college credit from Oregon Tech. Oregon Tech is partnered with more than 20 high schools and offers more than 15 introductory college courses. The Advance Credit Program consists of college courses taught in the high schools by college-level qualified high school instructors. These

courses are offered as part of the regular high school curriculum with the option of registering for college credit from Oregon Tech. ACP gives students the opportunity to try college-level courses, gain valuable skills, and develop study habits for college.

High School Transition Program

The High School Transition Program (HST) at Oregon Institute of Technology gives qualified high school students the opportunity to come to the Klamath Falls or Wilsonville campus and take a college course for Oregon Tech credit. Students must be 14 years or older and are typically eligible to take 100- and 200-level courses. High school students must register through the Office of Academic Agreements.

The ACP and HST Programs allow Oregon Tech to reduce the normal tuition fee by a considerable amount. Cost to the participating high school student is \$25 per credit.

Affirmative Action and Equal Opportunity

Human Resources Office, Snell 108
(541) 885-1108

The Affirmative Action Officer is charged with oversight and enforcement of Oregon Tech's compliance with relevant federal, state and university civil rights statutes, regulations and policies. Complaints and grievances related to unlawful discrimination, harass-

ment, and sexual assault under Title IX of the Education Amendments, federal and state Civil Rights Acts, the Rehabilitation Act, the Americans With Disabilities Act, and other federal or state anti-discrimination and employment laws are to be directed to the Officer for resolution. The Officer also coordinates Oregon Tech's Equal Opportunity programs and activities which seek to

maintain a learning and working environment that fosters diversity, inclusion and personal success.

Inquiries, requests for assistance, or grievances pertaining to Oregon Tech policies on discrimination, harassment, equal opportunity or access to programs and services should be directed to this office.

Assessment

(541) 885-1915
www.oit.edu/provost/learningoutcomes

Oregon Tech actively engages in assessment of both degree programs and broad institutional essential student learning outcomes (ESLOs). The director of Assessment, in conjunction with the Executive Committee of the Assessment Commission, leads the campus in these efforts.

Assessment plans are developed for each un-

dergraduate and graduate degree program focusing on program learning outcomes created by each academic department. The faculty for the program identify strengths and weaknesses in student learning and recommend plans for improvement through a continuous program improvement process. Information on assessment of student learning outcomes is posted on the Oregon Tech website.

Oregon Tech faculty members also assess the ESLOs, which are intended to reflect com-

mon themes from departmental and program learning outcome statements. Information on assessment of ESLOs is posted on the Oregon Tech website at www.oit.edu/provost/eslo.

Campus Safety

Cornett 131A
(541) 885-1111
www.oit.edu/safety

The Campus Safety department administers the university's security and parking programs. The department promotes security on

the Oregon Tech campus through emergency and non-emergency response services, problem solving, and enforcement of appropriate laws, rules and regulations. The Campus Safety department also provides service functions such as crime prevention and crime reporting programs. Campus Safety patrol officers are

available 24/7 for any concern, including disability issues that need immediate resolution or assistance. Our "Night Ride" assistance program is also available for any person that needs an escort from one area to another on campus 24/7.

College Union

Information Desk
(541) 885-1030
www.oit.edu/collegeunion

The College Union is the center of student activity on campus. Located within the Union are the student government offices, Campus Arts and Entertainment, the Diver-

sity Center, Student Services staff, Campus Dining operations, *The Edge* student newspaper, the Tech Nest bookstore, the Outdoor Program, the Women's Resource Center, the Oregon Tech Veterans Lounge, and the main campus auditorium. In addition, there are comfortable study and lounge areas and meeting rooms for both student and community use. Coffee house functions, lectures,

special classes, shows, dances, and movies are among the typical events scheduled in this facility.

For information about using space in the College Union or to make a reservation, contact the CU Information Desk located on the lower level, south of the main entrance.

Marketing and Communication

Snell Hall
(541) 885-1162
marketing@oit.edu

The Marketing and Communication Department at Oregon Tech is responsible for developing and implementing integrated marketing and communication strategies designed to advance the university's image and standing among a variety of constituents and audiences.

The department is responsible for the university's brand position and identity. The Marketing and Communication Department works with academic programs and administrative departments throughout the university on marketing and advertising efforts, manages university-wide publications and the university's website, as well as social media. The department also serves as the public relations office for the university.

The Marketing and Communication Department is a creative team that provides writing, graphic design, photography, web content development, as well as strategic marketing and communication services to the university. The department promotes the university at the local, state, regional, and national levels through the media, as well as community and government relations.

Student Affairs

College Union, 2nd Floor
(541) 885-1011
www.oit.edu/student-affairs

The Student Affairs Office is the office location for the Vice President for Student Affairs and the Dean of Students, and the Executive Assistant. The division of Student

Affairs provides direct service to students in the following offices: Admissions, Campus Life, Campus Safety, College Union, Financial Aid, Housing & Residence Life, the Integrated Student Health Center, Retention Office, and the Student Success Center, which is composed of Career Services, Disability Services, Testing and Peer Consulting

Services, and TOP (a Trio program).

The Vice President for Student Affairs and her staff maintain close relationships with students and student organizations and are available for consultation and collaboration on all matters pertaining to student well-being and success.

Strategic Partnerships and Government Relations

Wilsonville
(503) 821-1247
www.oit.edu/strategic-partnerships

The Office of Strategic Partnerships (OSP) and Government Relations promotes and oversees industry and government relationships at the Oregon Institute of Technology. The staff is responsible for campus-wide

promotion of the University's economic development mission by facilitating the external relationships that enable the University to contribute to the vitality of its campus regions and the state of Oregon.

The OSP has responsibility for:

1. Building long-term partnerships with

businesses and industry associations that are crucial to Oregon Tech's mission;

2. Providing support to secure external funding by leveraging private sector partnerships for grants and sponsored projects;
3. Proactively working with faculty to develop collaborations with industry

that lead to sponsored projects, commercialization and entrepreneurial opportunities;

4. Building an alliance of local, state and national support for Oregon Tech's policy and funding priorities; and
5. Representing the University on strategic partnerships, industry affairs, and legislative advisory councils.

The OSP collaborates with the Office of Sponsored Projects & Grants Administration (SPA) and the Office of Innovation and Technology Transfer (OITT) to determine Oregon Tech's research priorities and align faculty research interests with industry, other universities, and economic development and research organizations. Operationally, the Office of Strategic Partnerships reports to the President and the Provost to advance the University's strategic priorities.

Business and Industry Partnerships

The Office of Strategic Partnerships assists Oregon Tech's faculty at all locations to connect to industry partners and advisors to ensure that Oregon Tech's courses integrate new technologies and are responsive to business needs for skilled professionals. Businesses throughout the Pacific Northwest, such as Intel, Pacific Power, Maxim, PCC Structurals, Oregon Cutting Systems, Jeld-Wen, Providence and the Boeing Company, send their best and brightest to Oregon Tech for professional development so they can advance into engineering, technology, healthcare and management positions within their companies.

Oregon Tech's business partners participate on Industry Advisory Councils, support students through internships and sponsored student projects, teach as adjunct faculty, recruit graduates for jobs, donate labs and equipment, and sponsor applied research. Oregon Tech could not fully execute its mission without the engagement and support of industry partners.

Oregon Tech is a member or partner with the Smart Grid Oregon, Drive Oregon, Oregon Solar Energy Industry Association, Renewable Northwest Project, Northwest Collaboratory for Sustainable Manufacturing, Oregon BEST (Built Environment & Sustainable Technology), Manufacturing 21 Coalition, Northwest High Performance Enterprise Consortium, Pacific Northwest Defense Coalition, Gorge Technology Alliance, Technology Alliance of Oregon, Oregon Manufacturing Extension Partnership, Oregon Workforce Investment Board and several local workforce boards, Oregon Transportation Research and Education Consortium, Oregon Healthcare Workforce Institute, and the Greater Portland, Klamath Falls, Tualatin, and Wilsonville Chambers of Commerce.

Individual businesses or business associations that are interested in university-industry partnerships are encouraged to contact the Associate Vice President for Strategic Partnerships at (503) 821-1247.

Class Schedule and General Catalog contain information about academic regulations, registration instructions and college procedures and policies. Students should be familiar with this information. These documents can be found on the Oregon Tech Web site at www.oit.edu/registrar.

Student Records

The Registrar's Office maintains information regarding academic progress, including grade reports and permanent academic records (transcripts). Students and alumni may request transcripts at any time.

Government Relations

Oregon Tech's government relations activities support the university community's vision "Oregon Tech will be a nationally recognized public polytechnic university delivering in-demand, industry-focused degrees and graduates ready to meet workforce needs in Oregon and the Northwest."

Working with local, state and national elected and appointed leaders, Oregon Tech's government relations efforts are focused on enhancing student and graduate success, continuing excellence in applied degree programs, providing statewide educational opportunities, and increasing service to the community.

Oregon Tech provides information to local, state and national legislator and policy makers on:

- Increasing access for rural and underserved students to science, technology, engineering and math (STEM) degree programs
- Workforce development support for local industries, such as healthcare, energy, and manufacturing
- Education policy and reform including Oregon Tech's initiatives to achieve the state's and nation's educational goals
- Financial aid and student access initiatives, with a focus on rural students and first-generation college students
- Reauthorization bills that impact Oregon Tech's portfolio of programs
- Federal competitive grants to enhance Oregon Tech's degree programs and net-zero campus initiatives

Registrar's Office

Snell, Lower Level
(541) 885-1300
registrar@oit.edu
www.oit.edu/registrar

Major functions of the Registrar's Office are the maintenance of student records, registration, Web services, grade processing, transfer-credit evaluation and community college articulation, degree checking, graduation, scheduling, veterans' services, enrollment certification and the catalog.

Academic Information

The class schedule, introductory pages to the

The Registrar's Office also collects and maintains accurate information about students, such as address, curriculum (major) and advisor's name. Much of this information is required for local and state enrollment reporting and for accurate mailing addresses. Changes to personal data such as address or name should be reported to the office promptly.

Privacy Rights

Under the Family Educational Rights and Privacy Act of 1974, students are entitled to review records, files, documents and other materials that contain information

maintained by the university. Students may challenge information considered inaccurate or misleading. A list of university records, the responsible custodians and the university policy on records are available in the Registrar's Office.

Directory Information

The following information is considered Directory Information and may be made available to the public unless you restrict its release by written notice to the University

Registrar by the last day to register or add courses for the current term.

Oregon Tech designates the following items as Directory Information: student name, current address, current telephone number, dates of attendance, classification (year in school), major field of study, most recent previous school attended, degrees and awards received (including dates), hometown, past and present participation in officially recognized activities and sports; and for members of

athletic teams: age, height and weight.

Registration

The Registrar's Office publishes the class schedule and registration instructions for each term on the Oregon Tech Web site at www.oit.edu/registrar. It also maintains class rosters for instructors and processes grades. Personal information, class schedules and grades, as well as unofficial transcripts, are on Oregon Tech's Web for Student and also available in the office.

Athletics, Recreation and Fitness

(541) 885-1634
www.oit.edu/athletics

The mission of the Oregon Tech Athletic Department and the Tech Fit Center is to facilitate growth and development of students. The department provides a broad-based athletic program that creates educational opportunities through the medium of competition at the collegiate level as well as the opportunity to benefit personal health and fitness to the campus community through the Tech Fit facilities and educational classes. Oregon Tech's Athletics, Recreation and Fitness Education Center has many facilities, fitness and education opportunities. An expansion off the front of the center provides students with a larger cardiovascular workout area. A free-weight room stocked with all the needed equipment is located downstairs on the east side. A new eight-lane, 400-meter, all weather surface track and turf field was added this past spring and a lighted basketball court offers more outdoor recreation. Also, watch for a lawn volleyball net as it tends to move around campus. Oregon Tech competitive athletics teams include men's and women's basketball, cross country, soccer, golf and track and field; women's volleyball, women's softball and men's baseball. Tech also sup-

ports men's and women's Rugby programs as extramural sports.

The Tech Fit Center, Athletics, Intramural Sports and Extramural Sports are funded by sales revenue (tickets, concessions, camps etc.), Incidental Fees, Oregon State Lottery funds, State General Appropriations and contributions from the community through the Oregon Tech Foundation.

Competitive Athletic Teams

The Oregon Tech Athletic department is dedicated to preparing our student-athletes for professional and personal success in the real world by learning the values of integrity and excellence on the court, field and in the classroom. To that end, we are committed to field teams with the talent and ability to compete at the top of the Cascade Collegiate Conference, as well as regionally and nationally in the NAIA while representing Oregon Tech with dignity and class. To date, Oregon Tech has brought home four NAIA National Championships in team sports – men's basketball in 2004, 2008 and 2012 and softball in 2011. The privilege of participation in intercollegiate athletics and dedication to team goals provides a classroom where students may experience the development of

skills, sportsmanship, loyalty, self-discipline and responsibility while learning the values of winning, losing and competing. The Oregon Tech athletic program contributes to campus life by providing a focal point for social interaction, leadership development, involvement in peer support groups and entertainment.

Intramural Sports

The Oregon Tech intramural program offers a variety of individual and team events in three divisions: men, women and co-ed. We hope that our program and its diversity will invite each of you to participate in at least one event during the academic year. Call 541-885-1722 for information about intramural sports programs or see the website for rosters and information.

Tech Fit

The Tech Fit Center is free to all Oregon Tech students enrolled in eight or more credits per term. Students taking less than eight credits or community members may sign up in either credit or non-credit classes for a minimal charge. For more information call 541-885-1634.

Campus Life

College Union 108
(541) 885-1827
www.oit.edu/campuslife

Campus Life supports the meaningful growth

and development of Oregon Tech students throughout the life of their university experience. Through active partnership with our students, opportunities are created for hands-on learning, self-discovery, leadership,

teamwork, diversity, community service, and social justice in an environment that is rewarding, energetic and fun. Our goal is to inspire students to discover their unique place in our world.

Campus Life oversees the following resources and areas.

Community Service

Campus Life has information available to connect students to ongoing service projects with local agencies in Klamath Falls. The department also coordinates projects each

quarter to take place on campus and in our local community. In addition, we sponsor an annual spring break service trip and take a group of students to serve outside of our local

area. The 2014 service trip was to Sisters, Oregon where we worked on a Habitat for Humanity build.

Family Weekend

Family Weekend gives families the opportunity to experience their student's university life and a snapshot of our community. Activi-

ties and events include in-depth campus tours, a student talent show, senior project symposium, and club displays and demonstrations.

Each year we also partner with the community to provide discounts at local businesses and hotels, as well as tours of Klamath Falls.

Leadership Development

In addition to taking on leadership roles with student organizations, student can gain leadership experience through the LEADER-

SHIP ACADEMY, which includes a variety of workshops sponsored by departments across campus each term. The workshops are

free and open to all students, and participants can receive a variety of incentives for reaching different achievement levels.

Multicultural and International Student Services

Multicultural and International Student Services serves as a resource for minority and international students and staff, including in-

ternational student orientation and advising (personal/academic/social); F1 visa compliance; SEVIS; OUS Study Abroad Program;

and support to cultural organizations and clubs.

New Student Orientation

New Student Orientation (NSO) is held each year during the week preceding the start of fall term classes. It is designed to help new students acclimate to Oregon Tech, meet their fellow students, and feel ready for the

start of a successful year. Students who come to orientation receive Oregon Tech gear, free meals, and the chance to win great prizes while learning all about being an Oregon Tech Owl!

Campus Life also hosts New & Transfer Student Orientation during the Winter and Spring quarters, which take place one evening during the first week of classes each term.

Student Programs and Campus Clubs

Student clubs and organizations add another important dimension to life on campus. ASOIT funds approximately 50-60 student organizations and clubs each year. Almost half of the clubs are related to various academic disciplines and provide opportunities for students to meet, study, and take part in professional development opportunities such

as conferences and competitions related to their majors. Clubs and organizations also work together to support service learning by participating in a variety of community service projects at home and abroad. Clubs are also linked to special interests, sports, recreation, and cultural, spiritual and social activities.

In addition, there are ten student programs, which are larger student organizations that exist to provide resources to a specific constituency of students. Student Programs have office space on campus, paid student leader positions, and a budget allocation each year. The student programs include:

ASOIT (Student Government)

www.oit.edu/asoit

The purpose of the ASOIT is to supplement the social, cultural, physical, and educational

interests in its members, and to represent the individual and collective interests of the students of Oregon Tech. The membership consists of all admitted students at Oregon

Institute of Technology currently holding a current, valid student ID card.

Campus Activities Board

www.oit.edu/campusactivities

The purpose of the Campus Activities Board (CAB) is to provide quality activities for all students, taking into consideration their

expressed wishes, interests, and needs. CAB provides quality social, cultural, arts and recreational programs for all Oregon Tech students.

A broad array of events have been offered to students including bands, comedians, student talent shows, lectures, discount bowling and movie nights, and homecoming week.

Diversity Center

www.oit.edu/dc

Here at Oregon Tech, we are committed to fostering a safe and welcoming campus for all students, faculty, and staff by increasing understanding, sensitivity and awareness to

diversity. The Diversity Center (DC) supports these efforts by coordinating programs such as cultural hours, special events, discussions, films and other educational programs. Activities range from cultural exchange presentations and celebrations to workshops and training

on a variety of diverse topics. The DC student lounge provides a comfortable atmosphere where students can gather as well as study. Student-use computers, internet access, a large screen TV, kitchen and social area are available. Everyone is welcome.

Outdoor Program (OP)

www.oit.edu/op

The Oregon Tech Outdoor Program (OP) is a student-funded and student-led organization that allows students to enjoy fun activities and beautiful scenery that surrounds them for an extremely low & reasonable price!

Past trips have included:

- Skiing/Snowboarding trips
- Mountain Biking
- Hiking
- Backpacking
- Fishing
- Skydiving
- White Water Rafting
- Snowshoeing
- Camping
- Hot Springs
- Theme Park trips
- Lava Bed Caving (Spelunking)
- Mountain Climbing
- Rock Climbing
- Canoeing

In addition to sponsoring trips the OP also offers low-cost rental equipment for a variety of outdoor activities.

Residence Hall Association (RHA)

www.oit.edu/rha

Each student living on campus is automatically a member of the Residence Hall Association. The organization works with Residence Life staff to promote, organize, and

implement programs and activities for on-campus students. Throughout the course of the year, RHA sponsors events and activities to provide social, cultural and educational enrichment. RHA also serves as a liaison to convey resident concerns related to housing,

food service and development programs for students in order to provide an educational environment that maximizes opportunities for student growth, development and equal access to education.

Oregon Tech Veterans Association (OVA)

www.oit.edu/ova

The members of the OVA are dedicated to satisfying the needs of any veteran of the Or-

egon Tech and KCC community during and after their time as a student, staff, or faculty. OVA reaches out to the greater Oregon Tech and Klamath community and seeks ways of

building friendships and partnerships that are based on the same honor, duty, loyalty, and selfless service instilled in all veterans.

Women's Resource Center

www.oit.edu/women

Community • Outreach • Education • Support.

Acknowledging the complexities of women's identities, the WRC facilitates choices and

change through programs, counseling, and workshops, and serves as the central resource for educational and supportive services for women. The Center is coordinated by a team of Oregon Tech students focusing on healthy relationships, stress management, leadership,

networking and professional development. The inclusive environment of the WRC offers a place to study, meet others and participate in events scheduled throughout the year.

Housing and Residence Life

Housing Office Residence Hall, A 151
(541) 885-1094
housing@oit.edu
www.oit.edu/housing

Housing and Residence Life encourages self-responsibility, a necessary ingredient for the accomplishment of academic, social and personal objectives. Accordingly, every attempt is made to provide the environment to accomplish this aim. Studies have indicated that much of the knowledge required for success in life is gained outside the classroom. Oregon Tech's Housing and Residence Life program provides a vital aspect of a student's educational experience. Emphasis is on providing accommodations that are attractive, safe, reasonably priced and that offer stimulating programs that satisfy individual needs for privacy, community life, diversity in living arrangements and educational growth. In the Housing Office, students can make

arrangements for a room, receive assistance with personal matters, consult with staff, make suggestions for improvements, work out financial details and receive assistance for a variety of housing related concerns and interests.

Residence facilities at Oregon Tech are operated on a self-supported financial basis and house up to 750 male and female students. Living in college housing relieves the student of many time-consuming and expensive tasks, including driving to and from campus. With this extra time and financial savings, students are able to devote more energy to their studies, to participate in non-academic learning experiences, to enjoy recreational and stress-relieving pursuits and to make new and often lifelong friends.

Information about on-campus housing is sent to all students admitted to Oregon Tech.

Students living on campus for the first time must sign up for the meal plan. If you need a housing or meal plan application, please visit our webpage at www.oit.edu/housing and click on Apply Now!

Applications for on-campus housing should be completed and returned as soon as possible to the Housing and Residence Life Office. Space is guaranteed to new students who apply before May 1 for the following academic year.

Room-and-Board Rates

Room-and-board rates at Oregon Tech are announced publicly after university approval. Current rate information and any other information concerning Housing can be obtained from the Housing and Residence Life Office, Oregon Tech, 3201 Campus Dr., Klamath Falls, OR 97601-8801, or online.

Student Media

The EDGE - Student Newspaper

<http://ottheedge.com/>
Oregon Tech's student newspaper, *The Edge*, is a weekly publication written by students from

all majors and produced by a student staff. Published fall, winter and spring terms, it is available online, with The Ledge (annual

satirical issue) distributed in printed format. Academic credit is also available by enrolling in journalism courses.

KTEC Campus Radio Station

www.oit.edu/ktec

89.5 FM

Request Line: 541-885-1648

Having hit the milestone of their 60th year

of operation in the spring of 2012, KTEC is the campus radio station and is the oldest FM station in Southern Oregon. KTEC is operated by student staff and volunteers and programmed to serve the interests of the

Oregon Tech student body and the Klamath Falls community.

Oregon Technical Broadcasting (OTB)

www.oit.edu/otb

OTB is the student-run video production program at Oregon Tech. OTB films campus

events, creates a video-blog series, and provides video services to campus organizations upon request.

University Services

Bookstore, Tech Nest

College Union, 1st Floor
(541) 885-1050
bookstore@oit.edu

The Tech Nest is a full-service campus store. Besides traditional new and used textbooks and course packs, the Tech Nest offers students the option to rent their textbooks or choose from a variety of digital text options. At the end of each term, the store has a book buy-back program allows students to sell

back books they do not wish to keep after taking a course.

In addition to course related text and supplies, The Tech Nest carries a wide variety of contemporary items: school, office and residence hall supplies; scientific calculators; writing instruments; emblematic clothing and gifts; computer supplies; software and general reading books. If something is out of stock, the staff can always special order it in

store. And online ordering is available 24/7 through the website www.oregontechshop.com. The website also features an expanded apparel, gift and supply selection.

Mailing supplies such as stamps and packing material may be purchased at the Tech Nest, and packages can be shipped via Federal Express from the store.

Campus Dining

College Union, 2nd Floor
(541) 885-1076
www.oit.edu/dining

Dining services, provided by Sodexo Inc., offer a dining program complete with services in several locations across campus, and menu selections that include just about every item you can imagine.

The Marketplace features a wide variety of fresh food designed to satisfy everyone's appetite with food choices to rival restaurant favorites. The Bistro is a quick-serve coffee/espresso and light meals venue located on the first floor of the College Union. Hootie's, located in the DOW building, and Duffie's,

located in the Purvine building both offer a variety of fresh items to get you going in the morning or for a quick pick-me-up between classes. The Night Owl, the residence hall snack bar, is open only at night and offers a selection of beverages and snacks to satisfy that late night hunger.

Career Services

Learning Resource Center 228
(541) 885-1020
career@oit.edu
www.oit.edu/career-services

The Career Services Office supports student and alumni efforts to develop and achieve career goals. Services include: individual career advising; workshops and classroom presentations on résumé-writing, job inter-

viewing, job search and applying to graduate school; on-campus employer recruitment, whereby companies and government agencies interview students for career and internship opportunities; Career Fairs, which bring employers and students together on campus to discuss career opportunities informally; career-resource materials and job listings; and a résumé referral service, which supports student applications for employment and

graduate school.

Career Services also coordinates the Student Employment Service, which provides part-time employment for students both on and off campus with local employers. Positions are available through the College Work-Study program or through regular employment.

Disability Services

Learning Resources Center 222
(541) 851-5179
(541) 885-1072 Text Telephone
access@oit.edu
www.oit.edu/ds

The Office of Disability Services coordinates academic, housing and program services accommodations for students with documented physical, learning, sensory, psychiatric and other disabilities. Students with disabilities

who anticipate needing services on campus should contact this office well in advance of attendance at Oregon Tech to arrange for timely services.

Document Resource Center

College Union, 1st Floor
(541) 885-1059
servicecenter@oit.edu

The DRC is a one-stop shop for printing and bulk mailing needs. Services are available to faculty, staff and students.

Black and white, color, digital printing as well as laminating, comb binding and gluing are available at low costs. Electronic job submission provides the campus with access to services and completed jobs can be delivered to campus mail boxes within 24 hours.

Mail services include bulk mailing; mail merge; folding and inserting; and postcard mailings. Special requests will be addressed on an individual basis. Hours of operation are 7 a.m. to 5 p.m. Monday through Friday.

Information Technology Services

Boivin Hall
(541) 885-1720
(541) 885-1470 Helpdesk/Service
(503) 821-1289 Wilsonville Helpdesk

Information Technology Services provides computing and telecommunications resources for the Oregon Tech campuses. Primary service and support areas include e-mail and network storage for all students,

faculty and staff; broadband network connectivity between all Oregon Tech buildings; and advanced technology services such as wired and wireless Internet connections, Internet 2 and interactive videoconferencing. In conjunction with Oregon Tech faculty, staff and students, ITS strives to offer the comprehensive and advanced technologies necessary to meet educational needs and to help facilitate instruction and research on the

Oregon Tech campus.

Oregon Tech offers more than 500 computers available for student use on the Klamath Falls campus. The Wilsonville campus have more than 300 computers for student use. ITS supports the computers and projectors in campus laboratories and classrooms to insure proper function and availability for faculty and students.

Integrated Student Health Center (ISHC)

(541) 885-1800
(541) 885-1866 Fax
health@oit.edu

The Integrated Student Health Center, located at the main campus in Klamath Falls, provides general medical care for illnesses and accidents, medical referral, counseling and wellness programs. Students taking six or more on-campus credit hours pay the annual Student Health fee, which covers most services offered by the clinic (including counseling, medical appointments, and a variety of other services). Students with less than six credit hours can utilize ISHC services by paying the student health fee.

Health Requirements to Register

The following health requirements must be fulfilled before registration. Documentation of requirements must be submitted to the Oregon Tech ISHC. Failure to complete these requirements will result in a "health hold" on the student's account, affecting a student's ability to conduct Business Office transactions and to register for courses.

1. Completed Health History and TB Risk Assessment forms. These forms are mailed to all students when they confirm registration.

2. Evidence of adequate immunizations (e.g., official immunization record, signed statement by a physician, immunizations on official high school transcript, etc.) including:
 - Two doses of measles/mumps/rubella vaccine (MMR) are required for all full-time college students born on or after Jan. 1, 1957. The first dose must be given after the first birthday. The second dose must be after 1989.*
 - Recent Tdap (tetanus/diphtheria/pertussis), hepatitis A/B, polio, varicella (chickenpox), HPV (Human Papillomavirus Vaccine), influenza, and meningococcal vaccines. The ISHC can administer most of these vaccines for a small fee.

* This requirement is supported by: Oregon Administrative Rule 333-050-0130 and the American College Health Association Guidelines: Recommendations for Institutional Prematriculation Immunizations, April 2014.

Medical Clinic Services

Oregon Tech's ISHC health care providers are committed to providing high quality, personalized care. The medical clinic is staffed by a physician, advanced practice nurse, registered nurse, psychiatric nurse practitioner, and a

massage therapist. Diagnosis and treatment of acute and chronic illnesses; gynecological exams, birth control and emergency contraception; routine laboratory procedures; immunizations; wart removal; minor surgery; and care of minor injuries are some of the services provided. Major emergencies are referred to Sky Lakes Medical Center adjacent to the Klamath Falls campus. Referrals are made to specialists as needed. Visits are free with low costs for medications, laboratory work, immunizations, and some treatments.

Counseling Services

Counselors are available to discuss personal, academic and career concerns. Crisis services are available and referrals are made to community resources if needed. Sessions are confidential and are provided free of charge to students enrolled for six or more on-campus credits. Students enrolled for five or fewer credits can receive one free assessment session, and then may access additional services by paying the Student Health fee.

Personal counseling focuses on concerns such as self-esteem, relationship issues, academic performance, family difficulties and troubled sleep. Some specific issues dealt with are: depression; anxiety, substance abuse, suicide, conflicts with parents, spouses or children; loneliness; dating problems; study skills; coping with past or present abusive situations; and grief. Testing is also available for

Learning Disabilities and Attention Deficit Hyperactivity Disorder for additional fees.

Wellness Programs

A Health Educator is on staff to assist students in staying healthy and fit while attending Oregon Tech. Free individual appointments are available for personalized health and fitness programs, BMI testing, nutrition education and smoking cessation. Awareness events and health promotion programs are also provided on a regular basis campus-wide. Please call the ISHC to make an appointment or learn more about various campus-wide wellness activities.

Student Health Advisory Committee (SHAC)

SHAC serves as an advisory committee to the ISHC. Students provide input on programs and services provided, generate new ideas and participate in wellness and promotion events. All students are welcome to apply to join this committee. SHAC meets on a monthly basis during the academic school year. Call or visit the ISHC to apply.

Peer Health Educator Program

The Oregon Tech Peer Health Education Leadership program gives students the op-

portunity to develop public speaking, leadership, and public health skills while providing a resource for health information to the Oregon Tech community. The mission of the program is "Helping people make informed, voluntary, health-promoting behavior changes." Student volunteers are called Peer Health Educators (PHEs), who work with peers through education and outreach. They receive training to gain facilitation skills, public speaking experience and knowledge about college health issues. Students in good academic standing and with sophomore status or above may apply during Winter Term. Opportunities for others to volunteer and assist PHEs are available throughout the year. For more information, visit www.oit.edu/health/peerhealth.

Fees/Charges

As indicated previously, students taking six or more on-campus credit hours pay an annual Student Health fee. This fee entitles students to services offered by the medical clinic, counseling and wellness programs. Other students can use the center if they pay the health fee. Office visits are free for illness and injury, evaluation, treatment, questions and other reasons. However, additional charges may be necessary for medications, treatments, supplies, immunizations and laboratory tests. Costs for these services and supplies are kept

well below the market price for student affordability. No cash is necessary at the time of visit. All medical expenses rendered outside the ISHC from private physicians, laboratories, or hospitals are the student's financial responsibility.

Student Health Insurance Plan (SHIP)

Purchasing Oregon Tech student health insurance is on a voluntary basis. If you do not have health insurance from an alternative source, you are strongly encouraged to look at purchasing the voluntary health insurance plan. International students and students in certain programs/externships will continue to have to meet requirements for health insurance through a hard waiver. The waiver must be completed within the first 14 days of a term before a refund can be given. Once completed, the waiver will cover the entire academic year. Students taking six or more on-campus credit hours (who pay the Student Health fee) remain eligible for services at the ISHC, even if the SHIP is waived.

Library Services

(541) 885-1772
www.oit.edu/libraries

The University Libraries consist of the Klamath Falls library located on the first and second floors of the Learning Resources Center building on the Klamath Falls campus, the Shaw Historical Library located on the second floor of the LRC, and the Wilsonville library located on the fourth floor of the Wilsonville campus building. Online catalogs provide access to the collections of the University Libraries, while web-based databases offer students access to extensive information sources. All electronic resources are available on both campuses and via remote access in order to promote student learning regardless of location. Research services include print

and electronic reserves, interlibrary loans, individual research assistance, and chat reference. Campus librarians offer class-related instruction in the use of the library and information resources, workshops on various topics, classes in research methods, and tours

Klamath Falls Library

The Klamath Falls library contains approximately 150,000 volumes, including government documents; access to more than 18,000 print and electronic journals; and unique digital and special collections. For librarian assistance, call 541-885-1772 or email libtech@oit.edu.

Wilsonville Library

The Wilsonville library houses a print collec-

tion on-site focusing on local programs, and will request any other resources as needed. For assistance call 503-821-1260 or email libtech@oit.edu.

Shaw Historical Library

The Shaw Historical Library, established in 1983 by Laurence and Dorothy Shaw, houses books, art, maps, manuscripts, photographs, and other materials on the history, cultures and natural history of the Land of the Lakes—South Central Oregon, Northern California, and Northwestern Nevada. The Journal of the Shaw Historical Library is available for purchase at the Oregon Tech bookstore. For more information call 541-885-1686 or email Shawlib@oit.edu.

Student Success Center (SSC)

Learning Resource Center, 2nd Floor
(541) 851-5179
ssc@oit.edu
www.oit.edu/ssc

The Student Success Center (SSC) is a multi-purpose department designed to enrich learning, teaching, and student success at Oregon Tech. The SSC consists of Testing, Peer Consulting (Tutoring), TOP, Breakfast Club, Disability, and Career Services. The SSC helps students succeed by providing effective academic assistance, support, and resources

through promotion of student learning, personal growth, and programs designed to enhance instruction, advising, involvement, satisfaction, achievement, retention, persistence, graduation, and post-graduate success. The SSC provides peer tutoring for matriculated Oregon Tech students, academic success (ACAD) classes, accommodations for students with disabilities, test proctoring, the campus writing center, as well as many other services to support students, staff, and faculty in an effort to facilitate student success at Oregon Tech. In addition, the SSC assists with

faculty orientation, support, and development efforts, including September Institute and Advisor Training for new faculty. The SSC also functions as the University Testing Center by offering testing, distance testing, placement testing, test proctoring, and other standardized testing programs.

The SSC is an integral part of Oregon Tech's student success initiatives and strives to provide effective programs and services to create a welcoming, supportive, and successful campus.

Tech Opportunities Program

Learning Resource Center 228
(541) 885-1125
TOP@oit.edu
www.oit.edu/TOP

The Tech Opportunities Program (TOP) is a federally funded (Student Support Services

TRIO) academic support program designed to assist highly motivated students who are also low income, first generation or students with disabilities. TOP staff work closely with participating students to comprehensively assess academic and financial needs and to develop personalized plans for college success.

Participants may be eligible for a variety of academic support services, including group and/or individual tutoring and related support; mentoring; networking with other students; college-success workshops and classes; additional academic advising; and limited financial assistance.

University Development

Snell 213
(541) 885-1130

The University Development Department is charged with providing financial support of Oregon Tech's mission by connecting donors, alumni, and friends with philanthropic opportunities at the university in partnership with the Oregon Tech Founda-

tion. University Development works to build positive relationships with students, faculty, staff, alumni and friends of the university to enhance and create opportunities that foster a tradition of philanthropic support. University Development engages in initiatives and activities that embody institutional values and position Oregon Institute of Technology among the nation's leading technological and

health professions universities. Fundraising, alumni relations, community outreach and other activities serve to promote the distinctive role and numerous educational, research and public service contributions of Oregon Tech throughout our communities, the nation, and internationally.

The Oregon Tech Alumni Association

(503) 821-1145
alumni@oit.edu
<https://alumni.oit.edu>

The Alumni Relations office promotes interactions and loyalty of alumni and currently enrolled students toward Oregon Institute of Technology. Services and activities include regional social events, student activities, reunions and continuing education programs. Alumni have the opportunity to keep in

touch with other alumni through the university's alumni Web page and other means of communications regarding their academic major and Oregon Tech.

The Oregon Tech Alumni Association, established in 1949, is guided by the Alumni Advisory Board and exists to support and promote Oregon Tech as a premier learning institution and to provide a structure for alumni affiliation. Membership is free and

automatic to anyone who has completed at least 90 credits at Oregon Tech. Areas of special interest for the Alumni Association include assisting the university with new-student recruitment activities, career networking, social and educational activities and the financial support of Oregon Tech. The Alumni Association is an affiliated organization of the Oregon Tech Foundation.

The Oregon Tech Foundation

Snell 212
(541) 885-1130

The Oregon Tech Foundation was established to support the educational, cultural, charitable, and service activities of Oregon Institute of Technology through philanthropic support. Established as a 501(c)(3) tax-exempt organization, the Foundation is a separate legal entity from the University and is the designated charitable arm of the University.

The Foundation is governed by a Board of Directors that represents a broad range of community leaders, alumni and private benefactors. The Foundation board of directors is tasked with management and growth of the assets of the Foundation and for participating in fundraising efforts of Oregon Tech.

The Foundation has enriched the University and student life by combining their efforts with the Oregon Tech administration and community leaders to accomplish some of the most notable projects on campus:

- Martha Anne Dow Center for Health Professions
- Jesse A. Crabtree Civil Engineering Learning Plaza
- Danny Miles Court floor and scoreboard replacement
- Shaw Historical Library
- John F. Moehl football stadium

On average, the Foundation provides approximately \$1 million to Oregon Tech, a large part of which is committed to the support of numerous scholarships that are

awarded primarily on the basis of academic achievement and financial need and for academic excellence.

The Foundation works closely with its affiliated organizations, including the Oregon Tech Alumni Association and the Shaw Historical Library.

Geo-Heat Center

Boivin Hall, 102
(541) 885-1750
geoheat@oit.edu
<http://geoheat.oit.edu>

The Oregon Renewable Energy Center encompasses Oregon Tech's Geo-Heat Center. Established in 1975, Geo-Heat is active in research, technical assistance and information services in geothermal direct-use, small-scale power generation and ground-source heat pumps. Research activities have included hydrology and geochemistry studies, district heating, downhole heat exchangers, heat pumps, agri-business applications, low tem-

perature Rankine cycle power generators and resource assessment.

As funding allows, the Center provides technical assistance for geothermal projects in the area of equipment and materials selection, feasibility studies, design, troubleshooting and economic evaluations. The Center also provides training sessions and information dissemination regarding the direct applications of geothermal energy, small-scale power generation and ground-source heat pumps.

The Center also publishes technical papers, software and monographs on geothermal

energy. Most publications are available on the Center's website, and also through the National Geothermal Data System (NGDS). Archival publications are available through Oregon Tech's library system. The staff has made presentations worldwide and gives tours of local geothermal installations. They are active in professional organizations such as the Geothermal Resources Council, the International Geothermal Association, International Ground-Source Heat Pump Association, and ASHRAE. An extensive Web site on geothermal energy is available at: <http://geoheat.oit.edu>.

Oregon Renewable Energy Center

The Oregon Renewable Energy Center (OREC) was established by the Oregon State Legislature in 2001 to promote energy conservation and renewable energy use in Oregon and throughout the Northwest. This is accomplished through applied research, educational programs and workforce development, and technical assistance and information dissemination. The Center also encompasses Oregon Tech's Geo-Heat Center. OREC draws its strong technical expertise from the Oregon Tech faculty, whose engineers and computer scientists have been involved in applied research in renewable energy for decades.

OREC:

- Investigates renewable energy technologies and opportunities for using them.
- Assesses which technologies are appropriate for particular circumstances.
- Applies promising technologies with effective instrumentation and controls.

- Evaluates technologies using testing and economic analysis.
- Supports Curriculum Development and student learning experiences
- Informs the public through classes, educational materials, and technical data.

Current OREC applied research and applications engineering projects focus on:

- Power conversion and storage – Testing renewable technologies such as solar, fuel cells, and geothermal heat pumps and developing control systems to smoothly integrate renewable technologies into existing facilities and electrical distribution networks.
- Alternative fuel sources – Investigating electric and biodiesel power options for cars and trucks.
- Green building technologies – Utilizing green building materials and techniques, and instrumentation, control and testing of buildings that use renewable

energy instead of conventional power.

- Grid integration of renewable energy sources (smart grid with smart buildings)

Renewable Energy Engineering (REE) Degree Program

The Renewable Energy Engineering undergraduate degree program offered by Oregon Tech is the only one of its kind to be ABET accredited. We now also have an MS REE degree. In addition to the REE courses, the general Oregon Tech curriculum includes classes and laboratories in renewable energy and sustainability that are available to students in other disciplines. The BS REE is delivered on both the Wilsonville and Klamath Falls campuses. The MSREE degree is delivered only on the Wilsonville campus

Youth and High School Programs

www.oit.edu/youth-programs

Oregon Tech's Youth Programs offers innovative and energizing pre-college educational outreach programs designed to encourage K-12 students to pursue educational and career goals in science, technology, engineering and mathematics (STEM). The goals of our programs are to:

1. Increase understanding and interest in STEM careers among participants;
2. Build confidence in their technical abilities; and
3. Introduce them to role models and mentors.

Youth Camps

GEAR UP

A series of special programs, created in partnership with Oregon GEAR UP, to ensure that Oregon's low-income middle school and high school students are prepared for, pursue and succeed in post-secondary education.

I'm Going To College

In partnership with NELA, this day program brings sixth-grade students to campus to expose them to college. The students attend classes, tour Oregon Tech, and have lunch. A follow-up meeting with parents will be hosted by students' elementary schools.

MATHCOUNTS

An annual competition in February that challenges students' math skills, develops their self-confidence and rewards them for their achievements. Open to sixth-, seventh- and eighth-grade students in the Klamath Basin, this program gives students the opportunity to participate in individual and team competitions. The top students advance to the state and national levels.

Directories

Governance Oregon University System

Since its founding in 1947, the Oregon Institute of Technology was governed by the Oregon State Board of Higher Education, the governing board for the seven public universities in Oregon. In April 2014, the State Board of Higher Education authorized the Oregon Institute of Technology to

establish a Board of Trustees, appointed by the Governor and approved by the Senate, without conditions.

Effective July 1, 2015, the University became an “independent public body” governed by the Board of Trustees with every authority

necessary or appropriate for the operation of a major public research university. The Oregon Tech Board of Trustees will approve the University’s mission, programs, budgets, and strategies, and then forward them to the Higher Education Coordinating Commission for review and approval in relation to the other seven publicly-assisted universities.

Oregon Tech Board of Trustees

Members and term expiration dates:

Jeremy Brown, 2018

Melissa Ceron, 2016

Jessica Gomez, 2016

Lisa Graham, Chair, 2018

Dana Henry, 2016

Kathleen Hill, 2018

Gary Johnston, 2018

Christopher Maples, ex-officio

Kelley Minty Morris, 2018

Celia Núñez, 2018

Dan Peterson, 2016

Steve Sliwa, Vice-Chair, 2018

Paul Stewart, 2018

Fred Ziari, 2018

Administrative Offices

President, Christopher G. Maples

Provost and Vice President for Academic Affairs, Brad Burda

Vice President for Finance and Administration, MaryAnn Zemke

Vice President for Student Affairs and Dean of Students, Erin Foley

Associate Provost and Vice President for Research, Mateo Aboy

Associate Vice President and Chief Information Officer, Paul Rowan

Associate Vice President for Communication and Public Affairs, Di Saunders

Associate Vice President for Strategic Partnerships, Dolores “Lita” Colligan

Associate Vice President for University Development, Tracy Ricketts

Dean, College of Engineering, Technology and Management, Vacant

Dean, College of Health, Arts and Sciences, LeAnn Maupin

Academic Agreements, Marla Edge, Director

Admissions, Carl Thomas, Director

Assessment, Sandra Bailey, Director

Athletics, Mike Schell, Director

Board Secretary, Oregon Tech Board of Trustees, Sandra Fox

Business Affairs, Michelle Meyer, Director

Campus Life, Joseph Maurer, Director

Campus Security, Ed Daniels, Director

College Union, Shellie Wilson, Manager

Facilities Management and Planning Services, Vacant

Financial Aid, Tracey Lehman, Director

Housing and Residence Life, Mandi Clark, Director

Human Resources and Affirmative Action, Ron McCutcheon, Director

Institutional Research, Vacant

Integrated Student Health Center, Gaylyn Maurer, Administrative Director

Library Services, Kelly Peterson-Fairchild, Director

Online Learning, Erika Veth, Director

Oregon Renewable Energy Center, Vacant

Procurement, Contracts and Risk Management, George Marlton, Executive Director

Registrar’s Office, Wendy Ivie, University Registrar

Seattle at Boeing, Vacant

Student Success Center, Dan Ziriach, Director

Oregon Tech Foundation Board of Directors

Diedra Thompson, President
 James Blair, Vice President
 Andrew Peterson, Treasurer
 Kristi Redd, Secretary
 Mark Bansemer
 Lance Bishop
 Don Boyd
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 Susan Laubengayer
 James McCobb
 John Novak
 Jean Pinnering
 Joan Staunton
 Nancy Wendt

Ex-Officio

Christopher Maples, Oregon Tech President
 Mary Ann Zemke, Oregon Tech Vice President for Finance and Administration
 Raphael Santiago, Oregon Tech Alumni Advisory Board President
 Steve Kandra, President, Shaw Historical Library

President's Advisory Council

Cecelia Amuchastegui, Educational Consultant, 2016

Dianne Appell, Engineering Senior Manager, The Boeing Company, 2017

William Buckley, Attorney at Law, Buckley LeChevallier P.C., 2018

Adam Burwell, Entrepreneur/Consultant, 2018

Ann Cavanaugh, Vice President, Smith Bates Marcomm Solutions, 2016

James DeHoog, President, Arctic Engineering, Inc., 2018

Lisa Graham, Vice President and COO, Bend Research, Inc., 2015

Daniel M. Hallesy, Ultrasound Sales Manager, Esaote North America, Inc., 2017

Denise Honzel, Healthcare Consultant, 2016

Sally Jones, Community Member, 2018

Jill Mason, Dental Hygienist/Education, Oregon Health & Science University, 2018

Steven Mays, President, Electronic Wood Systems, Int., 2018

Kelley Minty Morris, Outreach and Development, Citizens for Safe Schools, 2016

Carla McKelvey, MD, MPH, North Bend Medical Center Pediatrics, 2018

Patricia Smullin, President, California-Oregon Broadcasting, Inc., 2018

Paul Stewart, President and CEO, Sky Lakes Medical Center, 2015

Steve Vincent, Regional Business Manager, Avista, 2015

Heidi Wright, President and Publisher, Klamath Publishing LLC/Herald and News, 2017

Robert Wynne, President and General Manager, Wynne Broadcasting Company, 2016

Administration

Jan Abeita (2005), Access Services Manager, Library Services. B.S. (1990), Eastern Oregon University; M.S. (1992), Southern Oregon University

Mateo Aboy (2005), Associate Provost and Vice President, Research, Electrical Engineering, and Renewable Energy. B.S. (2002), B.S.E.E. (2002), M.S.E.C.E. (2004), Portland State University; Dipl. Ing. (2003), M.Phil. (2004), Ph.D. (2005), ETSIT-University of Vigo; Exec. Cert. (2007), Massachusetts Institute of Technology; M.B.A. (2011), University of London. Registered Professional Engineer (PE), European Union (COIT No. 12684). Registered US Patent Agent (USPTO Bar Admission No. 64040). Certified Licensing Professional (CLP).

Holly Anderson (2012), Assistant Director-Campus Visits and Programs, Admissions. B.S. (2008), Warner Pacific College.

Diana Angeli (2006), Executive Assistant, Vice President, Finance and Administration.

Angela Archer (2010), Coordinator, Tech Opportunities Program. B.S. (2009), Oregon Institute of Technology.

Sandra L. Bailey (2000), Director, Assessment. B.S. (1985), Utah State University; M.Ed. (2005), Oregon State University.

Jennifer Bavarskas (2005), Health Educator, Integrated Student Health Center. B.A. (1991), University of Oregon; M.S. (2000), San Jose State University.

Karen Blevins (2013), Payroll Supervisor, Business Affairs.

Carrie Blomquist (2014), Online Faculty Support Specialist, Online Learning. B.S. (2009), Oregon Institute of Technology; M.B.A. (2013), Southern Oregon University.

Brad Burda (1983), Provost and Vice President, Academic Affairs. B.S. (1972), Iowa Wesleyan College; M.A. (1982), California State University, Long Beach.

Kelly Caleb (2007), Athletic Trainer, Athletics. A.S. (1996), Oregon Institute of Technology; B.S. (1999), Oregon State University; M.S. (2015) Capella University,

Katie Cavendish (2015), Executive Assistant to Associate Vice President, Development

Andrew Chiasson (2011), Program Manager, Geo-Heat Center. M.S. (1999), Oklahoma State University; Ph.D. (2007), University of Wyoming.

Cindy Childers (2006), Accounts Receivable Manager, Business Affairs. B.S. (2004), Oregon Institute of Technology

Mandi Clark (2004), Director, Housing and Residence Life. B.A. (1997), Kansas State University; M.S. (1999), University of Nebraska.

Jason “Jake” Coatney (2007), Senior Counselor, Financial Aid. A.A. (2002), College of the Siskiyous; B.S. (2005), Eastern Oregon University.

Dolores “Lita” Colligan (2007), Associate Vice President, Strategic Partnerships. B.A. (1975), University of California, Santa Cruz.

Barbara Conner (2013), Coordinator, Testing, Tutoring, and Retention. B.S. (1985), Texas A & M; M.Ed. (2004), University of Southern Maine.

Chris Cook (2014), Grounds Supervisor, Facilities Management Services

Jeffrey Corkill (2013), Head Golf Coach, Athletics. B.S. (1976), California Polytechnic University.

Marisela Cornejo (2013), Counselor, Admissions. B.A. (2013), Southern Oregon University.

Jason Corwin (2010), Volleyball Coach, Athletics. B.A. (1999), Western Oregon University; M.A. (2004), Pacific University.

Edward Daniels (1988), Director, Campus Safety

Julie Daniels (2007), Scholarship Officer/Counselor, Financial Aid. B.A. (2003), Southern Oregon University.

Lindsey Davis (2013), Assistant Director-Recruitment, Admissions. B.A. (2008), University of Idaho; M.A. (2010) Washington State University

Carleen Drago Starr (2013), Coordinator, Academic Agreements. B.S. (2005), Oregon State University; M.A.I.S. (2007), Oregon State University.

Melissa Dubois (2014), Director, South Metro-Salem STEM Hub. B.S. (1999), Northeastern University, Ph.D. (2005), University of Wisconsin.

Marla Edge (1983), Assistant Professor; Director, Academic Agreements. B.S. (1976), M.Ed. (1989), Oregon State University.

Chris Erbland (2014), Assistant Director-Operations, Admissions. B.S. (2001), College of Charleston.

Erin Ferrara (2014), Disability Services Coordinator, Student Success Center

Kacie Flagor (2014), Annual Giving Manager, Foundation. B.S. (2004), Oregon Institute of Technology.

Erin Foley (1999), Vice President of Student Affairs; Dean of Students. B.S. (1988), University of Arizona; M.A. (1991), Michigan State University; Ph.D. (1996), Indiana University.

Sandra Fox (2014) University Board Secretary.

Michelle Frei (2013), Counselor, Financial Aid.

Michael Garrard (2007), Coordinator of Sports Marketing/Promotion, Athletics.

Alden Glidden (1978), Associate Professor; Medical Director, Student Health Center. B.S. (1965), University of Michigan, Ann Arbor; M.D. (1969), Wayne State University.

Bill Goloski (2011), Manager, Publications and Graphic Design. B.F.A. (2004), Cazenovia College.

Jan Goodyear (1999), Career Advisor, Student Success Center

Sandi Hanan (2008), Employment Specialist/Records Manager, Human Resources. A.S. (1999), Oregon Institute of Technology; B.S. (2013), Oregon Institute of Technology.

Lori Harris (2009), Senior Fiscal Manager, Business Affairs. A.S. (1983), Oregon Institute of Technology.

Michael Healy (2013), Lab Manager, CSET.

Remington Henderson (2015), Counselor, Admissions. B.A. (2014), Claremont McKenna College.

Sonja Holcomb (2010), Assistant Registrar, Registrar's Office. B.S. (2005), Oregon Institute of Technology; M.A. (2007), Southern Oregon University.

Tracie Houtz (2013), Associate Director, Human Resources. B.S. (2007), Eastern Oregon University.

Trish Hower (2009), Executive Assistant, Vice President for Research/Associate Provost. B.A. (2004) Oregon State University

Jill Hubbard (2013), Network Director, South Metro-Salem STEM Hub. B.S. (1987) Boston University; M.Ed. (2003) Portland State University.

Josie Hudspeth (2014), Student Engagement & Leadership Coordinator, Campus Life. B.A. (2011), California State University, Fullerton; M.A. (2013), California State University, Fullerton.

Wendy Ivie (1999), University Registrar, Registrar's Office. B.S. (1997), Oregon State University; M.S. (2005), Southern Oregon University.

Mark Kasper (2006), Custodial Supervisor, Facilities Services.

Jennifer Kass (2015), Associate Director-Career Services, Wilsonville

Michal Kawka (2015), Academic Specialist, Student Success Center

Jack Kegg (2011), Head Track & Field and Cross Country Coach, Athletics. B.S. (1996) Western Oregon University.

James Lake (1988), Maintenance Supervisor, Facilities Services. A.S. (1984), Sierra College.

Tracey Lehman (1999), Director, Financial Aid. A.S. (1986), Mohawk Valley Community College; B.A. (1988), State University of New York; M.S. (2005), Southern Oregon University.

Thomas Loney (1994), Associate Director, Athletics. B.S. (1992), M.S. (2000), Southern Oregon University.

Janeth Macias (2014), Admissions Coordinator, Wilsonville. B.S. (2011), Eastern Oregon University.

Anne Malinowski (1990), Assistant Registrar & Veterans Certifying Official, Wilsonville Operations.

Christopher Maples (2008), President. B.S. (1980), West Georgia College; M.A. (1985), Ph.D. (1985), Indiana University.

George Marlton (2010), Executive Director, Procurement, Contracts, and Risk Management. B.A. (2000), University of Washington; J.D. (2005), University of Oregon. Member of Washington Bar.

LeAnn Maupin (1997), Dean, College of Health, Arts and Sciences

Gaylyn Maurer (2013), Administrative Director, Integrated Student Health Center. B.S. (1993), University of Houston; M.A. (1996), University of Denver.

Joseph Maurer (2012), Director, Campus Life. B.A. (1994), Duquesne University; M.A. (1996), University of Denver.

Ron McCutcheon (1996), Chief Human Resources and Civil Rights compliance/Diversity Officer. B.A. (1972), Carroll College; M.S. (1976), Eastern Michigan University.

Scott Meredith (2009), Head Women's Basketball Coach, Athletics. B.A. (1987) Humboldt State University, M.A. (2000) St. Mary's College.

Michelle Meyer (2014), Director of Business Affairs, Business Affairs. B.S. (2004), Oregon State University; Certified Public Accountant, Oregon.

Brittany Miles (2011), Industry Outreach and Government Relations Manager, Wilsonville. B.A. (2004), Occidental College.

Daniel Miles (1970), Head Men's Basketball Coach, Athletics. B.A. (1968), Southern Oregon University.

Matthew Miles (2007), Head Baseball Coach, Athletics. A.A. (1992), Oregon Institute of Technology.

Matthew Munhall (2012), Head Men's Soccer Coach, Athletics. B.A. (2007), Principia College; M.S. (2011) Ohio University.

Corey Murphy (2014), Admissions Coordinator, Admissions. B.A. (2011), Oregon State University.

Valjean Newsome (1997), Executive Secretary to Dean of Engineering, Technology, and Management.

Dana Onorato (2013), Director of Student Services, Wilsonville.

Deanne Pandozzi (2002), International Student and Diversity Coordinator, Campus Life and SEVIS. B.S. (2010), Oregon Institute of Technology.

Justin Parnell (2012), Alumni Relations Manager, Development. B.S. (2011), Oregon Institute of Technology.

Adria Paschal (2007), Executive Assistant to the President.

Scott Pigman (2014), Facilities Project and Planning Manager, Facilities Services. B.A. (1989), California State Polytechnic University; (1993), Registered Architect California; (1996) Registered Architect Oregon.

Suzet Petersen (2002), Assistant Director, Financial Aid. A.A. (1996), B.S. (1998), Oregon Institute of Technology.

Leanne Reed (2014), Counselor, Wilsonville. B.A. (1994), Centenary College; M.A. (2005), Southern Methodist University.

Denise Reid (2010), Assistant Director, Business Affairs. B.S. (2008), University of Phoenix; M.S. (2012), University of Phoenix.

Sara Reuter (2009), Director of Sponsored Projects

Anthony "Tony" Richey (2003), Manager, Information Technology Services. A.A. (1989), B.S. (2005), Oregon Institute of Technology.

Tracy Ricketts (2010), Associate Vice President, Development and Alumni Relations. B.S. (1999), University of Oregon.

Paul Rowan (2015), Associate Vice President – Chief Information Officer. A.S. (1973), Foothill College; B.S. (1977), Biola University; M.S. (1991), Ball State University.

Grace Rusth (2011), Academic Partnerships Coordinator, Academic Agreements. B.S. (2009), Oregon Institute of Technology; M.A. (2014), Chicago School of Professional Psychology.

Di Saunders (2014), Associate Vice President, Communication and Public Affairs

Michael Schell (1996), Director, Athletics. B.S. (1995), Oregon Institute of Technology.

Vicky Seger (2010), Benefits and Workers Compensation Manager, Human Resources. A.S. (1982), North Dakota State College of Science.

Rob Shaffer (2013), Coordinator, Peer Consulting, Student Success Center. B.A. (2011), Boise State University; M.A. (2013), Boise State University.

Greg Stewart (2004), Head Women's Softball Coach, Athletics. B.S. (1992), Sterling College.

Nellie Stewart (2007), Executive Secretary to Vice President, Student Affairs. B.S. (2011), Oregon Institute of Technology.

Cynthia Stripling (2013), Office Coordinator, Admissions

Carl Thomas (2011), Director, Admissions. B.S. (1994), MiM (2002), Southern Oregon University.

Jean Turgesen (2004), Counselor, Integrated Student Health Center. A.A. (1987), Clackamas Community College; B.S. (1990), M.S. (1991), Southern Oregon University.

Kendal Vreeland (2012), Coordinator, Wilsonville Admissions. B.S. (2007), Southern Oregon University; M.Ed. (2012), Arizona State University.

Erika Veth (2011), Director, Online Learning. B.A. (2004), University of North Carolina; M.A. (2008), University of Alaska, Anchorage.

Harold "Hap" Wells (1994), Manager, Applications Support. A.A. (1994), Oregon Institute of Technology.

Shellie Wilson (2004), Manager, College Union. A.S. (2001), B.S. (2004), Oregon Institute of Technology; M.B.A. (2009), Southern Oregon University.

MaryAnn Zemke (2008), Vice President, Finance and Administration. A.S. (1975), Lake Michigan College; B.A. (1977), Western Michigan University; M.B.A. (1990), Western Michigan University.

Danny Ziriix (2012), Director, Student Success Center. B.S. (1989), Evangel University; M.S.M. (2010), Oral Roberts University.

Molly Ziriix (2014), Assistant Director, Housing and Residence Life. B.A. (1988), Oral Roberts University

Instructional Faculty

This listing reflects faculty for the 2015-16 academic year. In some cases, changes taking effect for 2015-16 are included in the faculty lists under the department descriptions.

Abdelouahab Abrous (2014), Associate Professor, Manufacturing and Mechanical Engineering and Technology. B.S. (1981), University of Science & Technology, Algeria; M.S. (1984), University of Washington, Seattle; Ph.D. (1988), University of Washington, Seattle. Licensed Professional Engineer, Washington.

Mateo Aboy (2005), Professor, Electrical Engineering and Renewable Energy. B.S. (2002), B.S.E.E. (2002), M.S.E.C.E. (2004), Portland State University; Dipl. Ing. (2003), M.Phil. (2004), Ph.D. (2005), ETSIT-University of Vigo; Exec. Cert. (2007), Massachusetts Institute of Technology; M.B.A. (2011), University of London. Registered Professional Engineer (PE), European Union (COIT No. 12684). Registered US Patent Agent (USPTO Bar Admission No. 64040). Certified Licensing Professional (CLP).

Mark Ahalt (2010), Assistant Professor, Management. B.S. (1973), Indiana University of Pennsylvania; M.P.A. (1978), California State University.

Seth Anthony (2011), Assistant Professor, Natural Sciences. B.A. (2004), North Carolina State University; M.S. (2011), Ph.D. (2014), Colorado State University.

Richard L. Bailey (1991), Professor, Management. B.S. (1984), M.A. (1985), Utah State University. Certified Public Accountant.

Sandra Bailey (2000), Assistant Professor, Management. B.S. (1985), Utah State University; M.Ed (2005), Oregon State University.

James W. Ballard (2000), Associate Professor, Mathematics. B.A. (1973), Union College; M.S. (1983), Colorado State University, Fort Collins; Ed.D. (2000), Montana State University.

Sharon Baudry (2014), Assistant Professor, Management. B.S. (1985), College of New Rochelle; J.D. (2009), Northwestern California University; M.B.A. (2013), Northcentral University. Senior Professional in Human Resources (SPHR).

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Linda S. Young (1983), Professor, Communication. B.S. (1974), Millersville University, Pennsylvania; M.A. (1977), University of Virginia, Charlottesville; Ph.D. (1997), University of Washington.

Gary L. Zimmerman (1995), Professor, Medical Imaging Technology. B.S. (1984), Oregon Institute of Technology; M.S. (1993), University of Wisconsin, Oshkosh. Registered Technologist (R), (MR), (CT), ARRT.

James W. Zipay (2001), Professor, Electrical Engineering and Renewable Energy. A.A.S. (1983), Broome Community College; B.S.E.E.T. (1988), State University of New York, Alfred; M.S.E.E. (1992), University of New Mexico.

Faculty Senate Presidents

1965-1966	Eugene A. Wellman
1966-1967	Max A. Saunders
1967-1968	Arthur A. LeCours
1968	George E. Miller
1968-1969	Dalhart R. Eklund
1969-1970	Walter R. Richartz
1970-1971	William L. Bradford, Jr.
1971-1972	Dale W. King
1972-1973	Larsen S. Svanevik
1973-1974	Sherman A. Anderson
1974-1975	Thomas J. Connors
1975-1976	James J. Boyle
1976-1977	Joseph T. Riker
1977-1978	Robert C. DeRosier
1978-1979	Richard H. Zbinden
1979-1980	Gary E. Wehr
1980-1981	Keith L. Spickler
1981-1982	Earl D. Kurtz
1982-1983	Charles V. Higbee
1983-1984	Charles V. Higbee
1984-1985	Edward Silling
1985-1986	Herbert H. Jolliff
1986-1987	Herbert H. Jolliff
1987-1988	Charles E. Harris
1988-1989	Ross S. Carroll
1989-1990	Pearl O. Juris
1990-1991	John V. Stec
1991-1992	James R. Etchison
1992-1993	James R. Etchison
1993-1994	Bradley D. Burda
1994-1995	Bradley D. Burda
1995-1996	Valerie J. Vance
1996-1997	Valerie J. Vance
1997-1998	David C. Warner
1998-1999	David C. Warner
1999-2000	Alberto Bello, Jr.
2000-2001	Mark Clark
2001-2002	Mark Clark
2002-2003	Timothy Thompson
2003-2004	Bradley D. Burda
2004-2005	Bradley D. Burda
2005-2006	Bradley D. Burda
2006-2007	Mark Neupert
2007-2008	Mark Neupert
2008-2009	Marla Miller
2009-2010	Debbie Caldwell
2010-2011	Matt Schnackenberg
2011-2012	Matt Schnackenberg
2012-2014	Dan Peterson
2014-Present	Robyn Cole

Emeritus Faculty

Marshall Ager, B.S., Assistant Professor, Civil Engineering and Geomatics, 1977-2004.

Randal Albert, M.S., Computer Systems Engineering Technology, 1984-2013

Robert E. Baird, E.E., Professor, Electrical Engineering and Renewable Energy, 1958-1979.

Lynda M. Baker, M.F.A., Professor, Humanities and Social Sciences, 1989-2012.

William Bradford, M.S., Professor, Medical Laboratory Technology, 1960-1986.

Judy Bronkey, M.A., Associate Professor, Director, Ethnic and International Student Services, 1969-1995.

Gene Bruner, M.S., Professor, Electrical Engineering and Renewable Energy, 1982-2004.

Ralph Carestia, M.S., Computer Systems Engineering Technology, 1990-2013

Ross Carroll, Ph.D., Professor of Communication, 1984-2003.

Thomas J. Connors, Ph.D., Professor and Vascular Technology Program Director, 1969-1999.

Harriet Cornachione, M.S., Professor, Civil Engineering, 1995-2010.

Michael Cornachione, M.S., Professor, Civil Engineering, 1992-2010.

Ben Cornelius, M.A., Mathematics, 1980-2013

Jesse Crabtree, Assistant Professor, Civil Engineering Technology, 1947-1976.

G. Gene Culver, B.S., Associate Professor, Associate Director, Geo-Heat Center, 1960-1995.

Hugh Currin, Ph.D., Manufacturing and Mechanical Engineering Technology, 1984-2013

W.M. Douglass, M.Ed., Professor and Dean of Administration, 1954-1983.

Elaine M. Deutschman, M.B.S., Professor, Mathematics, 1983-2004.

David Dyrud, Ph.D., Professor of Communication, 1975-2003.

James R. Etchison, M.Ed., Professor and Chair, Electrical Engineering and Renewable Energy, 1986-2004.

Marian Ewell, B.S., Assistant Professor, Allied Health Partnerships, Clinical Laboratory Science, 2001-2012.

Jeanne Ford, R.N., Assistant Professor, Administrative Director, Student Health Service, 1964-1983.

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James R. Gerhardt, M.S., Professor, Medical Imaging Technology, 1967-1992.

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Charles E. Harris, M.S., Professor, Department of Extended Studies and Summer Session, 1976-1996.

Irving H. (Bud) Hart, III, M.S., Professor, Mathematics, 1972-1999.

Donald R. Hefty, M.S.E.E., Professor, Electrical Engineering and Renewable Energy, 1973-1993.

Charles A. Hermach, M.S., Professor, Manufacturing and Mechanical Engineering and Technology, 1983-1993.

Fred Hess, M.S., Professor, Mathematics, 1969-1991.

Charles V. Higbee, M.B.A., Professor, Business, 1970-1987.

David M. Hull, M.S., Professor, Civil Engineering Technology, 1962-1987.

Margaret Huntley, Professor, Management, 1975-2006.

Herbert H. Jolliff, M.S., Professor and Department Chair, Mathematics, 1968-1999.

Charles Jones, Ph.D., Dean, College of Engineering, Technology, and Management, 1997-2015

Lewis Jones, M.A., Professor, Computer Systems Engineering Technology, 1969-1986.

Pearl O. Juris, M.S., Professor, Nursing, 1977-1992.

Richard A. King, M.S.E.E., Professor, Computer Systems Engineering Technology, 1982-2002.

David G. Korzan, M.S., Professor, Natural Sciences, 1973-2003.

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Arthur LeCours, M.Ed., Professor, Physics, 1959-1982.

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Joseph E. Sarsenski, Ph.D., Professor, Civil Engineering, 1998-2008.

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Edward Silling, Ph.D., Professor, Communication Department, 1975-2003.

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Susan K. Snyder, M.S., Professor, Physical Education, 1964-1995.

John V. Stec, M.B.A., Professor, Management, 1986-1990 and 1992-2007.

James V. Stewart, M.Ed., Professor, Mathematics, 1984-2002.

Charles R. (Dick) Strohkirch, M.S., Professor, Medical Imaging Technology, 1972-1998.

Edward R. Stuedli, D.D.S., Professor, Dental Hygiene, 1976-1998.

Pauline Stuedli, Assistant Professor, Dental Hygiene, 1977-1999.

Rees Stuteville, M. Ed., Professor, Medical Imaging Technology, 1991-2007.

Larsen S. Svanevik, Ph.D., Professor, Natural Sciences, 1966-1997.

Donald P. Theriault, Ed.D., Professor, Assistant to the President, Director of Development, 1962-1986.

Francis M. (Mel) Turner, Associate Professor, Electrical Engineering and Renewable Energy, 1982-2000.

David J. Vargas, M.S.C.E., Associate Professor, Civil Engineering Technology, 1985-1997.

Eric E. Wakkuri, M.S., Professor, Mathematics, 1975-2004.

John G. Ward, M.B.A., Professor, Management Department, 1969-1995.

David C. Warner, Ph.D., Professor, Natural Sciences, 1984-2002.

Gary E. Wehr, M.A., Professor, Department Chair, General Studies, 1969-1996.

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Richard H. Zbinden, B.S.C.E., Professor and Chair, Civil Engineering Technology, 1976-1997.

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Emeritus Administration

Linda "Abbie" Allen, M.S., Student Services Specialist, 1988-2015

Mary J. Bradford, M.S., Aquatics Director/Softball Coach, 1975-2004

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Paula Cloud, Executive Secretary to the President, 1997-2008.

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Nancy K. Cox, Executive Secretary to the President, 1961-1999.

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Ted E. Dobson, M.A., Executive Director, Institutional Advancement, 1986-2001.

William R. Dodge, B.A., Director of Paper Owl Bookstore, 1985-1999.

Martha Anne Dow, Ph.D., President, 1998-2007.

Christian H. Eismann, Ph.D., Professor and Dean of Academic Affairs, 1986-1996.

Sharon Hanson, Media Services Coordinator, Information Technology, 1986-2009.

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Roger Hulet, A.A., Facilities Services, 1983-2014.

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Sandra "Sam" King, Payroll Supervisor, Business Office, 1990-2012.

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Paul Lienau, M.S., Professor and Director of the Geo-Heat Center, 1968-1997.

John Lund, Ph.D., Geo-Heat Center, 1967-2010.

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Daniel J. Miles, B.A., Athletic Director and Men's Basketball Head Coach, 1970-2002.

Beth Murphy, M.S., Assessment, 1990-2010.

J. Samuel Murphy, Ph.D., CFLAT Specialist, Student Services, Assistant Professor,

E. Susan Richards, B.S., Registrar's Office, 1989-2013

Raymond Setters, B.S., Purchasing Manager, Business Affairs, 1989-2008.

Sandra Setters, Benefits Officer, Human Resources, 1989-2008.

Timothy J. Stanaway, Ed.D., Interim Provost and Vice President for Student Affairs, 1975-1999.

Robert Thompson, B.S., Sports Information Director, Athletics, 1993-2007

Gary L. Willhide, M.S., Director, Public Affairs, 1988-2005

Shelby Wilsdon, B.S., Director, Human Resources, 1971-2003.

Douglas P. Yates, Ed.D., Vice President for Finance and Administration, 1980-2002.

Betty J. Young, Office Manager, Business Office, 1961-1999.

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