



# Washington State University Graduate Course Catalog

2017-18



Graduate School

WASHINGTON STATE UNIVERSITY

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## Graduate Education at Washington State University

Washington State University, the state of Washington's land-grant institution, was founded in 1890. The first class of 21 students enrolled on Jan 13, 1892. Since that time, the University has grown steadily in size and diversity. It now contains 12 colleges and a Graduate School, with a total enrollment for all campus locations of more than 28,000. The main campus of nearly 600 acres, located at Pullman in the Palouse country of southeastern Washington, encompasses one of the largest residential universities west of the Mississippi. More than 80 percent of all students live on or near campus. In addition to the main campus, Washington State University offers courses of study at four regional campuses located in Spokane, Tri-Cities (Richland), Everett, and Vancouver, as well as a robust Global campus. In addition, the University maintains over 5,000 acres of farmland and eight agricultural research centers located at various points in the state.

Washington State University offers more than 100 graduate degree programs. Permanent tenure-track faculty number over 1,000 and approximately 70 percent of all full-time graduate students hold positions as teaching, research, and/or staff assistants.

Today, the Dean of the Graduate School administers the diverse graduate programs throughout the University, but the faculty are primarily responsible for directing graduate education. The Graduate Studies Committee of the Faculty Senate, composed of faculty members and graduate students, assists the Graduate School in the establishment of the policies and procedures of the Graduate School.

The Graduate School is committed to helping graduate students become learned scholars, effective researchers, and masters of disciplinary and interdisciplinary knowledge. WSU faculty emphasize both independent scholarship, research, and classroom learning. State-of-the-art equipment is present in the research centers and academic departments to help students conduct their research. Close research collaboration between students and faculty help create an atmosphere that stimulates intellectual curiosity. The individualized nature of graduate education at Washington State University also provides student with considerable flexibility in designing programs of study, and broadens the possibilities for unique creative endeavors.

Contact the Graduate School:

PO Box 641030  
Pullman, WA 99164-1030  
509-335-6424  
Email: [gradschool@wsu.edu](mailto:gradschool@wsu.edu)  
Website: [Gradschool.wsu.edu](http://Gradschool.wsu.edu)

## Academic Calendar

First Semester (Fall)	2017-2018	2018-2019	2019-2020	2020-2021
Classes begin, Monday	Aug 21, 2017	Aug 20, 2018	Aug 19, 2019	Aug 24, 2020
Labor Day holiday	Sept 4, 2017	Sept 3, 2018	Sept 2, 2019	Sept 7, 2020
Midterm grades due, 5:00 p.m.	Oct 11, 2017	Oct 10, 2018	Oct 9, 2019	Oct 14, 2020
Veterans Day holiday	Nov 10*, 2017	Nov 12*, 2018	Nov 11, 2019	Nov 11, 2020
Thanksgiving Vacation	Nov 20-24, 2017	Nov 19-23, 2018	Nov 25-29, 2019	Nov 23-27, 2020
Commencement	Dec 9, 2017	Dec 8, 2018	Dec 7, 2019	Dec 12, 2020
Final Examinations	Dec 11-15, 2017	Dec 10-14, 2018	Dec 9-13, 2019	Dec 14-18, 2020
Final grades due, 5:00 p.m.	Dec 19, 2017	Dec 18, 2018	Dec 17, 2019	Dec 22, 2020
Second Semester (Spring)	2017-2018	2018-2019	2019-2020	2020-2021
Classes begin	Jan 8, 2018	Jan 7, 2019	Jan 13, 2020	Jan 11, 2021
Martin Luther King, Jr. Day holiday	Jan 15, 2018	Jan 21, 2019	Jan 20, 2020	Jan 18, 2021
Presidents' Day holiday	Feb 19, 2018	Feb 18, 2019	Feb 17, 2020	Feb 15, 2021
Midterm grades due, 5:00 p.m.	Feb 28, 2018	Feb 27, 2019	Mar 4, 2020	Mar 3, 2021
Spring Vacation, (10th week)	Mar 12-16, 2018	Mar 11-15, 2019	Mar 16-20, 2020	Mar 15-19, 2021
Final Examinations	Apr 30-May 4, 2018	Apr 29-May 3, 2019	May 4-8, 2020	May 3-7, 2021
Commencement	May 5, 2018	May 4, 2019	May 9, 2020	May 8, 2021
Final grades due, 5:00 p.m.	May 8, 2018	May 7, 2019	May 12, 2020	May 11, 2021
Summer Session	2017-2018	2018-2019	2019-2020	2020-2021
Early Session begins	May 7, 2018	May 6, 2019	May 11, 2020	May 10, 2021
Memorial Day holiday	May 28, 2018	May 27, 2019	May 25, 2020	May 31, 2021
Eight-Week Session begins	June 4, 2018	June 3, 2019	June 8, 2020	June 7, 2021
Late Six-Week Session begins	June 18, 2018	June 17, 2019	June 22, 2020	June 21, 2021
Independence Day holiday	July 4, 2018	July 4, 2019	July 3*, 2020	July 5*, 2021

Summer Session ends, Friday	July 27, 2018	July 26, 2019	July 31, 2020	July 30, 2021
Final grades due, 4:00 p.m.	July 31, 2018	July 30, 2019	Aug 4, 2020	Aug 3, 2021



# Washington State University Administration

## Executive Officers

Kirk Schulz, President

Daniel J. Bernardo, Provost and Executive Vice President

## Board of Regents

[www.regents.wsu.edu](http://www.regents.wsu.edu)

## Chancellors

Sandra Haynes

Mel Netzhammer

Daryl DeWald

Paul Pitre

Chancellor, WSU Tri-Cities

Chancellor, WSU Vancouver

Chancellor, WSU Spokane

Chancellor, WSU Everett

## Academic Deans

Lisa Gloss, Interim

Joyce Griffin-Sobel

Mary Rezac

Daryll DeWald

Andre-Denis Girard Wright

M. Grant Norton

Bruce Pinkleton, Interim

Paul Pitre

Gary Pollack

Bryan Slinker

Jay Starratt

Mike Trevisan

Larry W. Hunter

John Tomkowiak

Graduate School

College of Nursing

Voiland College of Engineering and Architecture

College of Arts and Sciences

College of Ag, Human, and Natural Resource Sciences

University Honors College

Edward R. Murrow College of Communication

Dean, North Puget Sound, Everett Campus

College of Pharmacy

College of Veterinary Medicine

Libraries

College of Education

Carson College of Business

Elson S. Floyd College of Medicine

View the entire list online at: [publishing.wsu.edu/mailling-services/admin.html](http://publishing.wsu.edu/mailling-services/admin.html)

# Graduate Degrees List

## Program Location

Visit [gradschool.wsu.edu/degrees](http://gradschool.wsu.edu/degrees)

## Degree Acronyms

<b>CERT</b>	Graduate Certificate
<b>DNP</b>	Doctor of Nursing Practice
<b>EdD</b>	Doctor of Education
<b>EdM</b>	Master of Education
<b>IIDP</b>	Individual Interdisciplinary Doctoral Program
<b>MA</b>	Master of Arts
<b>MBA</b>	Master of Business Administration
<b>MAcc</b>	Master of Accounting
<b>MArch</b>	Master of Architecture
<b>METM</b>	Master of Engineering & Technology Management
<b>MFA</b>	Master of Fine Arts
<b>MHPA</b>	Master of Health Policy and Administration
<b>MIT</b>	Master in Teaching
<b>MN</b>	Master of Nursing
<b>MPA</b>	Master of Public Affairs
<b>MS</b>	Master of Science
<b>PhD</b>	Doctor of Philosophy
<b>PharmD</b>	Doctor of Pharmacy
<b>PSM</b>	Professional Science Masters

## Graduate Degrees

### A

Accounting, M.Acc  
Agricultural Economics, Ph.D.  
Agriculture, M.S. (Online)  
Agriculture – Food Science and Management,  
M.S. (Online)  
Agriculture – Plant Health Management, M.S.  
(Online)  
American Studies (Not accepting Applications)  
Animal Sciences, M.S., Ph.D.  
Anthropology, M.S., Ph.D.  
Apparel Merchandising and Textiles, M.A.  
Applied Economics, M.S.  
Architecture, M.Arch.

### B

Bioethics, Cert.  
Biological and Ag Engineering, M.S., Ph.D.  
Biology, M.S., Ph.D.  
Business Administration  
Accounting, Ph.D.  
Finance, Ph.D.  
Hospitality and Tourism, Ph.D.  
Information Systems, Ph.D.  
Management, Ph.D.  
Marketing, Ph.D.  
Master of Business Admin., MBA (Online)  
Executive M.B.A. (Online)  
Operations and Management Science, Ph.D.

### C

Chemical Engineering, M.S., Ph.D.  
Chemistry, M.S., Ph.D.  
Civil Engineering, M.S., Ph.D.  
Communication, M.A., Ph.D.  
Communication, Strategic, M.A. (Online)  
Computer Engineering, M.S.  
Computer Science, M.S., Ph.D.  
Criminal Justice and Criminology, M.A., Ph.D.  
Crop Science, M.S., Ph.D.

### D

Dietetics, Nutrition & Exercise Phys, M.S.  
Digital Humanities and Culture, Cert.

### E

Economics, Ph.D.  
Education  
Applied Measurement and Quantitative Methods, Cert.  
Cultural Studies and Social Thought in Ed., Ph.D.  
Curriculum and Instruction, Ed.M., M.A.  
Educational Leadership, Ed.M., M.A., Ph.D., Ed.D.  
Educational Psychology, M.A, Ph.D.  
Education Technology Across the Curriculum, Cert.  
Educational Research Methods, Cert.  
English Language Learners, Cert.  
Language, Literacy, and Tech, Ed.M., M.A., Ph.D.  
Mathematics and Science Education, Ph.D.  
Special Education, Online Ed.M., M.A., Ph.D.  
Electrical Engineering, M.S.  
Electrical and Computer Engineering  
Electrical Power Engineering, P.S.M. (Online)  
Engineering, M.S.  
Engineering and Technology Management,  
M.E.T.M. (Online)  
Constraints Management, Cert.  
Construction Project Management, Cert.  
Manufacturing Leadership, Cert.  
Project Management, Cert.  
Six Sigma Quality Management, Cert.  
Logistics and Supply Chain Mngmnt, Cert.  
Engineering Science, Ph.D.  
English, M.A., Ph.D.  
Entomology, M.S., Ph.D.  
Environmental Engineering, M.S.  
Environmental Science, M.S.  
Environmental and Nat. Res. Sciences, Ph.D.

### F

Fine Arts, M.F.A.  
Food Science, M.S., Ph.D.

## G

Geology, M.S., Ph.D.  
Global Justice and Security, Cert.  
Global Justice and Security Studies, Cert.

## H

Health Policy and Administration, M.H.P.A.  
Health Assistive Smart Environ. Design, Cert.  
Hispanic Studies, M.A.  
History, M.A., Ph.D.  
Horticulture, M.S., Ph.D.

## I

Individual Interdisciplinary, IIDP  
Interior Design, M.A.

## M

Materials Science and Engineering, M.S., Ph.D.  
Mathematics, M.S., Ph.D.  
Mechanical Engineering, M.S., Ph.D.  
Molecular Biosciences, M.S., Ph.D., Online  
P.S.M.  
Molecular Plant Sciences, Ph.D.  
Music, M.A.

## N

Natural Resource Sciences, M.S.  
Neuroscience, M.S., Ph.D.  
Nuclear Materials, Cert.  
Nursing, M.N., Ph.D.  
Family Nurse Practitioner, D.N.P.  
Nurse Educator, Cert.  
Nursing Leadership, Cert.  
Population Health D.N.P.  
Psychiatric/Mental Health D.N.P.  
Nutrition and Exercise Physiology, M.S., Ph.D.

## P

Pharmaceutical Sciences, Ph.D., Pharm.D.  
Physics, M.S., Ph.D.  
Plant Biology, M.S., Ph.D.  
Plant Pathology, M.S., Ph.D.  
Political Science, M.S., Ph.D.  
Prevention Science, Ph.D.  
Psychology  
Clinical, Ph.D.  
Experimental, Ph.D.  
Public Affairs, M.P.A.

## R

Radiation Protection, Cert

## S

Sociology (P)  
Software Engineering, M.S. (Online)  
Soil Science, M.S., Ph.D.  
Special Education, Ed.M., M.A., Ph.D.  
Speech and Hearing Sciences, M.S.  
Sport Management, M.S.  
Statistical Science, Ph.D.  
Statistics, M.S.  
Sustainable Agriculture, Cert.

## T

Teaching, Elementary, M.I.T.  
Teaching, Secondary, M.I.T.  
Teaching English as Second Language, Cert.

## V

Veterinary Science, D.V.M. (Professional Degree)  
Combined Anatomic and Pathological Res., Ph.D.  
Combined Clinical Microbiology Residency, Ph.D.  
Immunology and Infectious Diseases, M.S., Ph.D.  
Integrative Physiology and Neuroscience M.S., Ph.D.  
Veterinary Clinical Translational Srvcs, M.S., Ph.D.

# Admission and Registration

## General Information

Admission to Washington State University is granted without regard to age, sex, race, religion, color, creed, disability, national or ethnic origin, sexual orientation, or marital status. Graduates of Washington State University and other colleges and universities whose degrees are recognized by this institution and who meet the requirements for admission to the Graduate School may be admitted. Inquiries and requests for information may be found at [gradschool.wsu.edu](http://gradschool.wsu.edu), or you may write the Graduate School at: The Graduate School, Washington State University, PO Box 641030, Pullman, WA 99164-1030. You can also contact Graduate School Admissions at 509-335-1446.

Applicants for admission must have or anticipate receiving a bachelor's degree from an accredited school before the start of the semester for which they have applied to the Graduate School. Previous schools must be accredited by a recognized accreditation association. Applicants must have a 3.0 grade point Avg of graded undergraduate coursework, or from graded graduate coursework where there are 12 or more graded semester hours of graduate coursework taken after the bachelor's degree.

Applicants must have official equivalent transcripts from colleges or universities from which any degrees have been granted or are expected, and those transcripts which show the last 60 graded semester or 90 graded quarter hours of undergraduate work. Transcripts are also required from colleges or universities showing graded graduate level coursework taken after the bachelor's degree. Official transcripts are those mailed directly to the Graduate School from the Registrar of the institution attended. Transcripts mailed by the student are not considered official. Complete credentials should be on file at least one month before registration. Transcripts from other institutions cannot be returned. Records of previous work at Washington State University need not be submitted.

The Dean of the Graduate School may approve admission of a student from a foreign university if the student presents a superior academic record, satisfactory evidence of adequate ability in English, and has sufficient financial resources. Such applications should be completed at least six months in advance of the proposed date of enrollment in the Graduate School. International students who have taken graduate courses at other institutions will be accepted only after evaluation of their undergraduate records, and their performance in graduate study and the minimum criteria, described above, is met.

In a graduate program, a student is required to complete appropriate advanced courses to participate in seminars and to make an original contribution of knowledge. At least one academic year of graduate study, or the equivalent, is necessary for the completion of a program leading to a master's degree.

Most advanced degree programs emphasize the preparation of students for careers as productive scholars with research accomplishments. Those who earn advanced degrees often become teachers in institutions of learning, so many departments provide special attention to preparing students for careers in the teaching profession.

Departmental approval is required for any admission regardless of grade point Avg, and departments may require higher levels of performance than those cited. Because of limitations within certain departments, it may be necessary to deny admission to some qualified applicants. Graduate students are subject to the usual procedures and regulations of the institution and to the Graduate School rules and procedures outlined in the Graduate School Policies and Procedures Manual (<http://gradschool.wsu.edu/policies-procedures>).

## Classification of Students

### Regular Student Status

Applicants with at least a B (3.0 on a 4.0 scale) grade point Avg, or the equivalent in the last 60 graded semester (90 quarter) hours, from an accredited college or university; or at least a B grade point Avg in any graduate work from a recognized graduate school are eligible for admission to regular student status. Applicants with at least 12 semester hours of approved coursework from accredited graduate schools with at least a B grade point Avg are eligible for admission to regular student status.

### Provisional Student Status

A student not eligible for regular student status may be admitted on provisional student status upon special recommendation of the chair of the major department and with approval of the Associate Dean of the Graduate School.

### Full-time Students

Graduate students must register for a minimum of 10 credit hours to maintain full-time enrollment status in the fall and spring semesters. All full-time graduate students must register for at least one (1) 700 (masters), 702 (non-thesis masters), or 800 (doctoral) level research credit each semester. Students should check with their departments for additional information and/or exceptions to this policy.

### Part-time Students

Graduate students must register for a minimum of 2 credit hours and no more than 9 credit hours to maintain part-time enrollment status in the fall and spring semesters.

## Enrollment Requirements

The normal load for a full-time graduate student is 10-12 credit hours per semester; however, under specific circumstances individuals' programs may require more. Graduate students on half-time teaching or research assistantships are expected to carry a minimum of 10 credits per academic semester. See the Graduate School Policies and Procedures Manual for requirements for graduate students on appointment or taking examinations.

### Continuous Enrollment

All full- and part-time degree-seeking graduate students at all campus locations must maintain continuous enrollment in the Graduate School by registering for each semester, excluding summer sessions, from the time of first enrollment until all requirements for the degree are completed. Continuous enrollment is maintained by registering for a minimum of 2 graduate credits per semester (excluding the summer). International students who enroll for fewer than 10 credits must be approved by the Office of International Programs in consultation with the Graduate School, prior to part-time enrollment during the academic year. Exceptions to the continuous enrollment policy are noted in Chapter 5 of the Graduate School Policies and Procedures Manual. Continuous doctoral status meets the continuous enrollment requirement.

### Exceptions to Continuous Enrollment

Degree-seeking graduate students typically enroll in credits every semester until degree completion. However, sometimes circumstances are such that degree-seeking students are unable to enroll for credits. Such circumstances may include illness, family issues, financial need, work, or other obligations.

The exceptions to continuous enrollment discussed in this section address circumstances in which a degree-seeking student must be away from campus and cannot enroll for credits. These students must complete the appropriate graduate leave or internship leave paperwork, obtain approval from their faculty advisor and program chair, and submit the paperwork to the Graduate School in advance of the semester they will be away. Official leave of absence, internship leave status, and absences not approved under this policy are included in the time limits to complete a degree.

## Graduate Leave of Absence

Students who must be away from campus for reasons such as medical issues, family obligations, job obligations, military service, and Peace Corps service, and who cannot maintain continuous enrollment in any given semester, may apply for an official graduate leave of absence. See the Graduate School's Policies and Procedures Manual, Chapter 5, for additional information and procedures. Only graduate leave for medical reasons, military service, and Peace Corps service is available to doctoral students in continuous doctoral status. Students who are approved for graduate leave while in continuous doctoral status will not be charged the \$50 administrative fee.

### Internship Leave

Students who wish to go on an internship approved by their program and who do not need to register for credits for the internship may apply for internship leave status. See the Graduate School's Policies and Procedures Manual, Chapter 5, for information and procedures. Only internship leave required by the student's program is available to doctoral students in continuous doctoral status. Students who are approved for internship leave while in continuous doctoral status will not be charged the \$50 administrative fee.

#### Short-term Parental Leave

The Short-term Parental Leave plan provides up to four consecutive weeks of leave for the period directly before or after the birth or adoption of a child. During this time, the student continues to be enrolled and, if on an assistantship appointment (during the academic year only), will continue to receive graduate assistant benefits (i.e., tuition waivers will remain in place, health benefits, and salary). For additional information, see the Graduate School's Policies and Procedures Manual, Chapter 5.

### **Other Policies and Procedures**

Special Projects or Independent Study (600), Master's Research, Thesis and/or Examination (700), Master's Special Problems, Directed Study, and/or Examination (702), and Doctoral Research, Dissertation, and/or Examination (800) shall have as a prerequisite regular or provisional student status in the Graduate School.

Graduate students must register for the required amount of 700, 702, or 800 credits during the semester or summer session in which they take their final examination. Fall and spring semesters and summer session officially end on the last day of finals week. Examinations normally are not scheduled between regular terms. However, students who have received special permission from the Graduate School to schedule final master's or doctoral oral examinations in the interim non-class period after the end of a term will be required to register for the following semester or summer session

### **Online Resources**

[Graduate Student Policies and Procedures: Navigating Your Graduate Degree](#)

# Academic Regulations

## Scholarship Standards

A student must earn a 3.00 grade point Avg for all course work (including all courses listed on the program and other graduate upper- and lower-division courses). No work of C- grade or less may be dropped from a program, nor can a course be repeated for a higher grade if the final grade is C or higher. Any course listed on the program in which a grade of C-, or below is earned must be repeated.

Any graduate student who fails to maintain a cumulative grade point Avg of 3.00 or higher for all coursework subsequent to admission to the Graduate School will be dropped from the University. A student who is dropped may be permitted to re-enroll if the chair of the major department makes a special recommendation with the concurrence of the Dean of the Graduate School.

## Description: of Degrees

### Doctoral Degree

The Doctor of Philosophy (Ph.D.) is a research doctoral degree that is awarded in recognition of mastery of research methods (as evidenced in class grades and a comprehensive examination) and academic research that is ideally publishable in a peer-reviewed academic journal, but that will minimally be assessed by submission and defense of a dissertation.

Professional doctorates such as the Doctor of Veterinary Medicine (D.V.M.) and Doctor of Pharmacy (Pharm. D.) degrees are awarded in certain fields where most holders of the degree are not engaged primarily in scholarly research, but rather in a profession, such as veterinary medicine or pharmacy, respectively.

The Doctor of Education degree (Ed.D.) is a professional doctorate that prepares the student for academic, administrative, clinical or specialized positions in education.

At the same level of academic standards as the Ph.D. program, the Doctor of Nursing Practice degree (D.N.P.) focuses on nursing practice and leadership, and prepares graduates to translate research evidence into practice.

### Master's Degree

The master's degree is awarded upon completion of one or more years of advanced graduate study beyond the bachelor's degree, with the length depending on the field of study and type of program. It recognizes heightened expertise in an academic discipline or professional field of study, gained through intensive course work and, in most cases, the preparation of a culminating project, scholarly paper, thesis, or a comprehensive examination.

Some master's degree programs are research-oriented (e.g. thesis Master of Science degree) but many are considered professional (e.g. Master of Accounting). In the non-thesis and professional oriented degrees, the program should include some mechanism to assess the student's integrative understanding of the discipline (e.g., special project, internship, examination).

### Graduate Certificates

Formal graduate certificates convey that students have developed mastery of course material. Requirements for the Graduate Certificate vary by Department or Program. They typically consist of 9 to 12 credits of graded coursework. Once admitted as a part-time graduate certificate student, the student can take graduate certificate courses and/or graduate courses but must maintain a 3.0 GPA. Students currently enrolled in regular graduate degree programs (master's or doctoral) may concurrently enroll in graduate certificate programs with the approval of their committee.

To qualify as a formal graduate certificate program, the program must conform to existing Graduate School academic standards and to existing policies outlined for graduate degree programs, including the following:

- Graduate certificate programs must use approved undergraduate or graduate coursework, with no more than one-third of the coursework being at the undergraduate (400) level.
- Student may be admitted to the Graduate School as a Graduate Certificate Student and have completed all appropriate prerequisite classes to take graduate coursework.
- Courses graded S/F cannot be used toward major or supporting work for any degree program.
- The maximum time allowed for completion of a certificate is 6 years from the beginning date of the earliest course applied toward the certificate. Students may request an extension of this time as described in the Graduate School's Policies and Procedures Manual Chapter 6, Section F.
- Requirements regarding WSU tenured/tenure-track status and critical mass for faculty supporting the program are the same as those required for degree programs.
- A certificate fee is assessed at the time of completion of the certificate. The student must be enrolled the semester in which he/she applies for a graduate certificate.

## Requirements for a Graduate Degree

The graduation requirements of the Graduate School (as published in the Graduate School Policies and Procedures Manual) in effect at the time of the student's initial admission as a regular or provisional graduate student must be met for completion of a graduate degree program. Subsequent changes in degree requirements of the Graduate School or departmental may be substituted at the option of the student upon approval by the master's or doctoral committee, by the department chair, and by the dean of the Graduate School. If a student is dropped from the University for failure to maintain continuous enrollment, the graduation requirements of the Graduate School are those in effect at the time of readmission.

The time limit for the use of graduate credits toward a master's degree is six years from the beginning date of the earliest course applied toward the degree. Each program for a doctoral degree is considered individually. In all cases, work for the degree must be completed within three years of the date of the satisfactory completion of the preliminary examination. At least four months must elapse between preliminary and final examinations for doctoral degrees.

### Transfer Credit and Credit Restrictions

Detailed policies and procedures on transfer credit and credit restrictions are outlined in the [Graduate School Policies and Procedures Manual](#).

### Transfer of Graduate Credits

Graded graduate-level course work (with a grade of B or higher) taken toward a master's degree at an accredited institution may be used toward a doctoral degree at WSU with the approval of the student's committee and the program director. However, graded graduate-level course work (with a grade of B or higher) taken toward a completed master's degree at an accredited institution may NOT be used toward another master's degree at WSU. All other graded graduate-level course work (with a grade of B or higher) taken as a graduate student, but not taken towards a completed graduate degree, may be used toward a master's degree or a doctoral degree at WSU with the approval of the students committee and program director. ***In all transfer cases, the number of such credit hours is limited to no more than half of the total graded course credits required by the program that is listed on the Program of Study.*** None of this credit may be applied toward another advanced degree. Individual departments/programs may choose to limit transfer credits to an amount less than what is specified above. For detailed information, view the [Graduate School Policies and Procedures Manual](#).

### Graduate Study by Seniors

Seniors who have at least a 3.00 grade point Avg in the last half of their undergraduate work at Washington State University may register for up to six semester hours of work in the Graduate School in excess of the number of hours required to complete the bachelor's degree. Graduate School approval is required at the time of registration. Only grades of "B" or higher may be applied toward an advanced degree. Seniors who wish to enroll in 500-level courses for undergraduate credit must obtain approval of the major advisor and the chair of the department of program in which the course is offered.

### Requirements for Doctoral Degree

The core of the Doctor of Philosophy (Ph.D.) program must include a minimum of 15 semester hours of graded course work (at the 500-level) beyond the bachelor's degree. It should include the most advanced courses appropriate to the field of study listed in the Graduate Catalog or approved for graduate credit since publication of the last Catalog. Of the minimum number of hours of core graded course work required on the Program of Study (15), none may be from non-graduate credit graded course work. No more than 9 credits of non-graduate (300- or 400-level) credit graded course work may be used for the total credits for the Program of Study. Many doctoral programs have minimum requirements that exceed those described above; in all cases, students must comply with the minimum standards of their doctoral programs as outlined in the Program of Study for that student.

Seminars numbered 500 or above that are graded other than P/F or S/F may be part of the core program. Courses graded S/F may not be used in the core program. Only those master's degree and transfer courses at a level equivalent to 500-level courses, and applicable to the doctoral core program, should be listed in this category.

In addition to the core requirements, the program shall show research and additional course work. Credit in this category, plus that in the core program, must total at least 72 hours. A minimum of 20 hours of 800-level credits are required. Unless otherwise specified, special projects and problems and seminars may be included in this category if they are taken at Washington State University. The doctoral program may not include courses graded P/F or courses taken as audit. For more information on general requirements and transfer credit, see the Graduate School's Policies and Procedures Manual Chapter 6, Section G.2.



## Programs of Study

### Program of Study for Ph.D.

- 72 hours minimum total credits
- 15 hours minimum from graded graduate-level (500-level) courses
- 20 hours minimum 800-level research credits
- 9 hours maximum of non-graduate (300- or 400-level) courses
- courses for audit may not be used for the program of study

### Program of Study for Ed.D.

- 72 hours minimum total credits
- 42 hours minimum from graduate approved graded courses
- 20 hours minimum 800-level research credits
- 9 hours maximum of non-graduate (300- or 400-level) courses
- courses for audit may not be used for the program of study

### Program of Study for DNP

#### Program of Study for Post-baccalaureate's DNP with Nurse Practitioner (NP) Specialty Track

Minimum of 72 total hours of 500-level coursework and 1,000 practicum hours required.

- 39 hours minimum of 500-level NURS courses for core DNP program
- 9 hours minimum of 500-level NURS courses for the DNP Project (NURS 557, 558, 559)
- 24 hours minimum of 500-level NURS courses from one post-baccalaureate DNP specialty track

Family Nurse Practitioner (FNP) courses

Psychiatric Mental Health

Advanced Population Health (APH) courses

Completion of a minimum of 1,000 post-baccalaureate practicum hours

### Program of Study for Post-master's DNP General Program

Minimum of 32 total hours of 500-level coursework and 1,000 practicum hours required

- 23 hours minimum of 500-level NURS courses for core DNP program
- 9 hours minimum of 500-level NURS courses for the DNP Project (NURS 557, 558, 559)

### Program of Study for Post-master's DNP Program with Nurse Practitioner (NP) Specialty Track

Minimum of 56 total hours of 500-level coursework and 1,000 practicum hours required

- 23 hours minimum of 500-level NURS courses for core DNP program
- 9 hours minimum of 500-level NURS courses for the DNP Project
- 24 hours minimum of 500-level NURS courses from one post-baccalaureate DNP Specialty Track

Family Nurse Practitioner (FNP) Courses

Psychiatric Mental Health Nurse Practitioner (PMHNP) Courses

Advanced Population Health (APH) Courses

- Completion of a minimum of 1,000 post-baccalaureate practicum hours

### Program of Study for Non-Thesis Master's Degree

- 30 hours minimum of total credits are required for the non-thesis master's degree.
- 26 hours minimum of graded course work
- 17 hours minimum of graded course work at the 500-level
- 9 hours maximum of non-graduate (300-400 level) graded course work
- 4 hours minimum of 702 credit in major, 2 of which must be taken in the semester of project completion; and/or graded course work at the 500-level if officially approved via the curricular change process. If the non-thesis curriculum is officially approved with a capstone (500-level) course in place of 702 credits, a ballot meeting is still required in the final semester in which the capstone course is taken to determine if the student has successfully met all of the program requirements.

### Program of Study for Thesis Master's Degree

- 30 hours minimum of total credits are required for the thesis master's degree
- 21 hours minimum of graded course work
- 15 hours of graded course work at the 500 level
- 6 hours maximum of non-graduate (300-400) graded course work

- 4 hours minimum of 700-level credit in major, 2 of which must be taken in the semester of the final exam and/or thesis completion.

Note: all full-time thesis and non-thesis degree students must register for one research credit of 700 or 702 each semester (excluding summers)

## Tuition and Fees

Tax revenue from the state finances a portion of the facilities and operations of the instructional programs, student services, and related activities. Graduate students share in the cost by paying tuition, fees, and other charges as established by the Board of Regents.

Tuition, fees, and other charges are subject to change, and are effective when established by the Legislature of the State of Washington and adopted by the WSU Board of Regents. For the most up-to-date rates, visit <https://financialaid.wsu.edu/tuition-expenses/>. Part-time students appointed to graduate assistantships may receive waivers of tuition (see the Assistantship, Fellowship, and Traineeships section).

Payment of registration fees is due on or before the fifth Friday of class. Receipt of payment after that day will result in a 5% late payment fee. Any tuition balances not paid by the eighth Friday of class will receive another 10% late payment fee.

On the Pullman Campus, fees for the Student Health Center, the Student Recreation Center, and Pullman Transit are charged each semester. (Graduate students appointed to half-time graduate assistantships qualify for medical insurance coverage. See Assistantships, Fellowships, and Traineeships section for more information). Other fees, including parking permits and health insurance are optional.

NOTE: Overdue accounts owed to the University will prevent release of transcripts, diploma and enrollment. Registration is not complete until all of the student's tuition and fees are paid.

## Student Financial Aid Programs

Graduate students wishing to apply for financial aid must complete the Free Application for Federal Student Aid (FAFSA). The FAFSA priority processing date is March 1. Students may apply online at [fafsa.ed.gov](https://fafsa.ed.gov), or pick up a paper version at any local high school, community college, public library, or the Washington State University Student Financial Services, Room 380 Lighty Student Services Building.

Graduate students are considered for the following programs: Federal Family Educational Loans (subsidized and un-subsidized Stafford loans) and Federal or State Work Study Programs. Work Study Program funds may be used toward funding graduate assistantships. The Office of Student Financial Aid determines student eligibility for these programs and will notify students in a letter of eligibility. Financial aid counselors are available to assist students and families with their financial aid concerns at 509-335-9711. You will also find information at: [wsu.edu/studacct/finaid.htm](https://wsu.edu/studacct/finaid.htm).

Each academic year a number of graduate students at WSU are awarded a graduate assistantship from their departments. The assistantship usually covers the majority of tuition costs. This Operating Fee Waiver is considered a resource when the OSFA determines the student's eligibility for other financial aid programs. In order to ensure your Financial Aid Award Notification is correct, please notify the OSFA if your department has granted you an Operating Fee Waiver. If the OSFA is notified after the first disbursement of your loan, any subsequent disbursement may be reduced accordingly.

NOTE: All graduate awards are initially based on resident tuition costs, regardless of resident status. You may request (in writing) an adjustment for nonresident tuition costs. If you have unmet need on your Financial Aid Award Notification and/or the Cost of Attendance has not been met, you may qualify to borrow an Alternative Loan. Contact the OSFA for more information. Short-term loans may be available to students who encounter delays in their financial aid delivery through the OSFA.

### Satisfactory Academic Progress (SAP) Policies

To receive and continue to be eligible to receive financial aid, graduate students must be in good standing with their department and the Graduate School. The maximum timeframe calculation is based on all semesters of enrollment regardless of whether or not financial aid was received each semester. Semesters in which enrollment is less than 10 hours will be counted as one-half of a full-time semester. The maximum timeframe for financial aid (exclusive of graduate assistance) is three years (6 full-time semesters) for master's degree candidates; three years (6 full-time semesters) for doctoral degree candidates who have a previous master's degree; six years (12 full-time semesters) for doctoral candidates without a master's degree; and five years (10 full-time semesters) for professional students and veterinary medicine students.

### Assistantships, Fellowships and Traineeships

Teaching and research assistantships are available in most departments offering advanced degrees, and nonservice research fellowships and traineeships are granted in some departments. Ordinarily, graduate appointments are limited to those who pursue programs of study leading to advanced degrees at Washington State University.

The [Graduate School Policies and Procedures Manual](#) should be consulted concerning qualifications, eligibility, and application procedures. As most appointments for fall semester are made by April 1, or as soon thereafter as possible, it is desirable to have applications completed by February 1; nonservice appointment applications should be completed by Jan 1. Spring semester applications should be completed by September 1. Applications received at a later date can be considered only for positions still available. Assistantship appointments require part-time service. The term of a graduate appointment may be for a nine-month period, a semester, or a summer. Students on appointment must maintain regular enrollment in the Graduate School (10 credit hours or more during the academic year; 3 credit hours during summer session) for the duration of their appointments. Stipends vary according to the amount of required service, the extent of the student's training, and merit factors (e.g., academic record, experience). Contact the Graduate School Office for salary information.

Graduate students who are not residents of the State of Washington, appointed to assistantships of one-half time service (20 hours per week) or more by the Board of Regents, and who reside in the State of Washington while attending WSU, may receive a waiver of the nonresident portion of the tuition. (NOTE: Nonresident tuition waivers cannot be assured beyond the first year of graduate students' assistantships. Students who intend to remain in the state are encouraged to review Washington statutes and associated administrative rules governing the establishment of residency for tuition purposes.

The residency operating fee may also be waived for resident students who hold half-time (or greater) service appointments (20 hours per week) and who qualify based on merit factors, and for nonresident students who reside in Washington state, who hold half-time graduate service appointments, and who qualify based on merit factors. Further, graduate students who hold half-time (or greater) service assistantship appointments automatically qualify for and receive medical insurance coverage.

All students on assistantships pay the general tuition and activities fees. (Please note: to be eligible for any waiver, a student must be physically living in the State of Washington).

Forms for assistantship or fellowship applications are included as part of the general application for admission to Graduate School. For information about special scholarships and fellowships, write to the dean of the Graduate School or the chair of the department concerned. You may also visit <http://gradschool.wsu.edu/student-finance-page/>

#### **Resolution Regarding Scholars, Fellows, Trainees, Assistants**

Acceptance of an offer of financial support (such as a graduate scholarship, fellowship, traineeship, or assistantship) for the next academic year by a prospective or enrolled graduate student completes an agreement that both student and graduate school expect to honor. In that context, the conditions affecting such offers and their acceptance must be defined carefully and understood by all parties. Students are under no obligation to respond to offers of financial support prior to April 15; earlier deadlines for acceptance of such offers violate the intent of this Resolution. In those instances, in which a student accepts an offer before April 15, and subsequently desires to withdraw that acceptance, the student may submit in writing a resignation of the appointment at any time through April 15. However, an acceptance given or left in force after April 15 commits the student to not accept another offer without first obtaining a written release from the institution to which the commitment has been made. Similarly, an offer by an institution after April 15 is conditional on presentation by the student of the written release from any previously accepted offer. It is further agreed by the institutions and organizations subscribing to the above Resolution that a copy of this Resolution should accompany every scholarship, fellowship, traineeship, and assistantship offer.

Courses listed in this catalog are subject to change through normal academic channels. New courses and changes are initiated by the corresponding departments or programs, approved through the appropriate academic dean, the Catalog Subcommittee, the Academic Affairs or Graduate Studies Committees, and the University Senate. Additions to the curriculum for the ensuing year are published each fall in the Catalog Supplement within the Fall Time Schedule. It is the obligation of the student to be acquainted with all the pertinent information in this Catalog and the Graduate School Policies and Procedures Manual to see that all departmental requirements are satisfied.

## Degree Programs by College

### College of Agriculture, Human, and Natural Resource Sciences

#### Agriculture, MS

Options: Agriculture (general); Agriculture-Plant Health Management; Agriculture-Food Science and Management  
College of Agricultural, Human, and Natural Resource Sciences

**Website:** [msag.wsu.edu](http://msag.wsu.edu)

**Number of graded credits:** 21 thesis, 26 non-thesis

**Avg time to complete degree:** 2.8 years

**Location(s):** Global

**Tests required:** TOEFL, TOEFLI

**Deadline:** Fall: June 1; Spring: November 1

**Requirements:**

Undergraduate GPA Avg 3.0. Some students may require 6 to 9 semester credits of agriculture courses to begin their program.

**Thesis Option:** The program of study requires a minimum of 21 graded credits, including the MS in Ag Core courses (AGRI 587, STAT 512). Preparation of a formal thesis/research paper is required culminating in a public seminar and oral examination; 4 credits of AGRI 700 thesis/research/examination are required. Thirty credits are required overall for the degree.

**Non-Thesis Option:** The program of study requires a minimum of 26 graded credits, including the MS in Ag Core Courses (AGRI 587, STAT 412, as well as other coursework specific to the option. An independent project and paper is required culminating in an oral presentation and oral examination before the committee; 4 credits of AGRI 702 non-thesis/special project/examination credits are required. Thirty credits are required overall for the degree.

**Description:** The M.S. in Agriculture program is designed to provide practitioners and professionals an opportunity to strengthen and diversify their expertise in agriculture-related disciplines. The program is completely web-based and can be completed from anywhere in the world, although students may choose to take courses on the Pullman campus. Outstanding faculty participate from a diverse array of academic disciplines, including animal science, crop and soil sciences, entomology, horticulture, landscape architecture, plant pathology, food science, and economic sciences, which makes the program truly interdisciplinary. With support from an advising committee, students have the opportunity to tailor their coursework to meet their personal and professional learning goals. To enable students to become outstanding educators and practitioners in agricultural disciplines, the program will foster the development of excellent communication and teaching skills, as well as a comprehensive understanding of research approaches used to address agricultural issues. Both thesis (research emphasis) and non-thesis (coursework emphasis) tracks are available to students pursuing the MS in Agriculture degree.

#### Contact Information

Deb Marsh, Academic Coordinator  
Johnson Hall Graduate Center  
PO Box 646420  
Pullman, WA 99164-6420  
Telephone: 509.335.2615  
E-mail: [marshdj@wsu.edu](mailto:marshdj@wsu.edu)

Lisa Lujan, Academic Coordinator  
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PO Box 646420  
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Telephone: 509.335.9542  
E-mail: [llujan@wsu.edu](mailto:llujan@wsu.edu)

#### Agricultural Economics, PhD

School of Economic Sciences  
College of Agricultural, Human, and Natural Resource Sciences

**Website:**

[ses.wsu.edu/graduatestudies/phdprograms/](http://ses.wsu.edu/graduatestudies/phdprograms/)

**Number of graded credits:** 42

**Transfer Credit Limit:** 21

**Other requirements:** Must successfully complete three preliminary core exams, (end of first year); Agricultural Economics Field; and one additional field and course elective.

**Location(s):** Pullman

**Tests required:** GRE (Combined), GRE (Quantitative), GRE (Verbal), TOEFL

**Deadline:** Fall: Priority Jan 10

**Description:** The PhD in Agricultural Economics is designed to provide the student with an excellent foundation in the theory and methods of economic analysis as well as experience in applied analysis of agricultural, agri-business, and/or resource economics problems. Career opportunities for agricultural economists also include academia, government, and the private sector. Many academic positions (especially at land grant universities) include salary support for a combination of teaching, research, and/or outreach related to the food and fiber sectors and the natural resource base that supports them.

#### Contact Information

Dr. Jill McCluskey, Professor  
School of Economic Sciences  
Washington State University  
PO Box 646210  
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Telephone: 509-335-2835  
Fax: 509-335-1173  
E-mail: [mccluskey@wsu.edu](mailto:mccluskey@wsu.edu)

#### Animal Sciences, PhD

Department of Animal Sciences  
College of Agricultural, Human, and Natural Resource Sciences

**Website:** [ansci.wsu.edu](http://ansci.wsu.edu)

Number of graded credits: 22

Transfer credit limit: 11

**Additional Requirements:** Students considering graduate study in the Department of Animal Sciences should major in animal science, biology, genetics, zoology, or closely related fields

Location(s): Pullman

**Tests required:** GRE (Combined), TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** Programs are flexible and designed to meet the needs and interests of the student and, as such, specific degree requirements are determined through individual consultation with an advisor and a special committee. The department maintains herds of dairy cattle, beef cattle, and swine for research and teaching purposes.

#### Contact Information

Holly Neibergs, PhD, Associate Professor

Animal Sciences

PO Box 64-6351

ASLB 210

Pullman, WA 99164-6351

Telephone: 509-335-6491

Fax: 509-335-1082

E-mail: [neibergs@wsu.edu](mailto:neibergs@wsu.edu)

#### Animal Sciences, MS

Department of Animal Sciences

College of Agricultural, Human, and Natural Resource Sciences

**Website:** [ansci.wsu.edu/](http://ansci.wsu.edu/)

Number of graded credits: 21

Required research credits Thesis

**Other requirements:** Students considering graduate study in the Department of Animal Sciences should major in animal science, biology, zoology, or closely related fields.

Location(s): Pullman

**Tests required:** GRE (Combined), TOEFL

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** Programs are flexible and designed to meet the needs and interests of the student and, as such, specific degree requirements are determined through individual consultation with an advisor and a special committee. The department maintains herds of dairy cattle, beef cattle, and swine for research and teaching purposes.

#### Contact Information

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#### Apparel, Merchandising, and Textiles, MA

Options: Thesis or Non-Thesis

Department of Apparel, Merchandising, Design and Textiles

College of Agricultural, Human, and Natural Resource Sciences

**Website:** [amdt.wsu.edu/](http://amdt.wsu.edu/)

**Number of graded credits:** For students writing a thesis, a minimum of 24 graded credit hours are required. For students doing a thesis-project option, a minimum of 26 graded credits are required. (All students must complete a minimum of total 30 credits)

Avg time to complete degree: 2 years

Location(s): Pullman

**Tests required:** TOEFL, TOEFLI, IELTS

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** The mission of graduate education in the AMDT is to produce high quality professionals who will leave the program with professional level expertise in one or more of our departmental specializations: Apparel/Textile Product Development, Creative Scholarship and Design, Merchandising, Supply Chain Management, and Consumer Studies. Students become scholars capable of contributing in a global domain through study of specialized topics related to consumers, producers, distributors, and brands. In an atmosphere of collegiality, faculty and students assimilate, evaluate, develop and implement theoretical and applied research that addresses relevant issues of the textile/apparel/retail industry, companies, and consumers. General Program Timeline: Semester 1: The area of study and major professor are chosen Semester 2: The Program of Study and AMDT Graduate Committee are chosen and thesis or thesis-project work begins Semester 3: Thesis or thesis - project work continues Semester 4: Thesis or thesis-project is finalized, you defend your work to your committee and a manuscript is prepared for possible publication.

#### Contact Information

AMDT Graduate Program

Apparel, Merchandising, Design and Textiles

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Ting Chi, Ph.D., Associate Professor and Graduate Program Coordinator

Apparel, Merchandising, Design & Textiles

Johnson Hall Annex C23

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Telephone: 509-335-8536

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#### Applied Economics, MS

Options: Thesis or Non-Thesis

School of Economic Sciences

College of Agricultural, Human, and Natural Resource Sciences

**Website:**

<http://ses.wsu.edu/graduatestudies/msprograms/about-the-masters-in-applied-economics-at-wsu/>

**Number of graded credits:** 24 thesis, 26 non-thesis

Avg time to complete degree: 2 years

Location(s): Pullman

**Tests required:** GRE (Combined), GRE (Quantitative), GRE (Verbal), TOEFL

Deadline: Jan 10

**Description:** The program provides strong foundations in economic theory, quantitative methods, applications, communication skills, and research analysis. Students can focus their studies in general economics, agribusiness, or agricultural and resource economics by carefully selecting supporting and elective courses. Students can earn an M.S. in Applied Economics to specifically prepare for positions in private corporations and government service as management specialists, policy analysts, forecasters or economic consultants.

**Contact Information**

Dr. Jill McCluskey, Professor

School of Economic Sciences

Washington State University

PO Box 646210

Pullman, WA 99164-6210

Telephone: 509-335-2835

Fax: 509-335-1173

**Biological and Agricultural Engineering, PhD**

Options: Bioenergy and Bioproducts Engineering; Food Engineering; Land, Air, Water & Environmental Engineering; Agricultural Automation Engineering  
College of Agricultural, Human, and Natural Resource Sciences

**Website:** [bsyse.wsu.edu](http://bsyse.wsu.edu)

**Number of graded credits:** 72, including 15 graded.

Minimum of 20 BSysE 800 credits or as many as needed to complete 72 total required credits

**Other requirements:** Two articles based on doctoral research must be submitted to a peer reviewed journal. Must present a minimum of two seminars. The first is a brief 25-minute seminar based on the student doctoral research proposal. The second is a 50-minute seminar prior to the final examination.

**Avg time to complete degree:** 5 years

Location(s): Pullman

**Tests required:** TOEFL, TOEFLI, and IELTS

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** The department of Biological Systems Engineering integrates the biological sciences and engineering for the development of engineering solutions to agricultural, food and natural systems. BSysE offers the Ph.D. and M.S. degrees in Biological and Agricultural Engineering with four areas of emphasis: Bioenergy and Bioproducts Engineering; Food Engineering; Land, Air, Water & Environmental Engineering; Agricultural Automation Engineering

**Contact Information**

Joanna Dreger, MBA, Academic Coordinator

Biological Systems Engineering

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Shyam Sablani, PhD

Associate Chair and Graduate Coordinator

Biological Systems Engineering

LJ Smith 213

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[ssablani@wsu.edu](mailto:ssablani@wsu.edu)

**Biological and Agricultural Engineering, MS**

Options: Thesis or Non-Thesis

College of Agricultural, Human, and Natural Resource Sciences

**Website:** [bsyse.wsu.edu](http://bsyse.wsu.edu)

**Number of graded credits:** Thesis, 21; Non-thesis 26.

Minimum of 4 credits of BSysE 700 (thesis option) or 702 (non-thesis option)

Avg time to complete degree: 2 years

**Other requirements:** A written research proposal must be completed by the end of the third semester.

Location(s): Pullman

**Tests required:** IELTS, TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** The department of Biological Systems Engineering integrates the biological sciences and engineering for the development of engineering solutions to agricultural, food and natural systems. BSysE offers the Ph.D. and M.S. degrees in Biological and Agricultural Engineering with four areas of emphasis: Bioenergy and Bioproducts Engineering; Food Engineering; Land, Air, Water & Environmental Engineering; Agricultural Automation Engineering.

**Contact Information**

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Shyam Sablani, PhD

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Biological Systems Engineering

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## Crop Science, PhD

Department of Crop and Soil Sciences  
College of Agricultural, Human, and Natural Resource  
Sciences

**Website:** [css.wsu.edu](http://css.wsu.edu)

**Number of credits:** 15 hours of 500-level grade coursework are required; not included but required are 2 credits of Crops 510 Seminar, 1 credit of Crops 512 State Tour, and 2 credits of Crops 511 Science Writing Workshop. Additionally, 20 hours minimum of Crops 800 Research/Dissertation and Examination credits are required. No more than half of the graded credit may be transfer credit. 72 total credits are required overall for the degree.

Avg time to complete degree: 4 years

Location(s): Pullman

Tests required: TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** This program allows students to conduct graduate research in a variety of specialized areas within each discipline. Current research in Crop Science is being conducted in the areas of plant breeding and genetics, molecular genetics, crop production, turf management, weed science, plant physiology, and cereal chemistry. We work with wheat, forages, barley, grain legumes, brassicas and turf. We have several research projects conducted in cooperation with the United States Department of Agriculture (USDA) through the USDA Agricultural Research Service (USDA-ARS) and USDA Natural Resources Conservation Service (USDA-NRCS) in addition to research projects being conducted in association with other universities.

Research facilities include state of the art laboratories and greenhouses and research farms located in Pullman and throughout the state at five Research and Extension Centers. Graduate students learn valuable skills and knowledge working side by side with faculty members and research technicians providing them the opportunity to play an integral role in the advancement of their major advisor's research. Students also have the opportunity to gain leadership, communication, and instructional experience through the option of serving as teaching assistants for one or more courses within their discipline. Qualified students typically receive competitive research or teaching assistantships. These assistantships provide non-resident and resident tuition waivers, paid health insurance, and stipends to help cover living expenses.

### Contact Information

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Lisa Lujan, Academic Coordinator  
Johnson Hall Graduate Center  
Pullman, WA 99164

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## Crop Science, MS

Options: Thesis or Non-Thesis

Department of Crop and Soil Sciences

College of Agricultural, Human, and Natural Resource  
Sciences

**Website:** [css.wsu.edu](http://css.wsu.edu)

**Number of graded credits:** Non-thesis, 26; thesis, 21 hours of graded credit are required, including 1 credit of Crops 510 Seminar and 1 credit of Crops 512 Statewide Tour and 4 hours of Crops 700 Research/Thesis and Examination. No more than half of the graded credit may be transfer credit. 30 credits are required overall for the degree.

Avg time to complete degree: 2.2 years

Location(s): Pullman

Tests required: TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** This program allows students to conduct graduate research in a variety of specialized areas within each discipline. Current research in Crop Science is being conducted in the areas of plant breeding and genetics, molecular genetics, crop production, turf management, weed science, plant physiology, and cereal chemistry. We work with wheat, forages, barley, grain legumes, brassicas and turf. We have several research projects conducted in cooperation with the United States Department of Agriculture (USDA) through the USDA Agricultural Research Service (USDA-ARS) and USDA Natural Resources Conservation Service (USDA-NRCS) in addition to research projects being conducted in association with other universities.

Research facilities include state of the art laboratories and greenhouse facilities and research farms located in Pullman, as well as throughout the state at five Research and Extension Centers. Graduate students learn valuable skills and knowledge working side by side with faculty members and research technicians providing them the opportunity to play an integral role in the advancement of their major advisor's research. Students also have the opportunity to gain leadership, communication, and instructional experience through the option of serving as teaching assistants for one or more courses within their discipline. Qualified students typically receive competitive teaching or research assistantships. These assistantships provide non-resident and resident tuition waivers, paid health insurance, and stipends to help cover living expenses.

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### Economics, PhD

School of Economic Sciences  
College of Agricultural, Human, and Natural Resource  
Sciences

**Website:** [ses.wsu.edu/graduatestudies/phdprograms/](http://ses.wsu.edu/graduatestudies/phdprograms/)

Number of graded credits: 42

**Other Requirements:** Must successfully complete three preliminary core exams (end of first year); a written doctoral examination; two fields and one additional course elective.

Avg time to complete degree: 4 years

Location(s): Pullman

**Tests required:** GRE (Combined), GRE (Quantitative), GRE (Verbal), TOEFL

**Deadline:** Fall: Jan 10

**Description:** The PhD in Economics is designed to prepare students for careers as professional economists in academia, government, and the private sector. The program is structured so that a student with a Bachelor of Arts degree in Economics and an appointment as a graduate assistant should be able to complete the required coursework within three academic years, excluding summer sessions. Students with a Master of Arts in Applied Economics degree may be able to complete the required coursework in less time, depending on the content and quality of the previous work.

### Contact Information

Dr. Jill McCluskey, Professor  
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Washington State University  
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Pullman, WA 99164-6210  
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E-mail: [mccluskey@wsu.edu](mailto:mccluskey@wsu.edu)

### Entomology, PhD

Department of Entomology  
College of Agricultural, Human, and Natural Resource  
Sciences

**Website:** [entomology.wsu.edu/](http://entomology.wsu.edu/)

Number of graded credits: 34

**Other requirements:** Students should have completed an undergraduate major in one of the biological or physical sciences, forestry, agriculture, or a closely related field. Collegiate teaching experience is required. This can include the preparation, introductory remarks and conduct of at least three lecture or lab sessions for an entomology course. Doctoral students are required to participate in at least five 1-credit seminars.

**Location(s):** Pullman

**Tests required:** GRE (Combined), GRE (Quantitative), GRE (Verbal), TOEFL, TOEFLI, IELTS

**Description:**

Facilities and training are available for graduate study in major areas of entomology, including (but not limited to) apiculture; behavior; integrated biological control and sustainable pest management; ecology; forest entomology; insect/plant interactions; medical/veterinary entomology; population genetics; physiology; systematic; biological diversity and environmental toxicology. Departmental faculty, adjunct faculty, and affiliate faculty may all serve as student advisors. Faculty are housed both on campus and at Research and Extension Centers throughout the state; the ability to significantly interact with both on- and off-campus advisors and mentors offers students opportunities and perspectives not available in most programs. We maintain strong cooperative interactions with the USDA ARS lab in Yakima, Washington. Students whose major advisor resides at a Research and Extension Center (Wenatchee, Prosser, Puyallup, Mt. Vernon or USDA Wapato) typically come to Pullman for at least two semesters then relocate to the center where they will conduct their research and take the remainder of their coursework via AMS/WECN. Each student's program of study is individualized based on research interests, prior academic experience, and collaboration with their major advisor.

### Contact Information

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### Entomology, MS

Options: Thesis or Non-Thesis

Department of Entomology  
College of Agricultural, Human, and Natural Resource  
Sciences

**Website:** [entomology.wsu.edu/](http://entomology.wsu.edu/)

**Number of graded credits:** 21thesis; 26 non-thesis

**Other Requirements:** Collegiate teaching experience is required. This can include the preparation, introductory remarks and conduct of at least three lecture or lab sessions for an entomology course. Master's students are required to participate in two 1-credit seminars.

Location(s): Pullman

**Tests required:** GRE (Combined), TOEFL, TOEFLI, GRE (Quantitative), GRE (Verbal), IELTS

**Description:** Curriculum provides the opportunity to study the basic and applied aspects of the science. Facilities and training are available for graduate study in major areas of entomology, including (but not limited to) apiculture; behavior; integrated biological control and sustainable pest management; ecology; forest entomology; insect/plant interactions; medical/veterinary entomology; population genetics; physiology; systematic; biological diversity and environmental toxicology. Departmental faculty, adjunct faculty, and affiliate faculty may all serve as student advisors. Faculty are housed both on campus and at research stations throughout the state; the ability to

significantly interact with both on- and off-campus advisors and mentors offers students opportunities and perspectives not available in most programs. We maintain strong cooperative interactions with the USDA ARS lab in Yakima, Washington. Students whose major advisor resides at a Research & Extension Center (Wenatchee, Prosser, Puyallup, Mt. Vernon or USDA Wapato) typically come to Pullman for at least two semesters then relocate to the center where they will conduct their research and take the remainder of their coursework via AMS/WECN. Each student's program of study is individualized based on their research interests, prior academic experience, and collaboration with their major advisor.

#### Contact Information

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### Environmental and Natural Resource Sciences, PhD

School of the Environment  
College of Arts and Sciences  
College of Agricultural, Human, and Natural Resource Sciences

**Website:** <http://cahnrs.wsu.edu/soe/>

**Number of credits:** 15 semester hours of graded coursework at the 500 level beyond the Bachelor's degree. No more than 9 credits of non-graduate credit course work may be used for the total credits for the Program of Study. Only those master's degree and transfer courses at a level equivalent to 500 level courses and which are applicable to the doctoral program can be used. Minimum GPA is 3.0. Any course with a grade of C- must be repeated.

**Location(s):** Pullman

**Tests required:** TOEFL, TOEFLI, GRE (Quantitative), GRE (Verbal)

**Deadline:** Fall: Jan 15; Spring: Oct 15

**Description:** Environmental and Natural Resource Sciences comprise an association of several areas of study at WSU. These sciences focus on factors related to the understanding and management of the environment and therefore have a commonality of interest. The Ph.D. program provides opportunities for doctoral study that involve integration and interaction among these various fields of science. The cooperation of WSU's faculties in environmental and natural resource sciences in this program fosters important exchanges of knowledge that greatly enhance interdisciplinary education.

#### Contact Information

Kelly Halsall  
509-335-8538  
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### Environmental Science, MS

Options: Thesis or Non-Thesis

School of the Environment  
College of Arts and Sciences  
College of Agriculture, Human, and Natural Resource Sciences

**Website:** <http://cahnrs.wsu.edu/soe/>

**Number of graded credits:** 32

**Additional Requirements:** At least 10 semester credits of completed coursework in basic biological and/or physical sciences. Deficiencies will be accepted with the expectation that they will be met within one year of admission.

**Location(s):** Pullman, Tri-Cities, Vancouver

**Tests required:** TOEFL, TOEFLI, GRE

**Deadline:** Fall: Jan 15; Spring: Oct 15

**Description:** The MS degree is an interdisciplinary program with the flexibility for elective classes in the student's own area of specialization. In consultation with their advisor, students may select classes from a wide variety of areas (i.e., ecosystem science and management, ecological planning, land and water conservation, air quality management, water quality management, energy and carbon policy, etc.). Most students conclude their MS studies with a thesis, where the goal is a publishable contribution. The requirements are given below and are subject to completion after entering the master's program.

#### Contact Information

Kelly Halsall  
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### Food Science, PhD

School of Food Science  
College of Agricultural, Human, and Natural Resource Sciences

**Website:** [sfs.wsu.edu](http://sfs.wsu.edu)

**Number of graded credits:** 34

**Number of S/F credits:** varies

**Required research credits:** 45

**Other requirements:** Exhibit competency in food chemistry, food microbiology, food processing, advanced food science, seminars, statistics, and research. Present research proposal and pass written and oral qualifying examination. Present and successfully defend dissertation.

**Avg time to complete degree:** 4 years

**Location(s):** Pullman

**Tests required:** GRE (General test), TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** Washington State University and University of Idaho merged faculty and programs to become the School of Food Science (SFS). This is the first program in the nation to share teaching, research, extension programs, faculty, and resources between two states and two universities. Food Science is a multidisciplinary science that applies biology, chemistry, physics, engineering, nutrition, and other sciences to improve the safety and quality of food products; develop new food products; and design new, safer, and more energy efficient food preservation methods. Curriculum emphasizes courses in food processing, food chemistry, food microbiology, sensory evaluation, food quality and regulatory compliance,

and other specialized areas. Examples include the processing and manufacturing of cereal, dairy, fruit, and vegetable products; including cheeses, wines, and potatoes. Faculty are housed at WSU and UI campuses, and the WSU Tri-Cities campus. Each student's program of study is individualized based upon their research interests, prior academic experience, and in collaboration with their major advisor.

#### Contact Information

Jodi Anderson, Academic Coordinator/Advisor  
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### Food Science, MS

Options: Thesis or Non-Thesis  
School of Food Science  
College of Agricultural, Human, and Natural Resource Sciences

Website: [sfs.wsu.edu](http://sfs.wsu.edu)

Number of graded credits: 21thesis; 26 non-thesis

Number of S/F credits: varies

Required research credits: 10

**Other requirements:** Exhibit competency in food chemistry, food microbiology, food processing, and area of specialization. Present and successfully defend thesis.

Avg time to complete degree: 2.2 years

**Location(s):** Pullman

**Tests required:** GRE (General Test), TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** Washington State University and University of Idaho merged faculty and programs to become the School of Food Science (SFS). This is the first program in the nation to share teaching, research, extension programs, faculty, and resources between two states and two universities. Food Science is a multidisciplinary science that applies biology, chemistry, physics, engineering, nutrition, and other sciences to improve the safety and quality of food products; develop new food products; and design new, safer, and more energy efficient food preservation methods. Curriculum emphasizes courses in food processing, food chemistry, food microbiology, sensory evaluation, food quality and regulatory compliance, and other specialized areas. Examples include the processing and manufacturing of cereal, dairy, fruit, and vegetable products; including cheeses, wines, and potatoes. Faculty are housed at WSU and UI campuses, and the WSU Tri-Cities campus. Each student's program of study is individualized based upon their research interests, prior academic experience, and in collaboration with their major advisor.

#### Contact Information

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### Geology, PhD

School of the Environment

College of Agricultural, Human, and Natural Resource Sciences; College of Arts and Sciences

Website: <http://cahnrs.wsu.edu/soe/>

Number of graded credits: 27

Required research credits: Dissertation

**Avg time to complete degree:** 3 years with MS; 4 years with no MS

**Location(s):** Pullman

**Tests required:** GRE (Quantitative), GRE (Verbal), TOEFL, TOEFLI

**Deadline:** Fall: Jan 15; Spring: Oct 15

#### Description:

The Ph.D. dissertation should be a significant contribution to the science of geology, worthy of publication in referred international journals. Each PhD specialization outlines required courses and provides additional help to design a program. The student's program should be one of, or a combination of, not more than two areas.

Course options and electives for the program are based on the student's research interest and needs. Undergraduate pre-requisites must be satisfied for all courses within the selected program, and will not count for graduate credit. It is expected that the Ph.D. degree requirements with previous M.S. degree be completed in three years (full-time enrollment, with assistantship).

#### Contact Information

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### Geology, MS

School of the Environment  
College of Agricultural, Human, and Natural Resource Sciences; College of Arts and Sciences

Website: <http://cahnrs.wsu.edu/soe/>

**Number of credits:** Candidates must take 15 hours of 500-level graded major course work. The thesis program must consist of not less than 30 hours of approved graduate credit including a minimum of 21 hours of graded course work and 4 hours of Geol 700, Master's Research. Of these 21 hours of course work, up to 6 credits of non-graduate graded credit (300- or 400-level) may be used. The program may not include courses graded Pass/Fail, courses not approved for graduate credit, or courses that are audited. Courses taken to remove undergraduate deficiencies cannot be taken for a Pass/Fail grade.

**Additional Requirements:** Any course included in the advanced degree program in which a grade of C- or below is earned must be repeated but not on a Pass/Fail basis. Geology M.S. candidates must enroll in Geol 598 (Seminar) a minimum of 2 semesters. A final oral exam is required to test the candidate's knowledge of geology with emphasis on the work presented in the thesis.

Avg time to complete degree:

**Location(s):** Pullman

**Tests required:** GRE (Quantitative), GRE (Verbal), TOEFL, TOEFLI

**Deadline:** Fall: Jan 15; Spring: Oct 15

**Description:** The Geology graduate programs have specializations in sedimentology-stratigraphy; structural geology-tectonics; mineralogy-petrology-geochemistry, and hydrogeology. The School of the Environment maintains close research ties with [Hanford Nuclear Reservation](#) and [Pacific Northwest National Laboratory](#), offering additional, unique research opportunities for student research. Research capabilities are significantly enhanced by collaboration and cooperation with NRS faculty members and adjuncts, scientists in other departments at WSU, and an extensive network at other universities and with state/federal agencies.

#### Contact Information

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### Horticulture, PhD

Department of Horticulture  
College of Agricultural, Human, and Natural Resource Sciences

**Website:** <http://horticulture.wsu.edu/>

**Number of credits:** 23 graded credits are required with at least 15 at the 500-level including 2 hours of Hort 510 Seminar, and 20 hours of Hort 800 Research/Dissertation and Examination. No more than half of the graded credit may be transfer credit. Seventy-two credits are required overall for the degree.

Avg. time to complete degree: 4.0

**Location(s):** Pullman

**Tests required:** GRE (Combined), TOEFL, GRE (Quantitative), GRE (Verbal), TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** All doctoral candidates conduct independent research leading to a dissertation, with the objective of making a major contribution to the body of scientific knowledge in Horticulture. Portions of the dissertation research are normally published in peer-reviewed journals. Students in this degree option are expected to have completed a research-based master's degree or to have equivalent research experience prior to enrolling in the doctoral program.

#### Contact Information

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### Horticulture, MS

College of Agricultural, Human and Natural Resource Sciences

**Website:** [horticulture.wsu.edu](http://horticulture.wsu.edu)

**Number of total credits:** 21 graded credits are required with at least 15 at the 500-level including 2 hours of Hort 510 Seminar, and 4 hours of Hort 700 Research/Thesis and Examination. No more than half of the graded credit may be transfer credit. 30 credits are required overall for the degree.

**Mean time to complete degree:** 2.4 years

**Location(s):** Pullman

**Tests required:** GRE (Combined), GRE (Quantitative), GRE (Verbal), TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** This is a research-based degree, involving a formal, major research project. The objectives are to train students in the experimental method and to prepare students for handling major projects after graduation or for entering a doctoral program.

#### Contact Information

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### Landscape Architecture, MS

School of Design & Construction  
Voiland College of Engineering and Architecture; College of Agricultural, Human, and Natural Resource Sciences

**Website:** [sdc.wsu.edu](http://sdc.wsu.edu)

**Location(s):** Pullman

**Tests required:** IELTS, TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** The Master of Science in Landscape Architecture (MSLA) program provides graduate students with a foundation in the theory and practice of landscape architecture. The program also provides students with the opportunity to focus on a self-selected, particular area of landscape architectural investigation. The program emphasizes that landscape architectural works should facilitate deep connections to place, enabling individuals to positively affect and connect with these places. The program also emphasizes service learning and the development of research projects that shift both personal and public values and facilitate ecological understanding. Through the program students are trained to develop an enlarged and holistic understanding of natural and social phenomena, events, and objects that shape the quality of people's lives in rural and urban environments. The MSLA is offered in a two or three-year track depending upon qualifications at the time of admission.

#### Contact Information

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### Natural Resource Sciences, MS

#### Options: Thesis or Non-Thesis

School of the Environment  
College of Agricultural, Human, and Natural Resource  
Sciences; College of Arts and Sciences

**Website:** <http://cahnrs.wsu.edu/soe/>

**Number of graded credits:** 21 thesis

**Other requirements:** Students are required to take NATRS 594 and NATRS 595, NATRS 700 plus one other grad level seminar in any discipline.

**Location(s):** Pullman

**Tests required:** GRE (Combined), TOEFL, GRE (Quantitative), TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** The Department of Natural Resource Sciences offers programs of graduate study and research leading to a master of science in natural resource sciences and a master of sciences in natural resources. The M.S. in natural resource sciences emphasizes original research by the student. The program in natural resource sciences, and in environmental sciences and regional planning offer a joint Ph.D. degree. This degree provides an atmosphere of scholarship coupled with research opportunities that produces people capable of responding to the complicated issues of use, management, and protection of the environment and its natural resources. The department has laboratory facilities and greenhouses on campus. Field facilities are located at the 12,000 acre Colockum Multiple-Use Research Unit located near Wenatchee, WA. The University of Idaho is eight miles from the Pullman campus and offers cross-listed courses in conjunction with WSU in natural resource management and sciences.

#### Contact Information

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### Plant Pathology, PhD

Department of Plant Pathology  
College of Agricultural, Human, and Natural Resource  
Sciences

**Website:** [plantpath.wsu.edu/](http://plantpath.wsu.edu/)

**Number of graded credits:** 34 graded credits are required; 25 must be at the 500-level with a maximum of 9 300-400 level credits. 14 hours minimum of Plant Pathology coursework are required (including transfer credit). 2 hours of PLP 515 Seminar are required, and 20 hours minimum of PLP 800 Research/Dissertation and Examination credits are required. No more than half of the graded credit may be transfer credit. 72 total credits are required overall for the degree.

Mean time to complete degree: 4.4

Location(s): Pullman

**Tests required:** IELTS, TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** Doctorate in Plant Pathology requires graded course work and completion of dissertation research. The degree involves study in mycology, bacteriology, nematology, virology, disease physiology and biochemistry, molecular biology of host-parasite relationships, etiology, ecology and epidemiology of plant diseases, disease resistance, and integrated disease management by developing and deploying cultural, chemical, biological, and biotechnological approaches.

#### Contact Information

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Lisa Lujan, Academic Coordinator  
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Pullman, WA  
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### Plant Pathology, MS

Department of Plant Pathology  
College of Agricultural, Human, and Natural Resource  
Sciences

**Website:** [plantpath.wsu.edu/](http://plantpath.wsu.edu/)

**Number of graded credits:** 21 hours of graded credit are required with 15 at the 500-level including 2 hours of PLP 515 Seminar, and 4 hours of PLP 700 Research/Thesis and Examination. 30 credits are required overall for the degree. Mean time to complete degree: 2.3

Location(s): Pullman

**Tests required:** IELTS, TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** Plant Pathology is the study of plant diseases caused by pathogens and environmental factors; it involves study in mycology, bacteriology, nematology, virology, disease physiology and biochemistry, molecular biology of host-parasite relationships, etiology, ecology and epidemiology of plant diseases, disease resistance, and integrated disease management using cultural, chemical, biological and biotechnological approaches. Because of its broad mission, the Department of Plant Pathology has strong interrelationships with all other plant- and biology-

oriented departments and commodity groups within the state and nationally and internationally. The mission of the department reflects the strategic goals of Washington State University by advancing knowledge of plant pathology through creative research and scholarship, by extending that knowledge worldwide through the training of graduate students, and by applying the knowledge to protect the quality and quantity of the local and global food supply.

#### Contact Information

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#### Prevention Science, PhD

Department of Human Development  
College of Agricultural, Human, and Natural Resource Sciences

**Website:** [hd.wsu.edu/gradstudies](http://hd.wsu.edu/gradstudies)

Number of graded credits: 25

Required research credits 26

**Other requirements:** Additional elective, research, thesis, and/or dissertation credits to meet the minimum of 72 credits for a doctoral degree. Students in the program will complete required courses in three areas of prevention science: 1) Developmental Epidemiology and Public Health; 2) Research Methods; and 3) Program Development, Implementation, and Institutionalization. Students will be required to take core courses in at least three of the following disciplines: Communication, Human Development, Nursing, and/or Psychology.

Avg time to complete degree: 4 years

**Location(s):** Pullman, Spokane, Vancouver

**Tests required:** GRE (Combined), GRE (Quantitative), GRE (Verbal), TOEFL

**Deadline:** Fall: Jan 10

**Description:** The Prevention Science Graduate Program provides training opportunities at the doctoral level for students interested in developing expertise in the study of individuals and families and in the development and evaluation of prevention programs. This program is available to students who have completed a bachelor's or master's degree in a prevention science-related discipline or have significant prevention science experience.

The PhD in Prevention Science is an interdisciplinary program with faculty from the departments of Human Development, Health Communication, Education, Kinesiology, Nursing and Psychology. The program emphasizes training in both the generation of research-based knowledge and its translation into effective programs and policies that positively impact the well-being of children, youth, adults, families, and their communities.

The field of prevention science is interdisciplinary, and integrates theories and methodology from the disciplines of human development, behavioral sciences (e.g., psychology, sociology), economics, communication, health sciences,

evaluation, epidemiology, and public policy and administration. Prevention science involves 1) conducting basic research on risk and protective factors, and 2) using the resulting knowledge to develop, evaluate, and disseminate programs that promote the healthy physical, cognitive, and socio-emotional development of children, youth, adults, and families.

#### Contact Information

Thomas G. Power, Director/Professor  
Prevention Science/Human Development  
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#### Soil Science, PhD

Department of Crop and Soil Sciences  
College of Agricultural, Human, and Natural Resource Sciences

**Website:** [css.wsu.edu/](http://css.wsu.edu/)

**Number of credits:** 72 total credits are required overall for the degree. 15 hours of 500-level grade coursework are required; not included but required are 2 credits of Soils 501 Seminar, 1 credit of Soils 502 Statewide Tour, and 2 credits of Soils 511 Science Writing Workshop.

Additionally, 20 hours minimum of Soils 800

**Research/Dissertation and Examination credits are required.** No more than half of the graded credit may be transfer credit.

Mean time to complete degree: 4.2

Location(s): Pullman

**Tests required:** GRE (Combined), GRE (Quantitative), GRE (Verbal), TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** The Soil Science program supports two major, overlapping research themes: sustainable agriculture and vadose zone hydrology. Within these broad themes, faculty lead collaborative research on organic, conservation and precision agriculture, biogeochemistry, contaminant transport, storm water management, nutrient cycling, microbial dynamics, climate change mitigation, proximal soil sensing, digital soil mapping, and bioenergy development. Soils faculty work closely with crops and horticulture faculty and with the Center for Environmental Research, Education and Outreach to apply this expertise to sustainable natural and agricultural systems.

Research facilities include state of the art laboratories and greenhouses and research farms located in Pullman, as well as throughout the state at five Research and Extension Centers. Graduate students learn valuable skills and knowledge working side by side with faculty members and research technicians providing them the opportunity to play an integral role in the advancement of their major advisor's research. Students also have the opportunity to gain leadership, communication, and instructional experience through the option of serving as teaching assistants for one

or more courses within their discipline. Qualified students typically receive competitive teaching or research assistantships. These assistantships provide non-resident and resident tuition waivers, paid health insurance, and stipends to help cover living expenses.

#### Contact Information

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Telephone: 509-335-9542  
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#### Soil Science, MS

##### Options: Thesis or Non-Thesis

Department of Crop and Soil Sciences  
College of Agricultural, Human, and Natural Resource Sciences

Website: [css.wsu.edu](http://css.wsu.edu)

**Number of graded credits:** 30 credits are required overall for the degree. 21 graded credits are required for a thesis option with at least 15 at the 500-level including 2 hours of Soils 501 Seminar and 1 hour of Soils 502 Statewide Tour, and 4 hours of Soils 700. No more than half of the graded credit may be transfer credit. 26 credits are required for the non-thesis option

**Additional Requirements:** Research/Thesis and Examination.

**Mean time to complete degree:** 2.6

**Location(s):** Pullman

**Tests required:** GRE (Combined), GRE (Quantitative), GRE (Verbal), TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** The Soil Science program supports two major, overlapping research themes: sustainable agriculture and vadose zone hydrology. Within these broad themes, faculty lead collaborative research on organic, conservation and precision agriculture, biogeochemistry, contaminant transport, storm water management, nutrient cycling, microbial dynamics, climate change mitigation, proximal soil sensing, digital soil mapping, and bioenergy development. Soils faculty work closely with crops and horticulture faculty and with the Center for Environmental Research, Education and Outreach to apply this expertise to sustainable natural and agricultural systems.

Research facilities include state of the art laboratories and greenhouse facilities and research farms located in Pullman, as well as throughout the state at five Research and Extension Centers. Graduate students learn valuable skills and knowledge working side by side with faculty members and research technicians providing them the opportunity to play an integral role in the advancement of their major advisor's research. Students also have the

opportunity to gain leadership, communication, and instructional experience through the option of serving as teaching assistants for one or more courses within their discipline. Qualified students typically receive competitive teaching or research assistantships. These assistantships provide non-resident and resident tuition waivers, paid health insurance, and stipends to help cover living expenses.

#### Contact Information

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## College of Arts and Sciences

#### Anthropology, PhD

Options: archaeology, cultural anthropology or evolutionary anthropology  
College of Arts and Sciences

Website: <https://anthro.wsu.edu/graduate-studies/>

**Number of graded credits:** Archaeology 56 cr., Cultural Anthropology 52 cr., Evolutionary Anthropology 52 cr.  
Number of S/F credits: 20

Required research credits 20 credits of ANTH 800

**Other requirements:** Doctor of Philosophy graduate students take a preliminary exam upon completion of their coursework. The preliminary exam consists of two parts: written and oral. Students submit a dissertation research proposal. The final dissertation is defended in an oral presentation. Cultural Anthropology graduate students are required to demonstrate competence in a foreign language by completing two semesters of a college course in a foreign language.

Avg time to complete degree: 5-8 years

**Location(s):** Pullman

**Tests required:** GRE (Combined), GRE (Quantitative), GRE (Verbal), TOEFL, TOEFLI

**Deadline:** Fall: Jan 10

**Description:** Doctor of Philosophy degrees in Anthropology are offered in archaeology, cultural anthropology and evolutionary anthropology. Our program emphasizes a four-field approach through a series of core classes that all our graduates take in order to establish a solid foundation in Anthropology. Each program area offers specialized courses in methodological, theoretical and regional areas.

The program in **archaeology** emphasizes research and training in the prehistory of the Americas including the Pacific Northwest from British Columbia to northern California, the Columbia Plateau, the Pueblo societies of



the Southwest, Mesoamerica, and the Andes, with additional strengths in South Asia, China, Japan, and Korea.

The graduate program in **cultural anthropology** at WSU emphasizes three constellations of subject matter within the broad range of the subdiscipline: (1) psychological and medical anthropology; (2) children, family, and gender; and (3) ecological anthropology.

The program in **evolutionary anthropology** is built on a strong and unified theoretical foundation in human behavioral ecology, evolutionary psychology, and cultural transmission.

#### Contact Information

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#### Anthropology, MA

Options: archaeology, cultural anthropology or evolutionary anthropology  
Department of Anthropology  
College of Arts and Sciences  
**Website:** <https://anthro.wsu.edu/graduate-studies/>  
**Number of graded credits:** Archaeology 31 cr., Cultural Anthropology 31 cr., Evolutionary Anthropology 28 cr.  
Number of S/F credits: 4  
Required research credits 4 credits ANTH 700  
**Other requirements:** The Master of Arts graduate students also develop a research proposal for a thesis, the final version of the thesis is defended in an oral examination.  
**Avg time to complete degree:** 2.5 years  
**Program Location(s):** Pullman  
**Tests required:** GRE (Combined), GRE (Quantitative), GRE (Verbal), TOEFL, TOEFLI  
**Deadline:** Fall: Jan 10  
**Description:** Master of Arts degrees in Anthropology are offered in archaeology, cultural anthropology and evolutionary anthropology. The Cultural Anthropology program also offers a Peace Corps Master's International Program in Environmental Anthropology. Our program emphasizes a four-field approach through a series of core classes that all our graduates take in order to establish a solid foundation in Anthropology. Each program area offers specialized courses in methodological, theoretical and regional areas.

#### Contact Information

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#### Biology, PhD

School of Biological Sciences  
College of Arts and Sciences  
**Website:** [sbs.wsu.edu/grad-studies/](https://sbs.wsu.edu/grad-studies/)  
Number of graded credits: 21  
Transfer credit limit: 10  
**Additional Requirements:** Proposal defense Exit seminar  
**Location(s):** Pullman  
**Tests required:** GRE (Combined), TOEFL, TOEFLI  
**Deadline:** Fall: Jan 10; Spring: September 1  
**Description:**  
The School of Biological Sciences offers a rigorous and competitive degree in biology. Students who complete this degree are successful in a broad variety of careers, including those in: research universities, teaching colleges, federal and state government and the private sector. Our biology students generally focus on research in the broad areas of ecology, evolution, systematics, molecular biology, and animal physiology.

#### Contact Information

Andrew Storfer, Associate Professor and Associate Director  
School of Biological Sciences  
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Pullman, WA 99164  
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#### Biology, MS

**Options: Thesis or Non-Thesis**  
School of Biological Sciences  
College of Arts and Sciences  
**Website:** [sbs.wsu.edu/grad-studies/](https://sbs.wsu.edu/grad-studies/)  
**Number of graded credits: 21**  
**Transfer credit limit: 10**  
**Additional Requirements:** Exit seminar  
**Location(s):** Pullman  
**Tests required:** GRE (Combined), TOEFL  
**Deadline:** Fall: Jan 10; Spring: September 1  
**Description:** The School of Biological Sciences offers a rigorous and competitive degree in biology. Students who complete this degree are successful in a broad variety of careers, including those in: research universities, teaching colleges, federal and state government and the private sector. Our biology students generally focus on research in the broad areas of ecology, evolution, systematics, molecular biology, and animal physiology.

#### Contact Information

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### Chemistry, PhD

Department of Chemistry  
College of Arts and Sciences

**Website:** [chem.wsu.edu](http://chem.wsu.edu)

Number of graded credits: 34

Number of S/F credits: 38

Required research credits 38

Avg time to complete degree: 5 years

Location(s): Pullman

**Tests required:** GRE (Combined), TOEFL

**Deadline:** Fall: February 1 Spring: Oct 1

**Description:** Graduate studies in Chemistry leading to the Ph.D. degree are designed to prepare students for carrying out creative, independent research for the many career paths in the chemical sciences. Formal courses are taken in the first 2 years and graduate research is started as soon as the first semester.

#### Contact Information

Stacie Olsen-Wilkes, Graduate Coordinator

Department of Chemistry

Washington State University

Pullman, WA 99164-4630

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### Chemistry, MS

Options: Thesis or Non-thesis

Department of Chemistry

College of Arts and Sciences

**Website:** [chem.wsu.edu](http://chem.wsu.edu)

**Number of graded credits:** 21 thesis; 26 non-thesis

**Additional Requirements:** Both options require a research project.

**Location(s):** Pullman, Tri-Cities

**Tests required:** GRE (Combined), TOEFL

**Deadline:** Fall: March 1 (Jan 15 international); Spring: Oct 1

**Description:** The Master of Science degree is awarded in recognition of scholarship and contributions to knowledge in the field of Chemistry. The Master's Degree is based on research carried out in the laboratories of the Department and allows students to gain experience in modern experimental techniques and to familiarize themselves with the daily workings of a laboratory. Master's Degree students (on either the thesis or non-thesis track) must carry out a research project under the supervision of a member of the Chemistry Department faculty. Master's students are expected to participate fully in the scientific life of the Department and to attend the various meetings and seminars that take place.

#### Contact Information

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Department of Chemistry

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### Criminal Justice & Criminology, PhD

Department of Criminal Justice and Criminology  
College of Arts and Sciences

**Website:** <http://crmj.wsu.edu/>

Number of graded credits: 48

Location(s): Pullman

**Tests required:** GRE (Combined); TOEFL

**Deadline:** Fall: Jan 10;

**Description:** The mission of Criminal Justice Ph.D. program is to advance the development of criminological and criminal justice research and theory, and to train graduate students to conduct and understand theoretically based research involving crime and the criminal justice system. Upon completion of their graduate program, graduate students in criminal justice will be able to read and evaluate data and social science research, analyze and develop criminal justice policy, conduct independent research related to criminology and criminal justice, and communicate original research findings and analyses of secondary research cogently for consideration by multiple audiences.

#### Contact Information

Rebeca Orozco, Graduate Coordinator

Criminal Justice and Criminology

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### Criminal Justice & Criminology, MA

Non-Thesis

Department of Criminal Justice and Criminology

College of Arts and Sciences

**Website:** <http://crmj.wsu.edu/>

**Number of graded credits:** 27

**Location(s):** Pullman, Spokane

Tests required: GRE

**Deadline:** Fall: Jan 10

Spring: July 1

**Description:** The MA degree in criminal justice is designed to develop and enhance the student's knowledge of criminal justice; expand and develop a student's analytical and assessment skills; and further develop their facility with oral and written communication and with research. The program is flexible and provides a superb basis for entry into graduate work at the doctoral level or applied work in criminal justice agencies. Approximately 70% of our M.A. graduates are employed in applied settings while the balance has pursued teaching and research careers.

#### Contact Information

Dr. Faith E. Lutze, Graduate Director

Criminal Justice & Criminology

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### English, PhD

Options: Literary Studies or Rhetoric and Composition  
Department of English  
College of Arts and Sciences

**Website:** <http://english.wsu.edu/>

Number of graded credits: 34

Number of S/F credits: 16

**Other requirements:** Foreign language proficiency as detailed on our web site.

Avg time to complete degree: 5 years

Location(s): Pullman

Tests required: TOEFL

**Deadline:** Jan 10 (for Fall Semester matriculation)

**Description:** Students entering the Ph.D. program in English are expected to have completed a Master's Degree in English or in a related field of study at an accredited college or university, and to show promise of doing excellent work at the doctoral level. Students who complete an M.A. at WSU must reapply for admission to the Ph.D. program. Ph.D. candidates must demonstrate general competence in two foreign languages or advanced competence in one. All doctoral students are expected to take part actively in planning their own programs of study and in meeting deadlines set by the department and by the WSU Graduate School.

The objective of the Ph.D. program – including concentrations either in literary studies or in rhetoric and composition – is to prepare scholars for employment in a wide variety of post-secondary institutions of learning by providing both generalized and specialized training, as well as opportunities to develop critical and research skills in literary studies, rhetorical theory, composition studies, pedagogical theory, linguistics, cultural studies, and other related fields. The Ph.D. candidate's course of study is not designed to confront the student with every significant piece of writing in the respective field (i.e., English and American literature or rhetoric and composition). Rather, the coursework aims to produce mature critics and scholars who are widely read in their specific fields of study, knowledgeable about methods of systematic scholarship and effective verbal communication, and competent to function professionally, not only in the modern university, but also in related institutions such as historical societies, museums, libraries, and publishing firms.

### Contact Information

Tanya Gonzales, Program Coordinator  
English  
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### English, MA

Options: Literary Studies or Rhetoric and Composition  
Department of English  
College of Arts and Sciences

**Website:** <https://english.wsu.edu/graduate-studies/>

**Number of graded credits:** 24 for the thesis option; 27 for the portfolio option

Number of S/F credits: 12

Other requirements: Linguistics and/or language proficiency requirement as outlined in the program web site.

Avg time to complete degree: 2 years

Location(s): Pullman

Tests required: TOEFL

**Deadline:** Jan 10 (for Fall Semester matriculation)

**Description:** This broad program provides a solid foundation for more specialized doctoral study in English or American literature, rhetoric and composition, college-level pedagogy, American studies, comparative literature, or postcolonial anglophone literatures, as well as for professional training in such areas as law, information technology, divinity, journalism, professional editing, and business. Students pursuing an M.A. may choose either to write a thesis or to prepare a final portfolio. Language proficiency requirements are based on the candidate's expected needs and may be met by linguistics or other language studies.

### Contact Information

Tanya Gonzales, Program Coordinator  
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### Environmental and Natural Resource Sciences, PhD

School of the Environment  
College of Arts and Sciences  
College of Agricultural, Human, and Natural Resource Sciences

**Website:** <http://cahnrs.wsu.edu/soe/>

**Number of credits:** 15 with BS & MS; 17 with BS only.

No more than 9 credits of non-graduate credit course work may be used for the total credits for the Program of Study. Only those master's degree and transfer courses at a level equivalent to 500 level courses and which are applicable to the doctoral program can be used. Minimum GPA is 3.0. Any course with a grade of C- must be repeated.

**Location(s):** Pullman

**Tests required:** TOEFL, TOEFLI, GRE (Quantitative), GRE (Verbal)

**Deadline:** Fall: Jan 15; Spring: Oct 15

**Description:** Environmental and Natural Resource Sciences comprise an association of several areas of study at WSU. These sciences focus on factors related to the understanding and management of the environment and therefore have a commonality of interest. The Ph.D. program provides opportunities for doctoral study that involve integration and interaction among these various fields of science. The cooperation of WSU's faculties in environmental and natural resource sciences in this program fosters important exchanges of knowledge that greatly enhance interdisciplinary education.

#### Contact Information

Alecia Hoene, Academic Advisor  
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#### Environmental Science, MS

Options: Thesis or Non-Thesis  
School of the Environment  
College of Arts and Sciences  
College of Agriculture, Human, and Natural Resource Sciences

**Website:** <http://cahnr.wsu.edu/soe/>

**Number of graded credits:** 32

**Additional Requirements:** At least 10 semester credits of completed coursework in basic biological and/or physical sciences. Deficiencies will be accepted with the expectation that they will be met within one year of admission.

**Location(s):** Pullman, Tri-Cities; Vancouver

**Tests required:** GRE (Quantitative); GRE (Verbal)  
TOEFL, TOEFLI

**Deadline:** Fall: Jan 15; Spring: Oct 15

**Description:** The MS degree is an interdisciplinary program with the flexibility for elective classes in the student's own area of specialization. In consultation with their advisor, students may select classes from a wide variety of areas (i.e., ecosystem science and management, ecological planning, land and water conservation, air quality management, water quality management, energy and carbon policy, etc.). Most students conclude their MS studies with a thesis, where the goal is a publishable contribution. The requirements are given below and are subject to completion after entering the master's program.

#### Contact Information

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#### Fine Arts, MFA

Department of Fine Arts  
College of Arts and Sciences

**Website:** <http://www.wsu.edu/~finearts/>

Number of graded credits: 52

Number of research credits: 4

**Additional Requirements:** A final oral examination is also required.

Avg time to complete degree: 2 years

Location(s): Pullman

Tests required: TOEFL

**Deadline:** Fall: Jan 15

**Description:** The department offers an interdisciplinary program where students may focus in, but are not limited to, ceramics, drawing, digital media, painting, photography, printmaking, and sculpture. Emphasis is placed on personal and conceptual artistic development in light of contemporary art practices. Graduates meet with faculty for one-on-one studio discussions. First year students have an exhibition in the departmental gallery and the second year program culminates in a thesis exhibition held in the Museum of Art.

#### Contact Information

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#### Hispanic Studies, MA

**Options:** Thesis or Non-Thesis

College of Arts and Sciences

**Website:** <http://www.forlang.wsu.edu>

**Number of graded credits:** 32

**Number of S/F credits:** 4 (Span 560 / 561)

**Required research credits:** 8-10 (Span 600 and 702)

**Other requirements:** Four Written Exams; Research Paper or Thesis; Final Oral Comprehensive Exam

**Avg. time to complete degree:** 2 years

**Location(s):** Pullman

**Tests required:** TOEFL

**Deadline:** Fall: February 1; Spring: N/A

**Description:** Our MA Program focuses on the fields of Latin American and Peninsular Spanish literatures, film, and cultures. Our program offers graduate courses in Medieval, Golden Age, and Colonial literature as well as 19<sup>th</sup>-21<sup>st</sup> Century Latin American literature and film, and 19<sup>th</sup> - 21<sup>st</sup> Century Peninsular literature, culture, and film. The program provides a theoretical foundation and practical application to conduct research in the different areas aforementioned. Besides preparing students in literary theory, criticism and research methods, the program emphasizes an interdisciplinary and trans-regional approach to all the Latin American and Peninsular Spanish literary and cinematic traditions, epochs, genres, and cultural expressions (both, high and popular). Our approach to literature, film, and culture bridges theoretical frames provided by fields of studies as diverse as Gender Studies, Psychology, Cultural Studies, Queer Studies, Postcolonial Studies, Sociology, Economics, Philosophy, Fine Arts, History, to mention a few. Admission is competitive and qualifying graduate students are financially supported by

Teaching Assistantships. Graduate students who are granted a Teaching Assistantship receive a mandatory training in Teaching Spanish as a Second Language, Theory and Methods of Foreign Language Instruction, and Oral Proficiency Interview. Graduate Teaching Assistants take one course in which they learn about the communicative task-based foreign language instruction and some practical teaching tools. They are introduced to the fields of Second Language Acquisition and Foreign Language Pedagogy.

**Note:** This MA program will **not** fulfill your expectations if your **primary interest** is a graduate program in:

- Language and Linguistics
- Spanish Education and/or Teaching Spanish as a Second Language
- Spanish Translation and Interpreting
- Spanish for the Professions
- Creative Writing

### Contact Information

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Main Office  
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Washington State University  
Pullman, WA 99164-2610  
Telephone: 509 335-4135  
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### Geology, PhD

School of the Environment  
College of Agricultural, Human, and Natural Resource Sciences; College of Arts and Sciences

**Website:** <http://cahnrs.wsu.edu/soe/>

Number of graded credits: 30

Required research credits: Dissertation

**Avg time to complete degree:** 3 years with MS; 4 years with no MS

Location(s): Pullman

**Tests required:** GRE (Quantitative), GRE (Verbal), TOEFL, TOEFLI

**Deadline:** Fall: Jan 15; Spring: Oct 15

**Description:** The Ph.D. dissertation should be a significant contribution to the science of geology, worthy of publication in referred international journals. Each PhD specialization outlines required courses and provides additional help to design a program. The student's program should be one of, or a combination of, not more than two areas.

The course options and electives for the program are based on the student's research interest and needs. Undergraduate pre-requisites must be satisfied for all courses within the

selected program, and will not count for graduate credit. It is expected that the Ph.D. degree requirements with previous M.S. degree be completed in three years (full-time enrollment, with assistantship).

### Contact Information

Casey Bauline, Academic/Graduate Coordinator  
School of Environment  
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### Geology, MS

School of the Environment  
College of Agricultural, Human, and Natural Resource Sciences; College of Arts and Sciences

**Website:** <http://cahnrs.wsu.edu/soe/>

**Number of credits:** Candidates must take 15 hours of 500-level graded major course work. The thesis program must consist of not less than 30 hours of approved graduate credit including a minimum of 21 hours of graded course work and 4 hours of Geol 700, Master's Research. Of these 21 hours of course work, up to 6 credits of non-graduate graded credit (300- or 400-level) may be used. The program may not include courses graded Pass/Fail, courses not approved for graduate credit, or courses that are audited. Courses taken to remove undergraduate deficiencies cannot be taken for a Pass/Fail grade.

**Additional Requirements:** Any course included in the advanced degree program in which a grade of "C-" or below is earned must be repeated but not on a Pass/Fail basis. Geology M.S. candidates must enroll in Geol 598 (Seminar) a minimum of 2 semesters. A final oral exam is required to test the candidate's knowledge of geology with emphasis on the work presented in the thesis.

Avg time to complete degree:

Location(s): Pullman

**Tests required:** GRE (Quantitative), GRE (Verbal), TOEFL, TOEFLI

**Deadline:** Fall: Jan 15; Spring: Oct 15

**Description:** The Geology graduate programs have specializations in sedimentology-stratigraphy; structural geology-tectonics; mineralogy-petrology-geochemistry, and hydrogeology. The School of the Environment maintains close research ties with [Hanford Nuclear Reservation](#) and [Pacific Northwest National Laboratory](#), offering additional, unique research opportunities for student research. Research capabilities are significantly enhanced by collaboration and cooperation with NRS faculty members and adjuncts, scientists in other departments at WSU, and an extensive network at other universities and with state/federal agencies.

### Contact Information

Alecia Hoene, Academic Advisor  
School of Environment  
Webster 1229  
Pullman, WA 99164-2812  
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Email: [alecia.hoene@wsu.edu](mailto:alecia.hoene@wsu.edu)

## History, PhD

College of Arts and Sciences

**Website:** <https://history.wsu.edu/>

Number of credits: 72

**Other requirements:** Dissertation requires oral examination. Must pass a foreign language competency exam by the 3rd semester of degree program. Minimum of 6 credits in coursework from one or two disciplines outside of history as a minor.

Avg time to complete degree:

**Location(s):** Pullman

**Tests required:** GRE (Combined), TOEFL

**Deadline:** Fall: Jan 10; Spring

**Description:** Students entering the Ph.D. program in History are expected to have completed a Master's degree in History or in a related field of study at an accredited college or university, and to show promise of doing excellent work at the doctoral level. All doctoral candidates conduct independent research leading to a written dissertation, with the objective of making a major contribution to the body of academic knowledge in History. Research will be focused on a specific Primary Field, which is embedded in a broader General Field that gives a geographical, chronological, and historiographical framework for the research. The student will also have a Comparative Field to provide a spatial and temporal context to the research. The program will culminate with a final oral examination. Financial aid in the form of an assistantship is available for dedicated, quality full time Ph.D. students.

### Contact Information

Kenneth Anderson, Program Coordinator

PO Box 644030

Washington State University

Pullman, WA 99164-4030

Telephone: 509-335-0432

Fax: 509-335-4171

E-mail: [kwanderson@wsu.edu](mailto:kwanderson@wsu.edu)

## History, MA

Options: Thesis or Non-Thesis

College of Arts and Sciences

**Website:** <https://history.wsu.edu/>

Number of credits: 30

**Other requirements:** Thesis option requires oral examination.

Avg time to complete degree:

**Location(s):** Pullman

**Tests required:** GRE (Combined), TOEFL

**Deadline:** Fall: Jan 10

**Description:** The History Department offers programs of study for full time and part-time students leading to a Masters of Arts (MA) degree. Students entering the MA program in History are expected to show promise of doing excellent work at the graduate level. All MA students conduct independent research leading to a written thesis, with the objective of making a contribution to the body of

academic knowledge in History. Research will be focused on a specific Primary Field, which is embedded in a broader General Field that gives a geographical, chronological, and historiographical framework for the research. The program will culminate with a final oral examination. The strong research emphasis and thesis experience prepare interested students for doctoral programs and careers in research and teaching. Financial aid in the form of an assistantship is available for dedicated, quality full time MA students.

### Contact Information

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Pullman, WA 99164-4030

Telephone: 509-335-0432

Fax: 509-335-4171

E-mail: [kwanderson@wsu.edu](mailto:kwanderson@wsu.edu)

## Materials Science and Engineering, PhD

Graduate School; Voiland College of Engineering and Architecture; College of Arts and Sciences

**Website:** [materials.wsu.edu](http://materials.wsu.edu)

**Number of credits:** Of the minimum 21 graded credit hours, the student must take 1) 3 credit hours of Math 440 or 540, 2) a minimum of 6 credit hours at the 400- or 500-level (MME or non-MME), and 3) a minimum of 12 credit hours of 500-level MSE or ME courses (at least 9 of these must be MSE courses). Note: a maximum of 6 credit hours of graded coursework at the 300- and 400-level can be included in the program. Also required: 1) a minimum of 4 credit hours of MSE 700 and 2) 2 credit hours of ME 598 or MatS 593 (seminar). All programs must have a minimum total credits of 72.

Avg time to complete degree: 4 years

**Location(s):** Pullman

**Tests required:** TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** Our School offers programs of study for full time and part-time students leading to the Doctor of Philosophy (Ph.D.) in Materials Science and Engineering. Programs of study are individualized with an interdisciplinary focus. Students are expected to pursue their degree programs with success and to earn the Ph.D. in four years. The program will culminate with a dissertation (Ph.D.). Financial aid in the form of an assistantship is available for dedicated, quality full time Ph.D. students.

### Contact Information

Kjelda Berg

Program Coordinator

Materials Science and Engineering

509-335-8231

[bergk@wsu.edu](mailto:bergk@wsu.edu)

## Materials Science and Engineering, MS

Options: Thesis or Non-Thesis

Graduate School; Voiland College of Engineering and Architecture; College of Arts and Sciences

**Website:** [materials.wsu.edu](http://materials.wsu.edu)

**Number of credits:** Of the minimum 21 thesis and 26 non-thesis graded credit hours, the student must take 1) 3 credit hours of Math 440 or 540, 2) a minimum of 6 credit hours at the 400- or 500-level (MME or non-MME), and 3) a minimum of 12 credit hours of 500-level MSE or ME courses (at least 9 of these must be MSE courses). Note: a maximum of 6 credit hours of graded coursework at the 300- and 400-level can be included in the program. Also required: 1) a minimum of 4 credit hours of MSE 700 and 2) 2 credit hours of ME 598 or MatS 593 (seminar). All programs must have a minimum total credits of 30.

Avg time to complete degree: 2 years

Location(s): Pullman

**Tests required:** TOEFLI, GRE (Quantitative), GRE (Verbal), IELTS

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** Our School offers programs of study for full time and part-time students leading to the MS in Materials Science & Engineering. Our School participates in the interdisciplinary degree programs of MS in Engineering, thesis and non-thesis options. Programs of study are individualized with an interdisciplinary focus. Students are expected to pursue their degree programs with success and to earn the MS degree in two years. The program will culminate with a final oral examination and a written thesis (MS thesis option), or project report (MS non-thesis option). Financial aid in the form of an assistantship is available for dedicated, quality full time MS students.

#### Contact Information

Mary Simonsen, Graduate Academic Coordinator  
School of Mechanical & Materials Engineering  
Sloan Hall 203E

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[gradapp@mme.wsu.edu](mailto:gradapp@mme.wsu.edu)

#### Mathematics, PhD

Options: Applied Mathematics, Statistics, or Education  
Department of Mathematics

College of Arts and Sciences

**Website:** [math.wsu.edu](http://math.wsu.edu)

Emphases: education, statistics, or applied mathematics.

Number of graded credits: 34

Number of S/F credits: 20

Required research credits 20

**Other degree requirements:** The Graduate Qualifying Examination (GQE) is a single four-hour written examination based on undergraduate material covering advanced calculus (including vector calculus) and linear algebra. The Doctoral Qualifying Examination (DQE) is a written examination of approximately two hours in length and covers the candidate's area of specialization with the focus on appropriate mathematics graduate course work. The Preliminary Doctoral Examination will begin with a presentation by the student to his/her doctoral committee on a thesis research problem and a plan of research to be followed toward its solution. The examination will include

questions and feedback from members of the doctoral committee on the student's presentation. The Final Doctoral Examination (FDE) will occur after the student has completed the dissertation and it has been approved by the student's Doctoral Committee.

**Avg. time to complete:** 5 years

Location(s): Pullman

Tests required: TOEFL

Deadline: Fall: Jan 10; Spring: July 1

**Description:** Distinctive scholarship and original contributions to mathematical knowledge. This PhD program is designed to lead the student to the following learning outcomes:

-Critical Thinking: Students will be able to think critically and creatively.

-Knowledge and Scholarship: Students will be able to identify and conduct original research and scholarship.

-Ethical and Responsible Research: Students will be able to conduct research in an ethical and responsible manner.

-Effective Communication: Students will be able to effectively communicate research work in written and oral form.

#### Contact Information

Emily Lewis, Graduate Coordinator

Mathematics

Telephone: 509-335-8645

E-mail: [elewis@math.wsu.edu](mailto:elewis@math.wsu.edu)

Michael Tsatsomeros, Graduate Studies Chairperson

Mathematics

E-mail: [tsat@wsu.edu](mailto:tsat@wsu.edu)

#### Mathematics, MS

Options: Applied Mathematics, Computational Finance, Mathematics Teaching

Department of Mathematics

College of Arts and Sciences

**Website:** [math.wsu.edu](http://math.wsu.edu)

Number of graded credits: 26

Number of S/F credits: 5

Required research credits 4

**Other requirements:** All students must pass a final oral examination covering all of the student's course work plus the content of Math. 401, 402, 420, and 421. There is no thesis requirement, but the results of independent study and research are often summarized in a paper.

Avg time to complete degree: 2 years

Location(s): Pullman

Tests required: TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** This MS program is designed to lead the student to the following learning outcomes:

-Problem Solving: Students will be able to identify mathematical and computational methods in order to solve problems.

-Deductive Thinking: Students will be able to read and write logical arguments in order to prove advanced mathematical results.

-Effective Communication: Students will be able to effectively communicate mathematical concepts, problems and their solutions in written and oral form.

#### **Contact Information**

Emily Lewis, Graduate Coordinator  
Mathematics  
Telephone: 509-335-8645  
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Michael Tsatsomeros, Graduate Studies Chairperson Email:  
[tsat@wsu.edu](mailto:tsat@wsu.edu)

#### **Music, MA**

Options: Thesis or Non-Thesis  
College of Arts and Sciences

**Website:** [libarts.wsu.edu/music/](http://libarts.wsu.edu/music/)

**Number of graded credits:** 21thesis; 26 non-thesis

**Other requirements:** A graduate recital is required in the performance emphasis, including the conducting emphasis.

Location(s): Pullman

Tests required: TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** The Master of Arts in Music may be earned through study in areas of music education, composition, music history and literature, conducting, and performance studies. Four emphases are available: Music education, performance, composition, or Jazz; but the degree may also be completed without an emphasis. The program offers both thesis and non-thesis options, designed according to the goals of the student. Composition-emphasis students must complete the thesis option.

#### **Contact Information**

Dr. Shannon Scott, Senior Instructor/Graduate Coordinator  
School of Music  
PO Box 645300  
Kimbrough, Room 260  
Pullman, WA 99164-5300  
Telephone: 509-335-5342  
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#### **Natural Resource Sciences, MS**

**Options: Thesis or Non-Thesis**

School of the Environment  
College of Agricultural, Human, and Natural Resource Sciences; College of Arts and Sciences

**Website:** <http://cahnr.wsu.edu/soe/>

**Number of graded credits:** 21 thesis; 26 non-thesis

**Other requirements:** Students are required to take NATRS 594 and NATRS 595, NATRS 700 plus one other grad level seminar in any discipline, including NATRS but not limited to.

**Location(s):** Pullman

**Tests required:** GRE (Combined), IELTS, TOEFL

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** The Department of Natural Resource Sciences offers programs of graduate study and research leading to a master of science in natural resource sciences

and a master of sciences in natural resources. The M.S. in natural resource sciences emphasizes original research by the student. The program in natural resource sciences, and in environmental sciences and regional planning offer a joint Ph.D. degree. This degree provides an atmosphere of scholarship coupled with research opportunities that produces people capable of responding to the complicated issues of use, management, and protection of the environment and its natural resources. The department has laboratory facilities and greenhouses on campus. Field facilities are located at the 12,000 acre Colockum Multiple-Use Research Unit located near Wenatchee, WA. The University of Idaho is eight miles from the Pullman campus and offers cross-listed courses in conjunction with WSU in natural resource management and sciences.

#### **Contact Information**

Alecia Hoene, Academic/Graduate Coordinator  
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#### **Physics, PhD**

Department of Physics and Astronomy  
College of Arts and Sciences

**Website:** [www.physics.wsu.edu/](http://www.physics.wsu.edu/)

**Number of graded credits:** 36

**Number of S/F credits:** 36

**Required research credits:** Minimum of 20  
Other requirements: 4 hours of seminar credit; Phys 501. Dissertation required.

**Avg time to complete degree:** At least 3 years beyond passing of prelims

**Location(s):** Pullman

**Tests required:** TOEFL, TOEFLI, IELTS

**Deadline:** Fall: January 10

**Description:** The Department of Physics and Astronomy doctoral program at Washington State University is designed to produce leaders in industry, in academia and at national laboratories. The department's progressive environment seeks to provide an atmosphere that fosters intellectual growth and quantitative reasoning. The program engages students in teaching and research activities that provide the skills, knowledge and ability for critical thinking that will enable them to be productive members of society. In the process, our goal is to lay the foundations for technological advances that improve our quality of life.

#### **Contact Information**

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Physics and Astronomy  
PO BOX 642814  
Pullman, WA 99164-2814  
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Fax: (509) 335-7816  
E-mail: [physrecruit@wsu.edu](mailto:physrecruit@wsu.edu)



## Physics, MS

Options: Thesis or Non-Thesis  
Department of Physics & Astronomy  
College of Arts and Sciences

**Website:** [physics.wsu.edu/](http://physics.wsu.edu/)

Number of graded credits: 21 thesis; 26 non-thesis

Number of S/F credits: 12

Required research credits: 4

**Other degree requirements:** Phys 501, 4 hours of seminar credit. Includes a substantial thesis project.

**Avg time to complete degree:** 3 years

**Location(s):** Pullman

**Tests required:** TOEFL, TOEFLI, IELTS **Deadline:** Fall: January 10

**Description:** The Department of Physics and Astronomy master's program is designed to produce leaders in industry, in academia and at national laboratories. The department's progressive environment seeks to provide an atmosphere that fosters intellectual growth and quantitative reasoning. The program engages students in teaching and research activities that provide the skills, knowledge and ability for critical thinking that will enable them to be productive members of society. In the process, our goal is to lay the foundations for technological advances that improve our quality of life.

### Contact Information

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## Political Science, PhD

School of Politics, Philosophy, and Public Affairs  
College of Arts and Sciences

**Website:** [libarts.wsu.edu/polisci/graduate-studies/phd-polisci.asp](http://libarts.wsu.edu/polisci/graduate-studies/phd-polisci.asp)

**Number of graded credits:** 34

**Number of S/F credits:** 3

**Required research credits:** 20

**Other requirements:** 9 hours max non-graduate courses (400)

**Avg time to complete degree:** 4-6 years

**Location(s):** Pullman

**Tests required:** GRE (Combined), GRE (Quantitative), GRE (Verbal), TOEFL, TOEFLI

**Deadline:** Fall: Jan 10

**Description:** Faculty members teach and conduct research in the major subfields of the discipline: American, global politics, public policy and administration, political theory, and political methodology, with sub-specializations in public law, political communication, political psychology, European politics, American foreign policy, gender and politics, environmental policy, and multi-methods research.

### Contact Information

Martha Cottam, Professor and Graduate Director  
School of Politics, Philosophy and Public Affairs  
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Diane Scott, Program Coordinator  
School of Politics, Philosophy and Public Affairs  
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## Plant Biology, PhD

School of Biological Sciences  
College of Arts and Sciences

**Website:** [sbs.wsu.edu/grad-studies](http://sbs.wsu.edu/grad-studies)

Number of graded credits: 21

Number of S/F credits:

Required research credits

Other requirements: Proposal defense Exit seminar

Avg time to complete degree:

Location(s): Pullman

Tests required: GRE (Combined), TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: September 1

**Description:** The School of Biological Sciences offers a rigorous and competitive degree in Botany. Students who complete this degree are successful in a broad variety of careers, including those in: research universities, teaching colleges, federal and state government and the private sector. Our botany students generally focus on research in the broad areas of plant physiology, ecology, evolution, systematics, and molecular biology.

### Contact Information

Andrew Storfer, Associate Professor and Associate Director  
School of Biological Sciences  
Telephone: 509-335-7922  
Fax: 509-335-3184  
E-mail: [astorfer@wsu.edu](mailto:astorfer@wsu.edu)

## Plant Biology, MS

School of Biological Sciences  
College of Arts and Sciences

**Website:** [sbs.wsu.edu/grad-studies/](http://sbs.wsu.edu/grad-studies/)

Number of graded credits: 21 thesis only

Required research credits

Other requirements: Exit Seminar

Location(s): Pullman

**Tests required:** GRE (Combined), TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: September 1

**Description:** The School of Biological Sciences offers a rigorous and competitive degree in Botany. Students who complete this degree are successful in a broad variety of

careers, including those in: research universities, teaching colleges, federal and state government and the private sector. Our botany students generally focus on research in the broad areas of plant physiology, ecology, evolution, systematics, and molecular biology.

#### Contact Information

Andrew Storfer, Associate Professor and Associate Director  
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### Political Science, PhD

School of Politics, Philosophy, and Public Affairs  
College of Arts and Sciences

#### Website:

<https://pppa.wsu.edu/phd-in-political-science/>

Number of graded credits: 26

Required research credits 4

Other requirements: 9 hours max of non-graduate (400) graded course work

Avg time to complete degree: 2 years

Location(s): Pullman

**Tests required:** GRE (Combined), GRE (Quantitative), GRE (Verbal), TOEFL

**Deadline:** Fall: Jan 10

**Description:** Fifteen faculty members teach and conduct research in the major subfields of the discipline: American, comparative, international relations, public policy and administration, political theory, and political methodology, with sub-specializations in public law, political communication, political psychology, French and European politics, American foreign policy, gender and politics, environmental policy, and qualitative methodology.

#### Contact Information

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Diane Scott, Graduate Coordinator  
School Politics, Philosophy and Public Affairs  
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Fax: 509-335-7990  
E-mail: [scottjd@wsu.edu](mailto:scottjd@wsu.edu)

### Political Science, MS

#### Options: Thesis or Non-Thesis

School of Politics, Philosophy, and Public Affairs  
College of Arts and Sciences

#### Website:

<https://pppa.wsu.edu/graduate-studies/m-a-in->

### [political-science-certificate-in-gobal-justice-security-studies/](#)

Number of graded credits: 26

Required research credits 4

Other requirements: 9 hours max of non-graduate (400) graded course work

Avg time to complete degree: 2 years

Location(s): Pullman

**Tests required:** GRE (Combined), GRE (Quantitative), GRE (Verbal), TOEFL

**Deadline:** Fall: Jan 10

**Description:** Master of Arts in Political Science Non-Thesis in conjunction with certificate program is a terminal degree program designed to provide students with a specialized qualification better suited for the pursuit of professional careers in federal, state, or local government. The GJSS program targets students intending to pursue largely non-academic, governmental careers as practitioners, whether it be in the field of homeland security, law enforcement, or as analysts within the U.S. intelligence or defense communities.

#### Contact Information

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### Clinical Psychology, PhD

Department of Psychology  
College of Arts and Sciences

**Website:** <https://psychology.wsu.edu/clinical/graduate-clinical/>

**Number of graded credits: 34**

**Transfer Credit Limit: 12**

**Other requirements:** Students are involved in research activities each semester and clinical practica beginning the third semester. A 12-month internship is required.

**Location(s):** Pullman

**Tests required:** GRE (Combined)

**Deadline:** Fall: December 1; Spring: No spring applications

**Description:** The Clinical Psychology Program at Washington State University is based on the scientist-practitioner model of training. The Program is designed to integrate theory, research, and clinical practice in the training of students. Students are thus involved in research activities each semester in the Program and clinical practica beginning in the third semester until the start of the 12-month internship. The goal of the program is to train highly

competent clinical psychologists who will obtain high quality APA-approved internships and, with graduation, make positive contributions to the field of clinical psychology. Given that our graduates can potentially make contributions to clinical psychology in academic, research, medical, clinical, or community settings dependent on their interests and goals, the Program provides broad, general clinical training during the four years that students are at the University. Areas of interest within the Clinical Psychology Program include: Health Psychology, Neuropsychology, Adult Psychopathology, and Clinical Child, Adolescent and Family Psychology. The Program is fully accredited by the American Psychological Association.

#### Contact Information

Graduate Program Coordinator  
Psychology  
PO Box 644820  
Washington State University  
Pullman, WA 99164-4820  
E-mail: [psych.grad.adm@wsu.edu](mailto:psych.grad.adm@wsu.edu)

#### Experimental Psychology, PhD

Department of Psychology  
College of Arts and Sciences  
**Website:**  
<https://psychology.wsu.edu/experimental/goals-of-the-experimental-program/>

Number of graded credits: 26

Transfer credit limit: 13

**Other requirements:** A master's-level research project is also required for those students who enter without a master's

Location(s): Pullman

Tests required: GRE (Combined)

**Deadline:** Fall: December 1

**Description:** The doctoral program in experimental psychology at Washington State University is designed to produce highly skilled, innovative, and productive experimental psychologists in terms of research and teaching. Each student will build his/her program of study around one or more specialty areas. Graduates will be highly knowledgeable about their specialty areas, have a strong background in general experimental psychology, be able to identify significant research problems, be conversant with a wide variety of strategies for generating and testing hypotheses that emerge from these problems, and be able to effectively communicate these ideas. It is expected that graduates will leave Washington State University well equipped to become successful professionals in competitive research and teaching positions in academia, as well as competitive research or applied positions in government and industry.

#### Contact Information

Graduate Program Coordinator  
Psychology  
PO Box 644820  
Washington State University

Pullman, WA 99164-4820

E-mail: [psych.grad.adm@wsu.edu](mailto:psych.grad.adm@wsu.edu)

#### Public Affairs, MPA

College of Arts and Sciences

##### Website:

[cla.vancouver.wsu.edu/public-affairs/masters-degree-mpa](http://cla.vancouver.wsu.edu/public-affairs/masters-degree-mpa)

Number of graded credits: 30

**Number of S/F credits:** 3 credit internship may be required

Required research credits 4 (thesis credits)

**Other requirements:** Transfer credits are not accepted for core courses. Students are expected to submit their program of study in the second semester of coursework. Applicants and students should consult the current MPA Handbook for complete information.

Avg time to complete degree: 2.5 years

Location(s): Vancouver

**Tests required:** GRE (Quantitative), GRE (Verbal)

**Deadline:** Priority deadlines are Fall: Jan 10; Spring: July 1. Late applications may be considered.

**Description:** The MPA prepares students for a diverse group of positions in government such as public policy, personnel administration and strategic planning, as well as a range of jobs outside of government service, such as not-for-profit organizations. MPA students may already be employed in these areas and are seeking this degree to advance professionally in the field. Alternatively, the Master of Public Affairs degree is also appropriate for students who would like to shift their career tracks and obtain a position in the public and non-profit sector.

The MPA program is designed to promote professionalism, leadership, inventiveness, and a commitment to public service for government employees in the area of public administration, applied policy studies and health policy administration. Designed to accommodate the needs of working students, the degree can be completed entirely in the evenings, and most students often continue to work full time during the day when completing their degree. Seminars are small, ranging from 5-15 students, and typically meet one or two evenings a week over the course of the semester. Class structure includes lectures, small group discussions, and individual and group presentations. The program takes two or more years to complete.

#### Contact Information

Paul Thiers, Ph.D., Director, Program of Public Affairs  
VMCM 102S  
14204 NE Salmon Creek Avenue  
Vancouver, Washington 98686  
Telephone: (360) 546-9466  
Fax: (360) 546-9074  
E-mail: [pthiers@vancouver.wsu.edu](mailto:pthiers@vancouver.wsu.edu)

#### Sociology, PhD

Department of Sociology  
College of Arts and Sciences

**Website:** <https://soc.wsu.edu/graduate-program/prospective-graduate-students/>

Number of graded credits: 34

Transfer credit limit: 12

Location(s): Pullman

**Tests required:** GRE (Quantitative), GRE (Verbal), TOEFL, TOEFLI

**Deadline:** Fall: Jan 10

**Description:** The Sociology Program is designed to integrate research and teaching in the training of students. Students have the opportunity for involvement in collaborative and independent research activities, facilitated by faculty led seminars and research programs. In addition to offering yearly teaching workshops for students who teach their own courses, students participate in a teaching seminar in their second year. The goal of the Program, and focus of graduate curriculum, is to train highly competent sociologists who will make constructive contributions to the field of sociology in academic, research, governmental, and community settings.

#### Contact Information

Laurie Byers-Brown, Administrative Manager  
Sociology  
Pullman, WA 99164-4020  
Telephone: 509-335-5136  
Fax: 509-335-6419  
E-mail: [byersbro@wsu.edu](mailto:byersbro@wsu.edu)

#### Statistics, MS

Department of Mathematics  
College of Arts and Sciences

**Website:** <http://www.stat.wsu.edu/>

Number of graded credits: 26

Number of S/F credits: 4

Required research credits 4

**Other requirements:** The final Masters oral exam is a two-hour oral exam conducted by the students M.S. committee. The oral exam will consist of (i) a 30-minute presentation of the students Masters project, (ii) a 15-minute period following the Masters project presentation for questions by the committee related to the results contained in the Masters project, and, (iii) a 75-minute period devoted to a comprehensive oral exam covering the material in Stat 443, Stat 512, Stat 530, Stat 533, Stat 556 as well as material covered in additional course work. Avg time to complete degree: 2 years

Location(s): Pullman

**Tests required:** GRE (Quantitative), GRE (Verbal), TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** This degree is designed to give students skills for identifying and solving statistical problems arising in various interdisciplinary areas using the fundamental tools of statistical modeling and implementation. Students will learn:

- Problem solving skills: Students are expected to learn the fundamental tools of statistical modeling and implementation. Skills for identifying and solving

statistical problems arising in various interdisciplinary areas is an important expected learning outcome associated with this degree.

- Ability to work individually or in groups: Statistical modeling can be pursued at an individual level or as part of a group effort with the group comprised of experts in various allied fields. The students are expected to develop such skills so that modeling and analysis is done in a timely and efficient manner.
- Communication skills: Good communication skills are expected so that students can present in an effective manner the interpretation, as well as implications of the results obtained from a statistical model and its analysis.

#### Contact Information

Emily Lewis  
Neill Hall 103  
Pullman, WA 99164  
509-335-8645  
[elewis@math.wsu.edu](mailto:elewis@math.wsu.edu)

#### Statistical Science, Ph.D.

Department of Mathematics  
College of Arts and Sciences

**Website:** <http://www.stat.wsu.edu/>

The PhD in Statistical Science is meant to give students both a strong background in statistics and a working knowledge in a secondary field. Core (6) and elective (5) statistics classes offered through the Department of Mathematics & Statistics are taken in addition to five classes from a partnering allied department, such as Biology, Economics, Education, Mathematics, or Psychology. At least one member of the student's committee must be from the appropriate allied department in the student's field of research. This creates an interdisciplinary curriculum designed to teach students to develop new statistical methods to solve real life problems that arise in their chosen area of concentration.

#### Contact Information

Emily Lewis  
Neill Hall 103  
Pullman, WA 99164  
509-335-8645  
[elewis@math.wsu.edu](mailto:elewis@math.wsu.edu)

## Carson College of Business

#### Accounting, MAcc

Department of Accounting  
Carson College of Business

**Website:** <http://business.wsu.edu/graduate-programs/masters-accounting/advantages/>

Number of graded credits: 30

Required research credits 2

**Avg time to complete degree:** One year if entering the program with all undergraduate prerequisite courses completed.

Location(s): Pullman

**Tests required:** GMAT, IELTS, MELAB, Pearson, TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** The Master of Accounting program is designed to provide the breadth and depth in accounting required for you to excel as a professional accountant. The curriculum focuses on preparing you to become a purposeful, innovative, and versatile leader in the global marketplace. Students will focus on four learning goals:

1. Acquisition of the additional technical knowledge required to pass professional examinations such as the CPA exam with a minimum of additional directed study and/or otherwise advance your career.
2. Completion of professional accounting research related to national and international business decisions. The research can involve the application of generally accepted accounting principles to financial reporting issues; the application of tax law to tax planning and compliance issues; and the application of generally accepted auditing standards to auditing issues.
3. Ability to prepare business communications appropriate for the audience being addressed. Business communication can involve business letters, memoranda, reports, and oral presentations.
4. Understanding the ethical issues related to the profession.

#### Contact Information

Mitch Swanger, Recruitment and Admissions Manager  
Carson College of Business Graduate Programs  
PO Box 644710  
Todd Hall 121  
Pullman, WA 99164-4710  
Telephone: 509-335-7617  
Fax: 509-335-4735  
E-mail: [mba@wsu.edu](mailto:mba@wsu.edu)

Susan Gill, Associate Professor and Chair  
242A Todd Hall  
PO Box 644729  
Pullman, WA 99164-4729  
Telephone: 509-335-5633  
Fax: 509-335-4275  
E-mail: [gills@wsu.edu](mailto:gills@wsu.edu)

#### Accounting, PhD, Business Administration

Carson College of Business

**Website:** <https://business.wsu.edu/graduate-programs/phd-business/accounting/>

Number of graded credits: 28

Number of S/F credits: 1

Required research credits: 24

**Other requirements:** Research Tool Requirements include 12 hours or ANOVA, Regression/Econometrics, Psychometric Theory and Multivariate Statistics. 1 credit professional development seminar. An Area Research Paper and a written field examination are required, usually by the end of the second year.

Avg time to complete degree: 4 years

Location(s): Pullman

**Tests required:** GMAT; IELTS, MELAB; Pearson, TOEFL; TOEFLI

**Deadline:** Fall: Jan 10

**Description:** This program will prepare you to become an outstanding accounting educator/researcher in the areas of managerial accounting, financial accounting, auditing, and taxation. The program is research-oriented, emphasizing interaction between students and faculty to facilitate quality publications in both behavioral accounting research and archival accounting research. Students will: 1) Learn how to conduct quality accounting research, 2) Participate in faculty-sponsored research projects as a co-investigator and/or a co-author, 3) Develop a comprehensive understanding of all aspects of the academic accounting profession, including teaching, research, and service.

#### Contact Information

Bernie Wong-On-Wing, PhD Coordinator  
Todd Hall 242  
PO Box 644729  
Pullman, WA 99164-4729  
Telephone: 509-335-8541  
Fax: 509-335-4275  
E-mail: [gpbuadmin@wsu.edu](mailto:gpbuadmin@wsu.edu)

#### Finance, PhD, Business Administration

Carson College of Business

**Website:** <https://business.wsu.edu/graduate-programs/phd-business/finance/>

Number of graded credits: 37

Number of S/F credits: 1

Required research credits 24

Avg time to complete degree: 5 years

Location(s): Pullman

**Tests required:** GMAT, IELTS, MELAB, Pearson, TOEFL, TOEFLI

**Deadline:** Fall: Jan 10

**Other Requirements:** Candidates must reach a minimum admissions index score of 1250 to be considered for admission. The index is based on the formula  $GPA \times 200 + GMAT$ . There is not a minimum GMAT score. However, successful candidates typically exceed 650. GMAT score report code 09D-TL-81 Pearson Test of English score report code: 8Z2-GT-38 Desired pre-requisite courses: 3 semesters college level calculus, 1 semester mathematics for economists, 1 semester of linear algebra, 2 semesters of probability and statistics, 1 semester of intermediate microeconomics, 1 semester of intermediate corporate finance, 1 semester of investments, 1 semester of financial markets and institutions.

**Description:**

The doctorate in business administration with an emphasis in finance is designed to prepare graduates for careers in research and teaching. The primary goal of the finance doctoral program is to train academics for placements at AACSB-accredited universities throughout the United States and abroad. The program encompasses a variety of formal and informal interactions and projects with faculty and others, as well as course work, comprehensive exams, teaching experience and dissertation research. It enables students to develop substantial competencies in the theory, practice, and research methodology essential to the advancement of finance knowledge, while accommodating individual backgrounds, experiences, and objectives. Coursework covers topics associated with the scholarly pursuit of finance as well as topics from supporting fields of inquiry such as economics, accounting, and psychology. Extensive coverage of research methods and statistics associated with finance research is a large component of the program. In addition to specific coursework, the finance doctoral program also provides an environment in which students can develop research competencies in close association with the finance faculty and other graduate students.

#### Contact Information

Dr. George Jiang, Ph.D. Coordinator  
Finance  
PO Box 644746  
Todd Addition 482  
Pullman, WA 99164-4746  
Telephone: 509-335-8727  
Fax: 509-335-3857  
E-mail: [gpbusadmin@wsu.edu](mailto:gpbusadmin@wsu.edu)

#### Hospitality and Tourism, PhD, Business Administration

Carson College of Business  
**Website:** <https://business.wsu.edu/graduate-programs/phd-business/hospitality-tourism/>  
Number of graded credits: 48  
Number of S/F credits: 1  
Required research credits 24  
Avg time to complete degree: 4 years  
Location(s): Pullman  
**Tests required:** GMAT, IELTS, MELAB, Pearson, TOEFL, TOEFLI  
**Deadline:** Fall: Jan 10  
**Other Requirements:** Candidates must reach a minimum admissions index score of 1250 to be considered for admission. The index is based on the formula  $GPA \times 200 + GMAT$ . There is not a minimum GMAT score. However, successful candidates typically exceed 650. GMAT score report code 09D-TL-81 Pearson Test of English score report code: 8Z2-GT-38.  
**Description:** The PhD in business administration with an emphasis in hospitality and tourism management is designed to prepare graduates for careers in research and teaching at institutions throughout the United States and abroad. Applicants with strong hospitality and tourism business background are preferred. Incoming students are

expected to have both good written and oral communication skills, as well as good analytical skills to facilitate the mastery of research methods and statistics. The course of study requires a battery of hospitality and tourism business management courses as well as a group of research design and statistics courses. Students are also expected to take courses from supporting fields of inquiry such as psychology, sociology, management, marketing, etc. The degree normally takes four years to complete and involves taking courses, developing an area (2nd-year) paper, passing a comprehensive exam, and the completion of a doctoral dissertation.

#### Contact Information

Jenny Kim, Ph.D. Coordinator  
School of Hospitality Business Management  
Todd Addition 331C  
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Fax: 509-335-4735  
E-mail: [jennykim@wsu.edu](mailto:jennykim@wsu.edu)

#### Information Systems, PhD, Business Administration

Carson College of Business  
**Website:** <https://business.wsu.edu/graduate-programs/phd-business/information-systems/>  
Number of graded credits: 48  
Number of S/F credits: 1  
Required research credits 24  
Avg time to complete degree: 4 years  
Location(s): Pullman  
**Tests required:** GMAT, IELTS, MELAB, Pearson, TOEFL, TOEFLI  
**Deadline:** Fall: Jan 10; Spring: July 1  
**Description:** The Ph.D. in IS at WSU focuses on behavioral issues in MIS, enabling students to develop critical skills in both research and teaching, and therefore compete for, and succeed in, the best academic jobs in the country.

#### Contact Information

Deborah Compeau  
Hubman Distinguished Professor of Information Systems  
Department of Management, Information Systems, and Entrepreneurship  
Todd 440G  
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Pullman, WA 99164  
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#### Management, PhD, Business Administration

Carson College of Business  
**Website:** <http://business.wsu.edu/graduate-programs/phd-business/business-management/>  
Number of graded credits: 48  
Number of S/F credits: 1  
Required research credits 24  
Avg time to complete degree: 4 years

Location(s): Pullman

**Tests required:** GMAT, IELTS, MELAB, Pearson, TOEFL, TOEFLI

**Deadline:** Fall: Jan 10

**Other Requirements:** Candidates must reach a minimum admissions index score of 1250 to be considered for admission. The index is based on the formula  $GPA \times 200 + GMAT$ . There is not a minimum GMAT score. However, successful candidates typically exceed 630. GMAT score report code 09D-TL-81 Pearson Test of English score report code: 8Z2-GT-38.

**Description:** The doctorate in management requires an understanding of strategic management or organization behavior and the ability to conduct scientific research using tools of statistical analysis and research design. As such, students learn theory and methods from two years of intense coursework in their areas of specialization and develop the ability to conduct scientific research.

The program typically requires four years to finish, including courses, a second-year area paper, a comprehensive exam, and a doctoral dissertation. In case of exceptional merit, students in the program may be awarded a fifth year of funding, determined at the discretion of the doctoral program committee. This program will prepare you to conduct high-quality research publishable in top-tier journals and to teach at leading institutions of higher education throughout the U.S. and abroad.

#### Contact Information

Arvin Sahaym, PhD Coordinator  
Department of Management, Information Systems, and Entrepreneurship  
Todd 437E  
Pullman, WA 99164  
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E-mail: [arvin@wsu.edu](mailto:arvin@wsu.edu)

#### Marketing, PhD, Business Administration

Carson College of Business

**Website:** <https://business.wsu.edu/graduate-programs/phd-business/marketing/>

Number of graded credits: 48

Number of S/F credits: 1

Required research credits 24

Avg time to complete degree: 4 years

Location(s): Pullman

**Tests required:** GMAT, IELTS, MELAB, Pearson, TOEFL, TOEFLI

**Deadline:** Fall: Jan 10

**Other Requirements:** Candidates must reach a minimum admissions index score of 1250 to be considered for admission. The index is based on the formula  $GPA \times 200 + GMAT$ . There is not a minimum GMAT score. However, successful candidates typically exceed 650. GMAT score report code 09D-TL-81 Pearson Test of English score report code: 8Z2-GT-38.

**Description:** The doctorate in business administration with an emphasis in marketing is designed to prepare graduates for careers in research and teaching. The primary goal of

the marketing doctoral program is to train academics for placements at AACSB-accredited peer institutions (preferably with a doctoral program of their own) throughout the United States and abroad. Those with a completed master's degree in a business discipline can complete the doctorate in four years of full-time resident study. In addition to specific coursework, the marketing doctoral program also provides an environment in which students can develop research competencies in close association with the marketing faculty and other graduate students.

#### Contact Information

Dr. Darrel Muehling, Department Chair  
Marketing & International Business  
E-mail: [darrel@wsu.edu](mailto:darrel@wsu.edu)

#### Operations and Management Science, PhD, Business Administration

Carson College of Business

**Website:** [business.wsu.edu/graduate-programs/phd-business/management-operations/](https://business.wsu.edu/graduate-programs/phd-business/management-operations/)

Number of graded credits: 48

Number of S/F credits: 1

Required research credits 24

Avg time to complete degree: 4-5 years

Location(s): Pullman

**Tests required:** GMAT (or GRE Combined), IELTS, MELAB, Pearson, TOEFL, TOEFLI

**Deadline:** Fall: Jan 10

**Other Requirements:** Candidates must reach a minimum admissions index score of 1250 to be considered for admission. The index is based on the formula  $GPA \times 200 + GMAT$ . There is not a minimum GMAT score. However, successful candidates typically exceed 650. GMAT score report code 09D-TL-81 Pearson Test of English score report code: 8Z2-GT-38.

**Description:** The program in Operations and Management Science prepares students for careers in business, industry, or government using expertise garnered in applied problem solving and data analysis. Students receive rigorous fundamental training in statistics, research methods, mathematics, and operations research, followed by theoretical study within their respective fields of interest. All students are expected to produce publishable research for peer-reviewed journals prior to graduation.

#### Contact Information

Dr. Chuck Munson, Ph.D. Coordinator  
Finance and Management Science  
PO Box 644746  
Todd Addition 471  
Pullman, WA 99164-4746  
Telephone: 509-335-3076  
Fax: 509-335-3857  
Email: [munson@wsu.edu](mailto:munson@wsu.edu)

#### Business Administration, MBA

Contact the Carson College of Business regarding this professional degree.

### Contact Information

Pullman MBA  
Mauricio Faeatherman, Ph.D. and Pullman MBA Director  
[mba@wsu.edu](mailto:mba@wsu.edu)  
509-335-7617

Online MBA Admissions  
[omba.wsu.edu](http://omba.wsu.edu) for live chat with advisor  
Telephone: 1-877-960-2029 x3608  
Fax: 1-866-563-8901  
E-mail: [info@wsumba.com](mailto:info@wsumba.com)

## Edward R. Murrow College of Communication

### Communication, PhD

Edward R. Murrow College of Communication  
**Website:** [murrow.wsu.edu/academics/graduate-studies/](http://murrow.wsu.edu/academics/graduate-studies/)

Number of graded credits: 45  
Number of S/F credits: 3  
Required research credits 23  
Avg time to complete degree: 4 years  
Location(s): Pullman

**Tests required:** GRE (Quantitative), GRE (Verbal), TOEFL, TOEFLI

**Deadline:** Fall: December 31

#### Description:

The doctoral program in Communication provides world class curriculum, faculty, and facilities to prepare students as scholars and educators. In our doctoral program, you will work with diverse faculty who study health communication, media processes and effects, and media society and politics.

### Contact Information

Graduate Coordinator, Student Services  
The Edward R. Murrow College of Communication  
Pullman, WA 99164-2520  
Telephone: 509-335-7333  
Fax: 509-335-3739  
E-mail: [communication@wsu.edu](mailto:communication@wsu.edu)

### Communication, MA

#### Options: Thesis or Non-Thesis

Edward R. Murrow College of Communication  
**Website:** [murrow.wsu.edu/academics/graduate-studies/masters/](http://murrow.wsu.edu/academics/graduate-studies/masters/)

**Number of graded credits:** 27  
Number of S/F credits: 3  
Required research credits 9  
Avg time to complete degree: 2 years  
Location(s): Pullman

**Tests required:** GRE (Quantitative), GRE (Verbal), TOEFL, TOEFLI

**Deadline:** August 1, December 1, April 15

#### Description:

The M.A. in Communication is designed for individuals seeking higher-level and focused understanding of communication theory, processes and phenomena, whether their intent is to prepare for doctoral-level study in pursuit of an academic career or a communication-related career in business, government, education, research, or the communications industry. Successful completion of the program normally requires two academic years of full time study and results in the granting of the Master of Arts in Communication.

### Contact Information

Christy Curtis, Graduate Coordinator  
Murrow College of Communication  
PO Box 642520  
Pullman, WA 99164-2520  
Telephone: 509-335-5608  
Fax: 509-335-3979  
E-mail: [communication@wsu.edu](mailto:communication@wsu.edu)

### Strategic Communications, MA

Edward R. Murrow College of Communication  
**Website:** [online.wsu.edu/grad/StratComm.aspx](http://online.wsu.edu/grad/StratComm.aspx)

Number of graded credits: 30  
Avg time to complete degree: 2.5 years  
Location(s): Global

Tests required:

**Deadline:** August 01, December 01, April 15

#### Description:

Washington State University's online Master's Degree in Strategic Communication is designed for those who want to excel in advertising, public relations, corporate communication, and communication management. Whether you have no training in strategic communication or are a seasoned professional, the degree will advance and energize your career. Our multidisciplinary approach:

- Offers expertise in new and traditional media, critical for today's strategic communications
- Teaches students how to gather and analyze information and use those findings in creating communication campaigns
- Trains students, in the tradition of Edward R. Murrow, to create messages that are both strategic and responsible
- Includes weekly online instructor office hours, frequent student self-assessment tools, ongoing interaction with other students, and a cohort structure in which students go through the program with the same group.

### Contact Information

Christy Curtis, Graduate Coordinator  
Murrow College of Communication  
PO Box 642520  
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E-mail: [communication@wsu.edu](mailto:communication@wsu.edu)

## College of Education



## Cultural Studies and Social Thought in Education, PhD, Education

Department of Teaching and Learning  
College of Education

### Website:

<https://education.wsu.edu/graduate/culturalstudies/>

Number of graded credits: 45

Avg time to complete degree: 4 yrs.

Location(s): Pullman

Tests required: None

**Deadline:** December 1

**Description:** The Cultural Studies and Social Thought in Education (CSSTE) Ph.D. option is a rigorous, flexible, and individually tailored course of study that focuses on the issues of culture and power in the contemporary and historical contexts of education. Cultural studies includes popular culture and media, social justice, environment, ethics, aesthetics, race, ethnicity, gender, and social class, which are applied to a range of educational sub-fields that include literacy, educational leadership, teacher leadership, school reform, curriculum theory, higher education, science, art, special education, and bilingual/ELL (English Language Learners). The overall goal of the faculty is to articulate a cohesive and supportive community of educational scholarship and practice. While coursework is important, we work to establish a strong program of mentorship in which doctoral candidates are mentored into the world of research, knowledge generation and dissemination, and pedagogical and social action. We are committed to the idea that our scholarly endeavors stimulate positive change in schools and the communities and society those schools serve. Education, whether it takes place in the formal settings of schools and museums or the informal contexts of home and the movie theater, is defined by its cultural context. Cultural studies take these cultural contexts as the essential starting point to build research projects and define teaching practices.

### Contact Information

College of Education  
Cleveland Hall 70  
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Pullman, WA 99164-2114  
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Fax: 509-335-5907  
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## Curriculum and Instruction, MA, Education

Department of Teaching and Learning  
College of Education

### Website:

<https://education.wsu.edu/graduate/curriculum/>

Number of graded credits: 21 thesis

Transfer Credit Limit: 6

Required research credits: 9

**Other requirements:** The Master of Arts in Education (M.A.) degree program consists of a minimum of 30 semester credit hours, 21 of which must be graded course work. Three research courses, three credits each, are a

component of the 21 graded credits. Five credits of a supporting area are optional. A minimum of four additional credits of T&L 700 (independent research work) are required and usually involve research/scholarship activities associated with the thesis and final oral examination. The purpose of the thesis is to demonstrate your understanding of educational research and theory. The thesis also demonstrates your ability to design and implement a research study, as well as analyze and synthesize the results of the study.

Avg time to complete degree: 2 yrs.

**Location(s):** Pullman; Spokane; Tri-Cities; Vancouver

**Deadline:** Fall: Jan 10; Spring: July 01

**Description:** The Master of Arts (MA) degree is designed for students who desire to study and explore educational research. The MA degree is well suited for those students wishing to eventually pursue a doctoral degree or a research/ leadership role in schools or organizations/agencies. The Curriculum and Instruction specialization offers students rigorous and individually tailored programs of study. The master's degree programs are designed for students with bachelor degrees who have an interest in deepening their knowledge in a specific content area (in or outside the College of Education) as well as educational research in curriculum and instruction. The program also emphasizes applying research, theory, and evidence-based practices to improve education. This specialization is designed especially for teachers who wish to take courses in their teaching field as well as advanced coursework in teaching and learning.

### Contact Information

Office of Graduate Studies  
Washington State University – Pullman  
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Fax: 509-335-5907  
E-mail: [gradstudies@wsu.edu](mailto:gradstudies@wsu.edu)

## Curriculum and Instruction, EdM, Education

Department of Teaching and Learning  
College of Education

### Website:

<https://education.wsu.edu/graduate/curriculum/>

**Number of graded credits:** a minimum of 35 credits, 33 of which must be graded course work. A minimum of one, three credit research course and one, three credit foundations course must be included in the 33 graded credits. A minimum of 2 credits of T&L 702 are required and usually involve research/scholarship activities associated with the special project and final oral examination.

Required research credits: 3

Transfer Credit Limit: 9

Avg time to complete degree: 2 yrs.

**Location(s):** Pullman, Spokane, Tri-Cities, and Vancouver

**Deadline:** Fall: Jan 10; Spring: July 01

**Other Requirements:** The Master of Education (EdM) degree program consists of the Special Project that is a personal inquiry project that the student design in collaboration with their advisor/committee chair and the members of their committee. The purpose of the project is to demonstrate the student's understanding of educational research and its applicability to practice in their field of study. In addition, it is a demonstration of the student's ability to understand, evaluate and critique educational research.

**Description:** The EdM degree is designed for students wishing to extend their knowledge and skills in education, expand their content knowledge, and/or pursue leadership roles in schools and organizations/agencies. The Curriculum and Instruction specialization offers students rigorous and individually tailored programs of study.

The master's degree programs are designed for students with bachelor degrees who have an interest in deepening their knowledge in a specific content area (in or outside the College of Education) as well as educational research in curriculum and instruction. The program also emphasizes applying research, theory, and evidence-based practices to improve education. This specialization is designed especially for teachers who wish to take courses in their teaching field as well as advanced coursework in teaching and learning.

#### Contact Information

Office of Graduate Studies  
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Washington State University – Tri-Cities  
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#### Educational Leadership, MA, Education

College of Education  
Department of Educational Leadership, Sport Studies, and Educational/Counseling Psychology

##### Website:

<https://education.wsu.edu/graduate/edleadership/>

**Number of credits:** 30; Requirements include at least 21 hours of graded coursework and 4 hours of EdAd 700 for completion and defense of the master's thesis. At least 18 hours of the graded coursework must be in the Educational Leadership program.

**Other requirements:** To apply, submit a completed departmental application, letter of intent, current resume, three letters of recommendation, GRE scores (only if GPA is below 3.0), TOEFL or IELTS (international only), and transcripts of all past academic work.

Avg time to complete degree: 2 yrs.

**Location(s):** Pullman

**Tests required:** GRE (Combined) (only if GPA is below 3.0) **Deadline:** Fall: Jan 10; Spring: September 1

**Description:** The Educational Leadership Master of Arts in Education (M.A.) is a thesis degree designed for professional educators who plan to subsequently pursue a research-based doctoral program (Ph.D.). It is offered only on the Pullman campus and is closely aligned with the Principal and Program Administrator Certification program.

#### Contact Information

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#### Educational Leadership, EdM, Education

College of Education  
Department of Educational Leadership, Sport Studies, and Educational/Counseling Psychology

##### Website:

<https://education.wsu.edu/graduate/edleadership/>

**Number of graded credits:** The Master of Education (Ed.M.) is a non-thesis degree, the Program of Study requires a minimum of 35 semester hours, including at least 33 hours of graded coursework and 2 hours of EdAd 702 for completion of a master's comprehensive examination.

**Other requirements:** To apply, submit a completed departmental application, letter of intent, current

resume, three letters of recommendation, GRE scores (only if GPA is below 3.0), TOEFL or IELTS (international only), and transcripts of all past academic work.

Avg time to complete degree: 2 yrs.

**Location(s):** Pullman, Spokane, Tri-Cities, and Vancouver

**Tests required:** GRE (Combined) GRE(Quantitative) GRE(Verbal) (only if GPA is below 3.0)

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** The Educational Leadership Master of Education (Ed.M.) is a non-thesis degree program designed for professional educators preparing for leadership positions in K-12 schools. It is offered at all four WSU campuses and is closely aligned with the Principal and Program Administrator Certification program. Models for delivery of the master's program (e.g., sequencing of courses) differ slightly across the four campuses, although basic requirements for the degree are the same across the campuses.

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#### Educational Leadership, PhD, Education

College of Education  
Department of Educational Leadership, Sport Studies, and Educational/Counseling Psychology

#### Website:

<https://education.wsu.edu/graduate/edleadership/>

**Number of credits:** A total of 72 semester hours, including at least 36 semester hours of graded course work and at least 24 semester hours of EdAd 800 for completion and defense of the doctoral dissertation. In addition to core courses in Educational Leadership, a cognate area of at least 9 semester hours of graded coursework is required; the cognate may consist of a special emphasis within the College of Education (e.g., educational psychology or cultural studies) or outside the College of Education (e.g., anthropology, economics, health policy administration, political science, public administration).

**Other Requirements:** The Ph.D. dissertation requires the completion of an original, empirical research study that makes a contribution to scholarship in the field of leadership studies. A one-year residency of full-time enrollment (a minimum of 10 credits for 2 consecutive semesters) is required for the Ph.D. with a specialization in Educational Leadership. Most courses for the degree are offered at all WSU campuses.

Avg time to complete degree: 4 yrs.

**Location(s):** Pullman

**Tests required:** GRE (Combined); GRE (Quantitative) GRE (Verbal); TOEFL; IELTS

**Deadline:** Jan 10

**Description:** The program for the Doctor of Philosophy (Ph.D.) in Education with a specialization in Educational Leadership is intended to prepare scholars and researchers and focuses on developing and applying theoretical and research knowledge and skills to the field of leadership studies. The Ph.D. program is designed primarily for students who intend to pursue careers in policy, research, or college and university teaching. It may also be appropriate for students who are interested in careers in k-20 education or related fields, though it is more theory and research oriented than the Doctor of Education (Ed.D.) degree.

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#### Educational Leadership, EdD, Education

College of Education  
Department of Educational Leadership, Sport Studies, and Educational/Counseling Psychology

#### Website:

<https://education.wsu.edu/graduate/edleadership/>

Number of graded credits: 42

**Additional Requirements:** Students attend two-week summer institutes at the Pullman campus for two consecutive summers, after completion of at least 12

graded credit hours including a research methods course (typically EdRes 563). During the third or fourth year of the program, students fulfill the program's residency requirements by enrolling full-time (10-18 credits) in dissertation research (EdAd 800).

Avg time to complete degree: 4 yrs.

**Location(s):** Pullman, Spokane, Tri-Cities, and Vancouver

**Tests required:** GRE(Combined); GRE(Quantitative); GRE (Verbal)

**Deadline:** Fall: Jan 10

**Description:** The Statewide Doctor of Education (Ed.D.) program is designed as a modified cohort-based program, offered at all WSU campuses. Students in all regions of the state follow the same application process for admission; once admitted, students may access course offerings and advisement through any of WSU's campuses. WSU Educational Leadership Program faculty are dedicated to meeting students' needs as current and future K-12 educational leaders and to preparing future professors for work in academia.

The program provides a balance and integration of practical experience, theory, and research and aims to prepare educational leaders who function as scholar-practitioners.

WSU's Educational Leadership program is one of 70 doctoral-granting programs nationwide selected for membership in the [University Council for Educational Administration](#), a national consortium dedicated to the improvement of educational leadership preparation and practice. WSU's graduate students have the opportunity to participate in UCEA's annual convention and other professional activities.

WSU's administrator certification programs are organized around the national [ISLLC \(Interstate School Leaders Licensure Consortium\)](#) standards, which have been adopted as the certification standards for Washington State licensure. WSU's innovative cohort-based and field-based certification programs for principals and superintendents promote a close professional network. Faculty members for certification programs have extensive experience as school principals and/or central office administrators.

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### Educational Psychology, MA, Education

College of Education

Department of Educational Leadership, Sport Studies, and Educational/Counseling Psychology

**Options:** Thesis or Non-thesis

**Website:**

[education.wsu.edu/graduate/specializations/edpsychology](http://education.wsu.edu/graduate/specializations/edpsychology)

Number of graded credits: 31

Number of S/F credits: 4 min

Location(s): Pullman

Tests required: GRE (Combined)

**Deadline:** Rolling admission

**Description:** The master's degrees with specialization in educational psychology are a concentration in research, evaluation, psychometrics, and cognition. While students in educational psychology complete a common core of courses, a portion of each master's degree program is composed of courses selected by the student and his/her advisory committee to tailor the program of study around the student's personal interests and professional aspirations. Recipients of the master's degree in educational psychology are well prepared to continue doctoral level training if so desired. However, the master's degree would give access to entry-level positions in this intriguing field that presents an ever-changing, challenging, and rewarding work environment.

The M.A. requires the completion of a written thesis.

Graduates from this program have the opportunity to make contributions to the improvement of educational settings (e.g., schools, universities), to have some influence on individuals through consultation on programs, methods, or to provide information through analysis to individuals who shape policy. Experienced individuals in this profession can expect to earn a good salary and maintain an interesting and fulfilling career in employment in private firms, school districts, business, industry, or state agencies as program evaluators, student assessment coordinators, research technicians, or data analysts, as examples.

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**Educational Psychology, PhD, Education**

College of Education  
 Department of Educational Leadership, Sport Studies, and  
 Educational/Counseling Psychology

**Website:**

[education.wsu.edu/graduate/specializations/edpsychology/](http://education.wsu.edu/graduate/specializations/edpsychology/)

Number of graded credits: 42

Number of S/F credits: 20 min

Required research credits: 12

**Other requirements:** Doctoral students with a specialization in educational psychology take a foundation set of courses. To provide in-depth education in the program in students select supporting coursework. This is done in consultation with the student's doctoral committee. Each student has the opportunity of individualizing the program of study to meet his/her professional goals that may include course work from other departments (e.g., Department of Human Development, Sociology, and Statistics).

Avg time to complete degree: 4 yrs.

Location(s): Pullman

Tests required: GRE (Combined)

**Deadline:** Rolling admission

**Description:** The educational psychology program, with core requirements in research, evaluation, and measurement and learning theory, provides students with a solid academic foundation in educational measurement and evaluation. Assistantships for educational psychology students in the center provide unique opportunities to apply theoretical concepts and methodologies of program evaluation and educational and psychological measurement to specific practical projects in various educational settings through partnerships with school districts, state agencies, and other social service organizations.

Successful professionals in this field have strong methodological skills, an understanding of researchable topics, the ability to develop a research program, the ability to communicate and work with a wide variety of professionals, and the skills to understand nuance and ambiguity in the work environment. Through faculty and student partnerships across campus, the program provides an exciting, interdisciplinary atmosphere for course and field study. Consistent with the scientist-practitioner model of professional training in psychology, students in the doctoral program in educational psychology are required to integrate the theoretical and research offerings of the

university with substantial practicum and internship experiences by completing an internship directly related to the specific area of professional training.

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**Language, Literacy, and Technology, MA, Education**

Department of Teaching and Learning  
 College of Education

**Website:**

<https://education.wsu.edu/graduate/literacyeducation/>

**Number of credits:** a minimum of 30 semester credit hours, 21 of which must be graded course work. Three research courses, three credits each, are a component of the 21 graded credits. A minimum of nine additional credits of T&L 700 (independent research work) are required and usually involve research/scholarship activities associated with the thesis and final oral examination.

Transfer Credit Limit: 6

Required research credits: 9

Avg time to complete degree: 2 yrs.

**Location(s):** Pullman; Tri-Cities; Vancouver

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** The M.A. in education degree with a specialization in literacy education is designed for students who wish to focus on educational research in language and literacy and who may pursue a doctoral degree.

The degree is well suited for those students wishing to eventually pursue a doctoral degree or a research/ leadership role in schools or organizations/agencies. The purpose of the thesis is to demonstrate your understanding of educational research and theory, and demonstrates your ability to design and implement a research study, as well as analyze and synthesize the results of the study.

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### Language, Literacy, and Technology, EdM, Education

Department of Teaching and Learning  
College of Education

**Website:**

<https://education.wsu.edu/graduate/literacyeducation/>

**Number of credits:** The EdM degree program consists of a minimum of 35 credits, 33 of which must be graded course work. A minimum of one, 3-credit, research course, and one, 3-credit, foundations course must be included in the 33 graded credits. A minimum of 2 credits of T&L 702 are required and usually involve research/ scholarship activities associated with the special project and final oral examination.

Required research credits: 3

Avg time to complete degree: 2 yrs.

**Location(s):** Pullman, Tri-Cities, Vancouver

**Deadline:** Fall: Jan 10; Spring: July 1

**Additional Requirements:** The Special Project is a personal inquiry project that you design in collaboration with your advisor/committee chair and the members of your committee. The purpose of the project is to demonstrate your understanding of educational research and its applicability to practice in your field of study. In addition, it is a demonstration of your ability to understand, evaluate, and critique educational research.

**Description:** The non-thesis Ed.M. degree with a specialization in literacy education focuses on K-12. Its purpose is to develop teachers' or other professionals' knowledge and skills.

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### Language, Literacy and Technology, PhD, Education

College of Education

**Website:** <https://education.wsu.edu/graduate/llt/>

**Number of graded credits:** 52

**Other requirements:** Applicants must have a degree from an accredited 4-year institution and a 3.0 or higher cumulative grade point average (GPA) on a 4.0 scale. The GPA is based on the last 60 semester hours of graded course work. A writing sample, letter of intent, and three letters of recommendation are required. Students should have a strong background in teaching and/or language or literacy.

Avg time to complete degree: 4 yrs.

**Location(s):** Pullman

**Deadline:** Fall: January 10; Spring: July 01

**Description:** : The Language, Literacy and Technology (LLT) program addresses issues of teaching, learning and the wide range of literacies as they play out in formal and informal learning contexts. The course of study for the Doctor of Philosophy specialization in LLT is rigorous, flexible and individually tailored. It includes a minimum of 52 graded credits plus minimum 20 dissertation hours (72 total hours).

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### Master in Teaching, Secondary, MIT, Education

Department of Teaching and Learning  
College of Education  
**Website:** <https://education.wsu.edu/graduate/mit/>  
Number of graded credits: 31

Avg time to complete degree: 1.5 yrs.

**Location(s):** Pullman, Spokane, Tri-Cities, and Vancouver

**Tests required:** WEST B, WEST E

**Deadline:** Summer: November 15

**Additional Requirements:** The Master in Teaching (MIT) program is based on national teaching standards (i.e., NCATE, INTASC), state accreditation codes, and research-

based effective practices. The program consists of a wide range of pedagogy course work. Depending on the student's focus (elementary or secondary education), these courses may include literacy, social studies, science, math, reading, health, fitness, or fine arts methods. Students also study diversity in schools and society, educational technology, the social context of education, and research-based effective practices. When successfully completed, the MIT program results in a master's degree and teacher certification. Therefore, all MIT students complete both certification and graduate research courses. All MIT students complete a research project and present the project results at the culmination of their program. The research projects are usually aimed at examining teaching and educational issues, with the focus on understanding the positive impact of education on student learning.

**Description:** : The MIT is intended for those who possess a bachelor's degree in a field other than education and is designed to prepare students to become effective elementary or secondary education teachers. This program of study leads to a master's degree and a State of Washington elementary or secondary education teaching certificate. The MIT degree is available to students the Pullman, Spokane, Tri-Cities, and Vancouver campuses; however, the programs differ slightly from campus to campus. The programs at the Vancouver campus consist of 15 months of intensive study and internships. The program on the Pullman/Spokane campuses consists of 13 months of intensive study and internships to complete teacher certification with additional time to complete the master's project.

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#### **Master in Teaching, Elementary, MIT, Education**

Department of Teaching and Learning  
College of Education

**Website:** <https://education.wsu.edu/graduate/mit/>

**Number of graded credits:** 37

**Requirements:** The Master in Teaching (MIT) program is based on national teaching standards (i.e., NCATE, INTASC), state accreditation codes, and research-based

effective practices. The program consists of a wide range of pedagogy course work. Depending on the student's focus (elementary or secondary education), these courses may include literacy, social studies, science, math, reading, health, fitness, or fine arts methods. Students also study diversity in schools and society, educational technology, the social context of education, and research-based effective practices. When successfully completed, the MIT program results in a master's degree and teacher certification. All MIT students complete a research project and present the project results at the culmination of their program. The research projects are usually aimed at examining teaching and educational issues, with the focus on understanding the positive impact of education on student learning.

**Avg time to complete degree:** 1.5 yrs.

**Location(s):** Pullman, Spokane, and Vancouver

**Deadline:** Summer: November 15

**Description:** The MIT is intended for those who possess a bachelor's degree in a field other than education and is designed to prepare students to become effective elementary or secondary education teachers. This program of study leads to a master's degree and a State of Washington elementary or secondary education teaching certificate. The MIT degree is available to students the Pullman, Spokane, and Vancouver campuses; however, the programs differ slightly from campus to campus. The programs at the Vancouver campus consist of 15 months of intensive study and internships. The program on the Pullman/Spokane campuses consists of 13 months of intensive study and internships to complete teacher certification with additional time to complete the master's project.

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#### **Mathematics and Science Education, PhD, Education**

Department of Teaching and Learning  
College of Education

**Degree offered:** Doctor of Philosophy (Education)

**Website:**

<https://education.wsu.edu/graduate/mathematicsandscience/>

**Number of graded credits:** 43

**Other requirements:** Applicants hold an advanced degree in education, mathematics, science, technology, or other related fields. In addition, they must have a GPA of 3.0 on a 4.0 scale and submit an online application to the Graduate School including a letter of intent, three letters of recommendation, a writing sample, and GRE scores that are less than seven years old. In addition to familiarity with public school contexts and a rudimentary awareness of educational research, particularly in the context of mathematics or science education, incoming students are expected to have a strong foundation in mathematics or science.

Avg time to complete degree: 4 yrs.

Location(s): Pullman

Tests required: GRE (Quantitative)

**Deadline:** Fall: July 1; Spring: November 1

**Description:** The PhD. in Mathematics and Science Education is designed to develop scholars capable of making important contributions to the research base, professional context, and learning environments related to mathematics and science education. Areas of emphases can include student learning, teacher education, professional development, curriculum, and technology throughout the PK-16 grade spectrum.

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#### **Special Education, MA**

Department of Teaching and Learning

College of Education

**Website:**

<https://education.wsu.edu/graduate/specialed/>

**Number of graded credits:** The MA degree program consists of a minimum of 30 semester credit hours, 21 of which must be graded course work. Three research courses, three credits each, are a component of the 21 graded credits. A minimum of nine additional credits of T&L 700 (independent research work) are required and usually involve research/scholarship activities associated with the thesis and final oral examination.

Transfer Credit Limit: 9

Required research credits: 9

Avg time to complete degree: 2 yrs.

**Location(s):** Pullman, Vancouver

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** The College of Education offers two master's degrees and a doctoral degree with specializations in special education. The M.A. degree requires a thesis, while the Ed.M. degree requires a special project, both of which are research focused. The M.A. is designed for students who will potentially enter a doctoral program or who desire to focus on educational research, as opposed to application of educational strategies. A specific set of coursework also can lead to a supporting endorsement in special education.

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#### **Special Education, EdM**

Department of Teaching and Learning

College of Education

**Website:**

<https://education.wsu.edu/graduate/specialed/>

Number of credits: 33

Number of S/F credits: 2

**Other requirements:** A minimum of 2 credits of T&L 702 are required and usually involve research/scholarship activities associated with the special project and final oral examination.

**Avg time to complete degree:** 2 yrs.



**Location(s):** Global, Pullman, Spokane, and Vancouver

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** The College of Education offers two master's degrees and a doctoral degree with specializations in special education. The M.A. degree requires a thesis, while the Ed.M. degree requires a special project, both of which are research focused. The Ed.M. allows students to study a variety of education-related areas within structured coursework. A specific set of coursework also can lead to a supporting endorsement in special education. Although students enroll in research courses and engage in research endeavors, the emphasis in this degree option is on application of educational research strategies in school settings.

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#### **Special Education, PhD**

Department of Teaching and Learning  
College of Education

##### **Website:**

<https://education.wsu.edu/graduate/specialed/>

Number of graded credits: 34

**Requirements:** There are many courses offered in the department, college, and university that students can use for their Program of Study. Beyond the requirements, the student's Program of Study can be individualized to address their interests and needs. The student develops a Program of Study with the assistance of the advisor/committee chair and other committee members.

Avg time to complete degree: 4 yrs.

Location(s): Pullman

**Tests required:** GRE (Combined)

**Deadline:** Fall: Jan 10

**Description:** The Doctor of Philosophy prepares graduates for academic positions in research and teaching. The program in special education includes the study of response

to intervention across the curriculum, diversity issues, social development and school based prevention practices for students with social and behavioral adjustment problems, universal design, and single subject design in addition to the comprehensive Carnegie core of research courses in quantitative, qualitative and program evaluation research methods. The faculty support a strong program of mentorship and encourage doctoral students to work closely with faculty of their choosing in investigating the world of research, knowledge generation and dissemination, pedagogical action and advocacy.

#### **Contact Information**

College of Education  
Cleveland Hall 70  
PO Box 642114  
Pullman, WA 99164-2114  
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#### **Sport Management, MA, Education**

College of Education  
Department of Educational Leadership, Sport Studies, and Educational/Counseling Psychology

**Options:** Thesis or Non-thesis

##### **Website:**

<https://education.wsu.edu/graduate/sportmanagement/>

Number of graded credits: 34

**Other requirements:** Entering students will be expected to have appropriate pre-requisite coursework at the undergraduate level and/or work experience in sport and recreation that provides satisfactory background knowledge. Students admitted with identified background deficiencies will be required to complete undergraduate coursework prior to enrolling in graduate coursework in the identified areas. The 34-credit degree includes sport-specific courses in finance, management and organizational theory, marketing and sponsorship, law, media communication, and ethics.

Avg time to complete degree: 2 yrs.

Location(s): Pullman

Tests required: GRE (Combined)

**Deadline:** Fall: Jan 10

**Description:** The sport management specialization is designed to prepare students for a variety of careers in the sport industry, including positions with professional sport organizations and events, university athletic departments, community and recreational sport agencies, amateur sports organizations, sport management firms, and sport media enterprises.

WSU sport management faculty are practitioners as well as researchers, and bring a wealth of industry knowledge to their courses. Our graduates have found careers with such organizations as the NCAA, the Pac-12 Conference, the Seattle Sports Commission, numerous university athletic and recreation departments, the United States Tennis Association, the Tampa Bay Buccaneers, the Miami Dolphins, and the San Francisco 49ers.

### Contact Information

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## Voiland College of Engineering and Architecture

### Architecture, MArch

School of Design & Construction  
Voiland College of Engineering and Architecture

**Website:** [sdc.wsu.edu](http://sdc.wsu.edu)

Number of graded credits: 60

Required research credits 4

**Other requirements:** A study tour/study abroad experience is required for graduation from the graduate program. Students may choose from a variety of international and domestic experiences offered throughout the curriculum. Students are charged course fees commensurate with the cost of airfare, lodging, transportation, and site admission fees. Meals and personal incidentals are the responsibility of each student.

Avg time to complete degree: 2 years

Location(s): Pullman

Tests required: TOEFL, TOEFLI

**Deadline:** Fall: Jan 10

**Description:** The School of Design and Construction offers the NAAB accredited Master of Architecture degree (M. Arch) on a one, two, or three-year time frame. The program is structured in a manner that students explore topics in architecture that are current and germane to the critical issues facing our profession. All M. Arch students engage in coursework in studio, site design, technology, history and theory. It is expected that our students engage in design and scholarship that offer new insights into the role of architecture in our culture, civilization, and environment. Within this context, our students are challenging existing conventions and offering new and innovative solutions and ideas to many of the issues of today. A range of lectures and gallery shows, and off-campus experiences such as study tours, internships, studios, and project reviews provide opportunities for educational and professional engagement on the local, regional, national, and international level.

### Contact Information

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### Chemical Engineering, PhD

The Gene and Linda Voiland School of Chemical Engineering and Bioengineering  
Voiland College of Engineering and Architecture

**Website:** [voiland.wsu.edu/](http://voiland.wsu.edu/)

Number of graded credits: 16

Required research credits 20 minimum

Avg time to complete degree: 3-4 years

Location(s): Pullman

**Tests required:** TOEFL, TOEFLI, IELTS

**Deadline:** Fall: Jan 10

**Description:** The Chemical Engineering program specializes in the development of sustainable energy solutions, understanding environmental systems, and developing systems and devices to improve the health of individuals everywhere. Students may receive chemical engineering degrees working with faculty in Pullman or on the Tri-Cities campus, including adjunct faculty whose primary appointment is elsewhere. Faculty research is broadly focused in three synergistic areas: Sustainable Energy Systems, Bimolecular Engineering, and Biomechanics. Within these areas, projects are focused on: chemical and biological catalysis and kinetics; chemical and biological fuel cells; biofilm engineering; novel sensor technologies; cardiac and reproductive molecular engineering; and molecular, cellular, and musculoskeletal mechanics. Specialized equipment includes a dynamic x-ray diffractometer, a colloidal characterization lab with field scattering capabilities, large scale fermenters, GC, LC, LC/MS chromatographic systems, and Atomic Force and other optical microscopes. The graduate programs are flexible, allowing students to develop a program that fits individual needs. Many doctoral students also participate in training programs, such as the NIH-sponsored protein biotechnology training program.

### Contact Information

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Voiland School of Chemical Engineering and Bioengineering  
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### Chemical Engineering, MS

Options: Thesis or Non-Thesis

The Gene and Linda Voiland School of Chemical Engineering and Bioengineering  
Voiland College of Engineering and Architecture

**Website:** [voiland.wsu.edu/](http://voiland.wsu.edu/)

**Number of graded credits:** 22 thesis; 27 non-thesis

Avg time to complete degree: 12-15 months

Location(s): Pullman

**Tests required:** TOEFL, TOEFLI, IELTS

**Deadline:** Fall: Jan 10

**Description:** The Chemical Engineering program specializes in the development of sustainable energy solutions, understanding environmental systems, and developing systems and devices to improve the health of individuals everywhere. Students may receive chemical engineering degrees working with faculty in Pullman or on the Tri-Cities campus, including adjunct faculty whose primary appointment is elsewhere. Faculty research is broadly focused in three areas: sustainable energy systems, biomolecular engineering, and biomechanics. Within these areas projects are focused on chemical and biological catalysis and kinetics; chemical and biological fuel cells; biofilm engineering; novel sensor technologies; cardiac and reproductive molecular engineering; and molecular, cellular, and musculoskeletal mechanics. The graduate programs are flexible, allowing students to develop a program that fits individual needs.

#### Contact Information

Samantha Bailey, Academic Coordinator  
Voiland School of Chemical Engineering and  
Bioengineering  
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#### Civil and Environmental Engineering, PhD

Department of Civil & Environmental Engineering  
Voiland College of Engineering and Architecture  
**Website:** [www.ce.wsu.edu/Grads/ceGradProg.htm](http://www.ce.wsu.edu/Grads/ceGradProg.htm)  
Number of graded credits: 36  
Number of S/F credits: 36  
**Required research credits** 36  
Avg. time to complete degree: 4 years  
Location(s): Pullman  
**Tests required:** TOEFL, TOEFLI, IELTS; MELAB  
**Deadline:** Fall: Jan 10; Spring: July 1  
**Description:** Students may be accepted into the graduate program with undergraduate degrees in other than civil engineering (e.g., related areas such as mechanical engineering, materials science, physics, etc.). These students, however, may need to complete additional courses to cover deficiencies. Courses taken to satisfy deficiencies cannot be included in the program of study. Each student, in consultation with his/her graduate committee, will develop a program of study. This plan outlines what courses will be required for completion of the degree. To develop a program of study, students may choose from a variety of graduate and selected undergraduate courses offered in the area of emphasis. In addition, courses may be selected from a number of related courses in other programs in the Department of Civil and Environmental Engineering, as well as in other departments of the University. The doctorate program is individually tailored to each student's need and interest.

#### Contact Information

Dr. Balasingam Muhunthan, Graduate Committee Chair  
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Dr. Tom Jobson, Graduate Studies Committee Chair  
Department of Civil and Environmental Engineering  
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Dana 302D  
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#### Civil and Environmental Engineering, MS

Options: Thesis, Project, or Courses only  
Department of Civil & Environmental Engineering  
Voiland College of Engineering and Architecture  
**Website:** [www.ce.wsu.edu/Grads/ceGradProg.htm](http://www.ce.wsu.edu/Grads/ceGradProg.htm)  
**Number of graded credits:** 23 for thesis/ 26 for projects/  
28 for courses only  
**Number of S/F credits:** 7 for thesis/ 4 for project/ 2 for  
courses only  
**Required research credits** 7 for thesis/ 4 for project/ 0 for  
courses only  
**Avg time to complete degree:** 2 years for thesis/ 1.5 for  
project and courses only  
Location(s): Pullman  
**Tests required:** TOEFL, TOEFLI, IELTS, MELAB  
**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** Students may be accepted for this degree with undergraduate degrees in other than civil engineering (e.g., related areas such as mechanical engineering, materials science, physics, etc.). These students, however, may need to complete additional courses to cover deficiencies. Courses taken to satisfy deficiencies cannot be included in the program of study. The students doing the non-thesis option either take courses only with a final oral exam or a project option (with no thesis). The graded course work requirements vary as specified in the graduate handbook of Civil Engineering.

#### Contact Information

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### Computer Science, PhD

School of Electrical Engineering and Computer Science;  
Voiland College of Engineering and Architecture  
**Website:** <https://school.eecs.wsu.edu/academics/graduate-program/>  
**Number of credits:** The program of study should consist of approximately 35 credits of graded course work plus 30 or more research credits (Cpt S 800). A maximum of 6 credits of Directed Study (CptS 595) may be included. A maximum of 9 credits of 400 level graded course work approved by the EECS GSC may be included. In general, undergraduate courses REQUIRED for the BS/CS, BS/EE or BA/CS and undergraduate courses listed as pre-requisite for admission into the MS/PhD in CPT SCI program will NOT BE allowed. Minimum of 1 accepted journal paper OR 2 accepted peer-reviewed conference papers and a journal submission.

Avg time to complete degree:

Location(s): Pullman

**Tests required:** GRE (Combined), TOEFL

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** The School of Electrical Engineering and Computer Science is instrumental in determining competencies and preparing students at all levels (B.S., M.S., and Ph.D.) for technological productivity. The success of our graduate students in industry and higher education reflects the excellence of the School of EECS and its programs. In industry, our graduate degree holders are presidents, CEOs, CIOs, vice presidents, directors, and division and department managers. Some have founded at least one company and initiated and promoted new technologies, operations and sales strategies. Others have excelled as senior designers, project managers, senior scientists, and lead engineers. In higher education, they are professors, deans, and research directors. Graduate degrees have enriched their lives and careers, while affecting

positively the economy of the state and nation. All are excellent role models for their peers and our students.

### Contact Information

Sidra Gleason, Academic Coordinator  
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### Computer Science, MS

School of Engineering and Computer Science; Voiland College of Engineering and Architecture

**Website:**

<https://school.eecs.wsu.edu/academics/graduate-program/>

**Number of credits:** The program must consist of 33 or more hours of credit including 24 or more hours of coursework for which a grade of A-F is given and 9 or more credits of thesis research (EE or Cpt S 700).  
Avg time to complete degree: 2 years

**Location(s):** Pullman, Tri-Cities

**Tests required:** GRE (Combined), TOEFL

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** The School of Electrical Engineering and Computer Science offers an outstanding education, providing first-rate preparation for careers in Electrical Engineering, Computer Engineering and Computer Science. US News and World Report ranks WSU's Electrical Engineering graduate program 68th among nearly 180 PhD granting EE programs in the U.S.

### Contact Information

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### Computer Science, MS (Vancouver)

School of Engineering and Computer Science  
Voiland College of Engineering and Architecture

**Website:** [ecs.vancouver.wsu.edu/computer-science-ms](https://ecs.vancouver.wsu.edu/computer-science-ms)

Number of graded credits: 21

Required research credits 9 (CS700)

**Other requirements:** Students also must complete nine credit hours of CS 700 Masters Research and Examination. Two CS 700 credits must be taken in the semester during which the student intends to defend the thesis. The coursework and research are in the general areas of software engineering, artificial intelligence, computer networks and computer graphics. Before undertaking graduate study in computer science, the student should have completed a baccalaureate degree substantially similar to the BSCS degree. Students from other academic disciplines are encouraged to apply, however such students will be required to take or have taken the equivalent of the

following courses: CS 317, CS 360 and CS 450, including all prerequisites for these courses. An undergraduate grade point Avg of 3.0 is a minimum for admission to the MS program.

Avg time to complete degree: 2 years

Location(s): Vancouver

**Tests required:** TOEFL, TOEFLI, IELTS – International Students only

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** The WSU Vancouver MS in Computer Science is designed and administered separately from the MS program in Pullman. If you designate the WSU Pullman program as your main objective, you will not be automatically considered by the Vancouver program unless you submit the specific documentation requested on our "How to Apply" web page (<http://encs.vancouver.wsu.edu/how-apply>). Except in rare cases, only those who indicate WSU Vancouver as their main objective will be prompted to submit any missing documentation so our Selection Committee can review their completed applications. Sophisticated facilities are available for instruction and research. Teaching and research assistantships are available for qualified students.

#### Contact Information

Kristy Gutierrez, Academic Coordinator  
14204 NE Salmon Creek Avenue  
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Fax: 361-546-9438  
E-mail: [kgutierrez@wsu.edu](mailto:kgutierrez@wsu.edu)

#### Computer Engineering, MS

Options: Thesis or Non-Thesis

School of Electrical Engineering and Computer Science  
Voiland College of Engineering and Architecture

**Website:** [school.eecs.wsu.edu/graduate](https://school.eecs.wsu.edu/graduate)

**Number of graded credits:** The program consists of 30 or more hours of credit including 21 or more hours of coursework for a thesis option in which a grade of A-F is given and nine or more credits of thesis research (EE 700). Non-thesis option: 26.

Avg time to complete degree:

Location(s): Pullman

**Tests required:** GRE (Combined), TOEFL

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** The School of Electrical Engineering and Computer Science offers an outstanding education, providing first-rate preparation for careers in Electrical Engineering, Computer Engineering and Computer Science. US News and World Report ranks WSU's Electrical Engineering graduate program 68th among nearly 180 PhD granting EE programs in the U.S.

#### Contact Information

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#### Electrical and Computer Engineering, PhD

School of Electrical Engineering and Computer Science  
Voiland College of Engineering and Architecture

**Website:**

<https://school.eecs.wsu.edu/academics/graduate-program/>

Number of graded credits: 35

Transfer credit limit: 17

Additional Requirements: Qualifying Examination in 3rd Semester

Location(s): Global Campus

Tests required: GRE (Combined), TOEFL

**Deadline:** Fall: Jan 10 Spring: July 1

**Description:** WSU's reputation for high-quality education, research, and public service enables it to continue achieving its missions. Graduate students play an essential part in carrying out the School's mission to conduct research that will make a difference to industry, government, and society. Graduate-level programs in electrical and computer engineering include power engineering; microelectronics; electromagnetics and optical communications, control, and signal processing; embedded systems and software engineering.

#### Contact Information

Sidra Gleason, Academic coordinator  
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#### Electrical Engineering, MS

Options: Thesis or Non-Thesis

School of Electrical Engineering and Computer Science  
Voiland College of Engineering and Architecture

**Website:**

<https://school.eecs.wsu.edu/academics/graduate-program/>

**Number of graded credits:** 21 thesis; 28 non-thesis

**Required research credits** 9 (EE 700)

**Other requirements:** Under the thesis option (all programs), the student is expected to complete a significant research project and submit a thesis, which adheres to EECS standards and the formatting requirements of the advisory committee and the Graduate School. The thesis work should be submitted for refereed publication prior to scheduling the final exam. It is the student's responsibility to meet the deadlines specified by the Graduate School. All students on financial aid from WSU must choose the thesis option.

**Location(s):** Pullman, Tri-Cities, Vancouver

**Tests required:** TOEFL, GRE (Combined)

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** Graduate-level programs in electrical and computer engineering include power engineering; microelectronics; electromagnetics and optical communications, control, and signal processing; embedded systems and software engineering.

#### Contact Information

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### Electrical Engineering, MS - Vancouver

Options: Thesis or Non-Thesis  
School of Electrical Engineering and Computer Science  
Voiland College of Engineering and Architecture  
**Website:** <https://ecs.vancouver.wsu.edu/electrical-engineering-ms>

Number of graded credits: 30

**Required research credits** 4 (EE 700)

**Other requirements:** The Master of Science in Electrical Engineering is a thesis-option program and requires a minimum of 30 credit hours. This includes 21 hours of graded coursework beyond the bachelor's plus a minimum of 4 thesis credits. The Graduate School requires a minimum of 30 total credit hours for an MS degree. The School of ENCS graded course requirements add up to 21 credits and with the required minimum four credits of ECE 700, the program becomes 25 credits. The remaining five credits can be additional ECE 700 thesis credits or 500-level ECE classes.

Location(s): Vancouver

**Description:** Graduate-level programs in electrical and computer engineering include power engineering; microelectronics; electromagnetics and optical communications, control, and signal processing; embedded systems and software engineering.

### Contact Information

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### Electric Power Engineering, PSM

Options: Professional Science Masters  
Voiland College of Engineering and Architecture  
**Website:** <http://www.cea.wsu.edu/PSM>

**Location(s):** Global Campus

**Tests required:** TOEFL, TOEFLI

**Deadline:** Fall: July 1; Spring: November 15

### Description:

The Electrical Power Engineering PSM provides core technical education in power systems analysis, transmission and distribution systems and power system economics and electricity markets. You can supplement this core technical work with elective courses in areas ranging from power electronics to power system protection to smart grid communication.

Complementing this technical education is a wide selection of elective courses in areas ranging from quantitative methods, to management and communication and an industry based internship project. The goal is to produce graduates who have both a thorough knowledge of the electric power system and the professional skills needed to advance in both technical and management careers within the industry.

### Contact Information

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### Engineering, MS

Options: Thesis or Non-Thesis  
Voiland College of Engineering and Architecture  
**Website:** [vea.wsu.edu/interdisciplinary-graduate-studies-2/](http://vea.wsu.edu/interdisciplinary-graduate-studies-2/)

**Number of graded credits:** 30

**Transfer credit limit:** 6

**Location(s):** Pullman

**Tests required:** TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** These interdisciplinary programs are administered through the College of Engineering and Architecture's Office of the Associate Dean of Research and Graduate Programs, with students typically advised and funded through one of several departments in the College. The interdisciplinary nature of these degrees provides considerable flexibility in designing programs of study tailored to the specialized needs of each student. Areas of specialization include (but are not limited to): Biological systems engineering, Atmospheric research, Bioengineering. These students often work in one of our interdisciplinary centers such as: Bioengineering Research Center (BRC), Center for Environmental Education and Outreach (CEREO), Center for Materials Research (CMR), Laboratory for Atmospheric Research (LAR), and the Wood Materials Research Lab (WMEL). Thesis and non-thesis options are available in the M.S. degree program.

### Contact Information

Christopher Gass, Coordinator  
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### Engineering and Technology Management, METM

Voiland College of Engineering and Architecture  
**Website:** [etm.wsu.edu](http://etm.wsu.edu)  
**Number of graded credits:** 30 semester hours (10 courses) of course work and three to four+ credits of a final non-thesis project report or comprehensive exam (EM 702).  
**Program Location:** Global Campus (on-line only)  
**Deadline:** Fall: July 15 (Jan 10 international)  
Spring: November 1 (July 1 international)  
Summer: March 15 (Default international)

### Admission Requirements:

Students must have a bachelor's degree from an accredited institution with a 3.0 G.P.A. in math through college algebra and basic statistics, and experience in engineering

or technology. The application requires a resume showing significant experience and a well-written personal statement of at least three to five paragraphs explaining personal or career goals and how this program will help attain those.

**Description:** The Engineering and Technology Management (ETM) Program is designed for working professionals who want to develop skills to manage technology and people. The program prepares engineering and business professionals to make strategic and operational decisions and become leaders in the management of technology. Courses are designed to provide practicing engineers with the knowledge, tools, and skills to become proficient managers of projects, operations, organizations, and people. The ETM program is specifically tailored for professionals who want to advance their careers while still working full time. Live, online lectures are available from anywhere and at any time. Students will focus on: customer-oriented approaches; global technology and innovation strategies; performance management in technical organizations; management of scarce resources; and interdisciplinary team approach. The program is interdisciplinary, with course offerings in engineering management and technology related business courses. EM courses are delivered via the Internet to students worldwide. Web conferencing software allows faculty and students to interact and collaborate in a virtual classroom environment in real-time. Each class session is a self-contained webinar presented and facilitated by the instructor. All course webinars are presented and managed using WSU's Learning Management System, a web-enabled course hosting platform. Students must be familiar with the software used in the METM Program before taking classes. Links are posted on the program web site.

#### **Contact Information**

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#### **Engineering Science, PhD**

Voiland College of Engineering and Architecture  
**Website:** [vcea.wsu.edu/interdisciplinary-graduate-studies-2/](http://vcea.wsu.edu/interdisciplinary-graduate-studies-2/)

**Number of graded credits:** 15

Transfer credit limit: 6

Location(s): Pullman

Tests required: TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

#### **Description:**

This is an interdisciplinary program administered through the College of Engineering and Architecture's Office of the Associate Dean of Research and Graduate Programs, with students typically advised and funded through one of several departments in the College. The interdisciplinary nature of this degree provides considerable flexibility in

designing programs of study tailored to the specialized needs of each student. Areas of specialization include (but are not limited to): biological systems engineering, atmospheric research, materials science and engineering, and bioengineering. These students often work in one of our interdisciplinary centers such as: Bioengineering Research Center (BRC), Center for Environmental Education and Outreach (CEREO), Center for Materials Research (CMR), Laboratory for Atmospheric Research (LAR), Composite Materials and Engineering Center (CMEC).

#### **Contact Information**

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#### **Environmental Engineering, MS**

Options: Thesis, Project, or Courses (only)

Department of Civil & Environmental Engineering  
Voiland College of Engineering and Architecture

**Website:** [ce.wsu.edu/Grads/ceMSthesis.htm](http://ce.wsu.edu/Grads/ceMSthesis.htm)

**Number of graded credits:** 23 for thesis/ 26 for projects/ 28 for courses only

**Number of S/F credits:** 7 for thesis/ 4 for project/ 2 for courses only

**Required research credits:** 2 years for thesis/ 1.5 for project and courses only

Additional Requirements: TOEFL or TOEFLI

**Avg time to complete degree:** 2 years for thesis/ 1.5 for project and courses only

**Location(s):** Pullman, Tri-Cities, Vancouver

**Tests required:** TOEFL or TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** Students may be accepted into the graduate program with undergraduate degrees in other than Civil or environmental Engineering (e.g., related areas such as mechanical engineering, materials science, environmental science, etc.). These students, however, may need to complete additional courses to cover deficiencies. Courses taken to satisfy deficiencies cannot be included in the program of study. Each student, in consultation with his/her graduate committee, will develop a plan of study. This plan outlines what courses will be required for completion of the degree. To develop a plan of study, students may choose from a variety of graduate and selected undergraduate courses offered in the area of emphasis. In addition, courses may be selected from a number of related courses in other programs in the Department of Civil and Environmental Engineering, as well as in other departments of the University. The students doing the non-thesis option either take courses only with a final oral exam or a project option (with no thesis). The graded course work requirements vary as specified in the graduate handbook of Civil Engineering.

#### **Contact Information**

Dr. Balasingam Muhunthan, Graduate Committee Chair  
Department of Civil and Environmental Engineering

Washington State University  
Sloan 101  
Pullman, WA 99164  
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E-mail: [muhuntha@wsu.edu](mailto:muhuntha@wsu.edu)

### Interior Design, MA

Options: Thesis or Non-Thesis  
Voiland College of Engineering and Architecture; College of Agricultural, Human, and Natural Resource Sciences  
**Website:** <http://sdc.wsu.edu/interior-design>  
Number of graded credits: 60  
Number of S/F credits: 4  
Required research credits 10  
Avg time to complete degree: 2 years  
Location(s): Pullman  
Tests required: IELTS, TOEFL, TOEFLI  
**Deadline:** Fall: Jan 10  
**Description:** The School of Design + Construction offers an exciting Master of Arts in Interior Design degree focused on environment and design applications within the context of a cross-disciplinary program. The program increases students' understanding of the relationship between human behavior and interior environments through advanced study and hands-on research. The program also builds on the design studio experience to provide students with an opportunity for further exploration and discovery in the field. Students gain knowledge and skills that prepare them to analyze information and relationships, evaluate issues, and set priorities, while creating functional and high quality design solutions for complex projects. The degree is offered in a one, two, and three-year track depending on qualifications at the time of admission.

#### Contact Information

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Matt Melcher, Associate Professor  
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### Landscape Architecture, MS

School of Design & Construction  
Voiland College of Engineering and Architecture; College of Agricultural, Human, and Natural Resource Sciences  
**Website:** [sdc.wsu.edu](http://sdc.wsu.edu)  
Number of graded credits: 21  
Transfer credit limit: 10

Location(s): Pullman  
**Tests required:** IELTS, TOEFL, TOEFLI  
**Deadline:** Fall: Jan 10; Spring: July 1  
**Description:** The Master of Science in Landscape Architecture (MSLA) program provides graduate students with a foundation in the theory and practice of landscape architecture. The program also provides students with the opportunity to focus on a self-selected, particular area of landscape architectural investigation. The program emphasizes that landscape architectural works should facilitate deep connections to place, enabling individuals to positively affect and connect with these places. The program also emphasizes service learning and the development of research projects that shift both personal and public values and facilitate ecological understanding. Through the program students are trained to develop an engaged and holistic understanding of natural and social phenomena, events, and objects that shape the quality of people's lives in rural and urban environments. The MSLA is offered in a two or three-year track depending upon qualifications at the time of admission.

#### Contact Information

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### Materials Science and Engineering, PhD

Graduate School; Voiland College of Engineering and Architecture  
**Website:** [materials.wsu.edu](http://materials.wsu.edu)  
Number of graded credits: 22  
Transfer credit limit: 11  
Location(s): Pullman  
Tests required: TOEFL, TOEFLI  
**Deadline:** Fall: Jan 10; Spring: July 1  
**Description:** Washington State University has the largest interdisciplinary doctoral program in Materials Science and Engineering in the Northwest. Since its establishment in the 1960s as the doctoral program in Chemical Physics and rechristened as the Materials Science program in the 1980s, it has evolved into a strongly collaborative, vibrant interdisciplinary program with the participation of faculty from several departments and schools in the College of Engineering and Architecture (CEA) and the College of Sciences (COS). This cross-disciplinary approach enables



students to have access to a wide range of state-of-the-art research facilities from Mechanical, Materials, Civil, Chemical and Bio Engineering, as well as Physics and Chemistry. In addition, some of our faculty members have collaborations with the highly ranked Life Sciences programs (Plant Sciences, Veterinary Medicine and Agriculture) in WSU. More than 50% of our internationally renowned faculty members are fellows of their professional societies, and many have leadership roles in professional organizations, industrial consulting, and various federal government panels. Most of our students go on to work in academia, Fortune 500 companies and the national laboratories.

#### Contact Information

Kjelda Berg, Program Coordinator  
Materials Science and Engineering  
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#### Materials Science and Engineering, MS

Options: Thesis or Non-Thesis  
Graduate School; Voiland College of Engineering and Architecture; College of Arts and Sciences  
**Website:** [materials.wsu.edu](http://materials.wsu.edu)  
**Number of credits:** Of the minimum 21 graded credit hours for thesis option, the student must take 1) 3 credit hours of Math 440 or 540, 2) a minimum of 6 credit hours at the 400- or 500-level (MME or non-MME), and 3) a minimum of 12 credit hours of 500-level MSE or ME courses (at least 9 of these must be MSE courses). Note: a maximum of 6 credit hours of graded coursework at the 300- and 400-level can be included in the program. Also required: 1) a minimum of 4 credit hours of MSE 700 and 2) 2 credit hours of ME 598 or MatS 593 (seminar). Non-thesis option: 26 credits.

Location(s): Pullman

**Tests required:** TOEFL, TOEFLI, GRE (Quantitative), GRE (Verbal)

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** Our School offers programs of study for full time and part-time students leading to the degrees of Master of Science (MS) in Mechanical Engineering (Pullman and Tri-Cities campuses), MS in Materials Science & Engineering (Pullman campus), and Doctor of Philosophy (Ph.D.) in Mechanical Engineering (Pullman campus). Our School participates in the interdisciplinary degree programs of MS in Engineering, Ph.D. in Engineering Science, and Ph.D. in Materials Science & Engineering. Thesis and non-thesis options are available for the MS degree. Programs of study are individualized with an interdisciplinary focus. Students are expected to pursue their degree programs with success and to earn the MS degree in two years and the Ph.D. in four years. The program will culminate with a final oral examination and a written thesis (MS thesis option), project report (MS non-thesis option), or dissertation (Ph.D.). Financial aid in the form of an assistantship is available for dedicated, quality full time MS and Ph.D. students.

#### Contact Information

Mary Simonsen, Graduate Academic Coordinator  
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#### Mechanical Engineering, PhD

School of Mechanical and Materials Engineering, Voiland College of Engineering and Architecture

**Website:** [mme.wsu.edu/](http://mme.wsu.edu/)

Number of graded credits: 24

Of the minimum 24 graded credit hours, the student must take 1) 3 credit hours of Math 540 or equivalent, 2) a minimum of 12 credit hours of 500-level ME or MSE courses, and 3) 9 credit hours of additional 500-level courses approved by the student's advisor. Note: a maximum of 9 credit hours of graded coursework at the 300- and 400-level can be included in the program. Also required: 1) a minimum of 20 credit hours of ME 800 and 2) 3 credit hours of ME 598 or MatS 593 (seminar). All programs must have a minimum total credits of 72.

**Avg time to complete degree:** 4 years

**Location(s):** Pullman

**Tests required:** GRE (Quantitative), GRE (Verbal), TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** We offer programs of study for full- and part-time students leading to the degrees of Master of Science in Mechanical Engineering (Pullman and Tri-Cities campuses), MS in Materials Science & Engineering (Pullman campus), and Doctor of Philosophy in Mechanical Engineering (Pullman campus).

Programs of study are individualized with an interdisciplinary focus. Students are expected to pursue their degree programs with success and to earn the MS degree in two years and the Ph.D. in four years. The doctoral program will culminate with a dissertation. Financial aid in the form of an assistantship is available for dedicated, quality full time MS and Ph.D. students.

#### Contact Information

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#### Mechanical Engineering, MS

Options: Thesis or Non-Thesis  
School of Mechanical and Materials Engineering  
Voiland College of Engineering and Architecture

**Website:** [mme.wsu.edu/](http://mme.wsu.edu/)

**Number of credits:** 30 total. Of the minimum 21 graded credit hours thesis option, the student must take 1) 3 credit

hours of Math 540, 2) a minimum of 12 credit hours of 500-level ME or MSE courses (at least 9 of these must be ME courses), and 3) 6 credit hours of additional courses approved by the student's advisor. Note: a maximum of 6 credit hours of graded coursework at the 300- and 400-level can be included in the program. Also required: 1) a minimum of 4 credit hours of ME 700 and 2) 2 credit hours of ME 598 (seminar; Pullman students only). Non-thesis: 26.

**Avg time to complete degree:** 2 years

**Location(s):** Pullman, Tri-Cities

**Tests required:** GRE (Quantitative), GRE (Verbal), TOEFL, IELTS

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** Thesis and non-thesis options are available for the MS degree. Programs of study are individualized with an interdisciplinary focus. The program will culminate with a final oral examination and a written thesis (MS thesis option) or project report (MS non-thesis option). Financial aid in the form of an assistantship is available for dedicated, quality full time MS students.

#### Contact Information

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#### Mechanical Engineering, MS - Vancouver

School of Engineering and Computer Science, Voiland College of Engineering and Architecture

**Website:** [ecs.vancouver.wsu.edu/mechanical-engineering-ms](http://ecs.vancouver.wsu.edu/mechanical-engineering-ms)

Number of credits: 30

Four credit hours of Mech 700 Masters Research and Examination required. Additional credits are required in consultation with the academic advisor to total 30 credit hours. 2 credits of Mech 700 must be taken during the term in which the student intends to defend the thesis. The required credits include 21 hours of graded coursework beyond the bachelor's, a one-credit research seminar, plus a minimum of 4 thesis credits. The coursework and research are in the general areas of dynamics, robotics, solid mechanics, manufacturing and design, fluid dynamics, heat and mass transfer and micro and nanotechnology.

**Avg time to complete degree:** Two years

**Location(s):** Vancouver

**Tests required:** TOEFL, TOEFLI, or IELTS (International Students)

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** Our laboratories are equipped with state-of-the-art equipment worth more than \$6 million. Teaching and research assistantships are available for qualified students. A Bachelor of Science degree from an accredited program in mechanical engineering provides a good background for the MSME graduate program. Students with bachelor degrees in other engineering disciplines,

mathematics, and the physical sciences are routinely admitted, but may be required to make up requisite undergraduate deficiencies. An undergraduate grade point Avg of 3.0 is a minimum for admission to the MS program.

#### Contact Information

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School of Engineering and Computer Science  
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## Graduate School Interdisciplinary Degrees

### Individual Interdisciplinary, PhD

Graduate School

**Website:** <http://gradschool.wsu.edu/individual-interdisciplinary-doctoral-degree/>

Number of graded credits: 34

Required research credits: 20

Additional Requirements: Master's degree

Avg time to complete degree: 4 years

Location(s): Pullman

**Tests required:** IELTS, MELAB, TOEFL, TOEFLI, GRE (Combined)

**Deadline:** Fall: Jan 10

**Description:** Each student works with an advisor and four additional members of the WSU faculty from at least three academic disciplines. This committee oversees the development of the individual doctoral degree and works closely with the student to ensure a high quality doctoral education. The individual doctoral program must meet the following criteria: it will be of doctoral significance, no single recognized graduate degree-granting unit will be able to meet the student's needs, and the academic resources to complete the proposed program will be available at WSU.

#### Contact Information

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### Molecular Plant Sciences, PhD

Graduate School

**Website:** <http://mps.wsu.edu>

**Number of graded credits:** 15; 72 total credits required

**Additional Requirements:** Students entering the program must have completed their baccalaureate degree with training in one year each of elementary biology or botany,

and physics, chemistry through one semester of organic chemistry and biochemistry, one semester each of molecular plant sciences and genetics, and mathematics (through calculus). Limited undergraduate deficiencies may be remedied by taking the appropriate courses upon enrollment in the graduate program on a provisional basis. Degree requirements include courses in molecular biology, advanced molecular plant sciences, plant morphology and anatomy, and metabolism. Course requirements are drawn from existing courses offered by MPS and cooperating departments and programs.

Number of S/F credits: More than 9

Required research credits 20 minimum

**Avg time to complete degree:** 6-7 years

**Location(s):** Pullman

**Tests required:** GRE (Quantitative), GRE (Verbal), TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** Graduate study leading to the Doctor of Philosophy degree is offered as an interdepartmental curriculum by graduate faculty from the Departments of Crop and Soil Science, Food Science and Human Nutrition, Electrical Engineering and Computer Science, Horticulture and Landscape Architecture, Molecular Biosciences, Plant Pathology, Biological Sciences, and the Institute of Biological Chemistry. The objectives of the program are to provide the graduate student with a broad knowledge in molecular plant sciences and with research experience in a chosen area within this discipline. Specialization includes cellular and subcellular physiology, the molecular biology and biochemistry of plant-related processes, photosynthesis and photorespiration, nitrogen fixation, phytochemistry, the physiology of vascular plants, metabolism, plant pathogen interactions, hormonal interactions and regulation of growth, crop production physiology, and physiological ecology as well as related areas in agriculture and biology.

#### Contact Information

Molecular Plant Sciences Graduate Program

French Ad, Room 336C

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#### Materials Science and Engineering, Ph.D

Graduate School; Voiland College of Engineering and Architecture; College of Arts and Sciences

**Website:** <http://materials.wsu.edu/>

Number of graded credits: 22

Avg time to complete degree: 4 years

Location(s): Pullman

Tests required: TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

#### Description:

This strong collaborative interdisciplinary program enables students to work with faculty from several areas and have access to a wide range of state-of-the-art research facilities from mechanical, materials, civil, chemical and

bioengineering, physics and chemistry. Our graduate students may take advantage of our strong ties with the Pacific Northwest National Laboratory (PNNL) by participating in a special research internship program (WARIAC), which allows them to complete part of their PhD research while being resident at the Environmental Molecular Sciences Laboratory at PNNL for one to two semesters. Most of our students go on to work in academia, Fortune 500 companies and the national laboratories.

#### Contact Information

Kjelda Berg

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## Health Related Programs in Spokane

### Dietetics, Nutrition & Exercise Physiology, Coordinated Program, MS

**Website:** <https://spokane.wsu.edu/nep/ms-cpd-nutrition-and-exercise-physiology/accreditation/>

Number of graded credits: 38

Required research credits: Internship

**Other requirements:** Admission requires a criminal background check and drug testing. Since the emphasis area of the graduate dietetics program is exercise, some students may be required to take undergraduate nutrition and/or exercise physiology courses that prepares them to be dual credentialed as a registered dietitian nutritionist (RDN) and a clinical exercise specialist (CES). A minimum of 1200 hours of supervised practice hours in various healthcare and community settings is required as a part of MS CPD NEP program.

Location(s): Spokane

**Tests required:** GRE (Combined); GRE (Quantitative); GRE (Verbal); TOEFL; TOEFLI

**Deadline:** Spring: Jan 10

**Description:** The non-thesis Master of Science Coordinated Program in Dietetics, Nutrition, and Exercise Physiology (CPD NEP), is a coordinated program in dietetics with an exercise emphasis. The program is accredited by the Accreditation Council for Education in Nutrition and Dietetics, the accrediting agency for the Academy of Nutrition and Dietetics. Successful completion of this MS program prepares students to test for the Registered Dietitian (R.D.) credential.

#### Contact Information

Jill Wagner, Academic Coordinator

Coordinated Program in Nutrition & Exercise Physiology  
SHER 318

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## College of Medical Sciences

### Speech and Hearing Sciences, MS

**Options: Thesis and Non-Thesis**

Department of Speech and Hearing Sciences  
Medical Sciences

**Website:** <https://medicine.wsu.edu/speechandhearing/>

Location(s): Spokane

Tests required: GRE (Combined)

**Deadline:** Fall: Jan 10

**Description:** A bachelor's degree in speech-language pathology is not mandatory; however, students entering the graduate program with undergraduate majors in related fields must complete a core of prerequisites including 32 hours of undergraduate courses. All students are required to complete a statistics course, a biology course, and a physical science course. These courses are considered prerequisites, and not part of the graduate program, although the course may be taken at graduate level. Academic coursework and clinical practicum offerings prepare students to become professional personnel capable of meeting the diagnostic and therapy needs of individuals of all ages evidencing a wide variety of speech, language, learning, and hearing problems.

The program stresses the application of theory through work in the University's clinics, as well as in clinical placements throughout the state. Students are prepared as speech-language pathologists to provide direct and consultative services in educational and medical settings. The course of study emphasizes physiological, behavioral, neurological, and psychological dimensions of normal development, fundamental communication processes, and disorders of communication. By applying science and research to clinical practice, graduate students develop proficiency in reasoning and problem-solving relative to clinical principles and procedures in diagnosis and treatment. The academic teaching and learning philosophy is student-centered, research-based, and writing intensive. Full-time students typically complete the program in approximately two years (including one summer), carrying on Avg 18 credit hours per academic semester.

The master's degree program in speech-language pathology is accredited by the Council on Academic Accreditation in Audiology and Speech-Language Pathology (CAA) of the American Speech-Language Hearing Association and recognized at the state level by the Washington State Board of Education. The program provides the basis for certification in speech-language pathology by the American Speech-Language-Hearing Association (ASHA), the certificate of clinical competence or the CCC, and for state licensure. The post-baccalaureate program, a specialized one-year course sequence, allows a student with a bachelor's degree in another field to prepare for entry to the master's degree program in Speech and Hearing Sciences.

**Contact Information**

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Program Coordinator  
Speech and Hearing Sciences  
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## College of Nursing

**Health Policy and Administration, MHPA**

College of Nursing

**Website:** <https://nursing.wsu.edu/academics/mhpa/>

Number of graded credits: 56

Required research credits: 6

**Other requirements:** A student must earn a 3.0 grade point Avg for all course work. No work of C grade or less may be dropped from a program, nor can a course be repeated for a higher grade if the final grade is C or higher. Any course listed on the program in which a grade of C-, D, or F is earned must be repeated. Any graduate student who fails to maintain a cumulative grade point Avg of 3.00 or higher for all course work subsequent to admission to the Graduate School will be dropped from the University. Credits with a grade of B or higher that are awarded after a bachelor's degree and are earned in other accredited graduate schools may be transferred and applied toward a student's graduate degree program if they are also appropriate to HPA. The number of such credit hours is limited to no more than half of the total graded course credits required by the program. None of this credit may be applied toward another advanced degree.

**Avg time to complete degree:** 4 semesters plus 192-hour internship

Location(s): Spokane

**Tests required:** GMAT, GRE (Combined), IELTS, MELAB, TOEFL, TOEFLI

**Deadline:** Fall: Rolling; Spring: Rolling

**Description:** The core courses provide basic understanding and experience in managing health care systems in the context of enhancing community health status. A multidisciplinary systems perspective in many courses helps students develop knowledge and skills in communication, ethics, interpersonal relations, team building, management, and delivery of cost-effective health care. The learning environment is both rigorous and flexible. Students are encouraged to design individualized programs suitable to a variety of career goals and future employment opportunities. Practical and individualized experiences, through internships, fellowships, research assistantships, and special projects build students' skills and values in varied administrative settings.

**Contact Information**

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Dr. Jae Kennedy, Chair and Professor  
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### Nursing, MN, Population Health

College of Nursing

**Website:** <https://nursing.wsu.edu/academics/mn-nursing-leadership/>

Number of graded credits: 38

Required research credits: 3 (non-thesis project); 6 (thesis)

Avg time to complete degree: 2 years part time

**Location(s):** Spokane, Tri-Cities, Vancouver

Tests required: IELTS, TOEFL

**Deadline:** Fall: November 15, Spring: July 15

**Description:** The Master of Nursing Population Health (MN PH) is a practice-focused degree that places primary emphasis on population health. Graduates integrate policy, prevention and evaluation throughout their practices and are prepared to negotiate the realities of current practice with innovation as health care reform unfolds. Graduates provide care for individuals, families, groups and populations; serve as administrators in health care organizations; engage as faculty in nursing programs; develop and implement health policy; and translate research into expert practice. Within the Population Health MN, students may choose to focus on Nursing Education, Nursing Leadership, or may opt for the Individualized Study Track. This could include foci such as (but not limited to) public health, informatics, or a combination of Nurse Educator and Leader.

#### Contact Information

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Mel Haberman, Director, MN and Grad Certificate Programs  
WSU College of Nursing  
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[haberman@wsu.edu](mailto:haberman@wsu.edu)

### Nursing, MN, Nursing Education

Options: Thesis or Non-Thesis

College of Nursing

**Website:** [nursing.wsu.edu](https://nursing.wsu.edu)

Number of graded credits: 40

**Required research credits:** 3 (non-thesis project); 6 (thesis)

Avg time to complete degree: 2 years part time

**Location(s):** Spokane, Tri-Cities, Vancouver

**Tests required:** TOEFL, TOEFLI

**Deadline:** Fall: Jan 10 preferential; Spring: July 1

**Description:** The Master of Nursing Education (MN) prepares students for roles as nurse educators in collegiate and clinical settings. Students complete core courses in Population Health along with additional course work in education. Students may enter the MN program with a BSN or with an Associate Degree in Nursing (ADN) and a bachelor's degree in a related field. This degree is aligned with outcomes described in the *Essentials for Master's Education* (AACN, 2011), Core Competencies for Interprofessional Collaborative Practice (2011), Quad Council Competencies for Public Health Nurses (2011) and the Core Competencies for Educators (NLN, 2005).

#### Contact Information

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### Nursing, MN, Nursing Leadership

Options: Thesis or Non- Thesis

College of Nursing

**Website:** [nursing.wsu.edu](https://nursing.wsu.edu)

Number of graded credits: 42

Required research credits: 3 (non-thesis project); 6 (thesis)

Avg time to complete degree: 2 years part time

**Location(s):** Spokane, Tri-Cities, Vancouver

**Tests required:** TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** The MN Nursing Leadership (MN) track prepares nurses for advanced practice leadership roles. Students complete core courses in Population Health along with additional course work in leadership studies. Students may enter the MN program with a BSN or with an Associate Degree in Nursing (ADN) and a bachelor's degree in a related field. Graduate expectations include those mentioned in the overall Population Health MN and outcomes derived from the American Organization of Nurse Executives (AONE) Competencies for MN Programs (2005). Graduates work in a variety of leadership roles from unit managers to public health directors. They are healthcare system leaders, making progressive improvements in practice such as increasing evidence-based bedside practice to decreasing hospital alarm fatigue.

#### Contact Information

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### Nursing, DNP, Population Health

College of Nursing

**Website:** <https://nursing.wsu.edu/academics/dnp-population-health/>

**Number of graded credits:** 72; 71-73 (as of fall 2015)

Avg time to complete degree: 3 years

**Location(s):** Spokane, Vancouver, Tri-Cities, Vancouver

**Tests required:** IELTS, TOEFL

**Deadline:** Fall: December 1

**Description:** The Doctor of Nursing Practice (DNP) in Advanced Population Health (APH) focuses on the health of populations, while providing a background in assessment, pharmacology, and pathophysiology. Health policy, epidemiology, and health promotion concepts are integrated into the curriculum. While a master's degree in APH is also available, the DNP prepared APH graduate will gain enhanced skills in interprofessional collaboration, application of evidence-based practice, health information systems, organizational systems, and leadership.

#### Contact Information

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Nursing

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Darryl Duvall, Director, DNP Program

WSU College of Nursing

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#### Nursing, DNP, Family Nurse Practitioner

College of Nursing

**Website:** <https://nursing.wsu.edu/academics/dnp-family-nurse-practitioner/>

Number of credits: 72; 74 (as of fall 2015)

**Avg time to complete degree:** 3 years

**Location(s):** Spokane, Vancouver, Tri-Cities (as of fall 2015)

Tests required: IELTS, TOEFL

**Deadline:** Fall: December 1

**Description:** The Doctor of Nursing Practice (DNP) degree program prepares nurses to be leaders in clinical practice. Students practice at the most advanced level of nursing, working in various health care settings under the guidance of experienced faculty mentors and community experts. An integral part of the program is the completion of the DNP Project, which provides students with the knowledge and skills to utilize research and leadership in practice and to participate in research relevant to their practice. DNP graduates are prepared to:

- Translate evidence-based research into practice
- Lead interdisciplinary care teams
- Measure health-related outcomes
- Improve the health of individual patients, groups, populations, and communities.

#### Contact Information

Tami Kelley, Academic Coordinator

Nursing

PO Box 1495

Spokane, WA 99210-1495

Telephone: 509-324-7334

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Anne Mason, Director, DNP Program

WSU College of Nursing

[anne.mason@wsu.edu](mailto:anne.mason@wsu.edu)

#### Nursing, DNP, Psychiatric/Mental Health Nurse Practitioner

College of Nursing

**Website:** <https://nursing.wsu.edu/academics/dnp-psychiatric-mental-health-nurse-practitioner/>

Number of credits: 72; 74 (as of fall 2015)

Avg time to complete degree: 3 years

**Location(s):** Spokane, Vancouver, Tri-Cities

Tests required: IELTS, TOEFL

**Deadline:** Fall: December 1

**Description:** The DNP-PMHNP is offered at Spokane and Vancouver. The Psychiatric Mental Health Nurse Practitioner (PMHNP) program prepares students to provide psychiatric and mental health services to individuals of all ages and to groups and populations. A strong background in assessment, pharmacology, diagnostic, and treatment modalities is provided. Students have clinical experiences with psychiatric mental health practitioners in the community and are supervised by faculty who maintain active practices themselves.

#### Contact Information

Tami Kelley, Academic Coordinator

Nursing

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Anne Mason, Director, DNP Program

WSU College of Nursing

[anne.mason@wsu.edu](mailto:anne.mason@wsu.edu)

#### Nursing, PhD

Option: Dissertation

College of Nursing

**Website:** <https://nursing.wsu.edu/academics/phd/>

Number of graded credits: 52: 34 core/18 electives

**Required research credits:** 20 dissertation credits (800)

Other requirements: Pass preliminary exam

Avg time to complete degree: 3 years

Location(s): Spokane

Tests required: TOEFL, TOEFLI

Deadline: Oct 15

**Description:** The Doctor of Philosophy in Nursing (PhD) prepares you to advance the discipline of nursing science through a research-focused program emphasizing innovative approaches and leveraged resources to improve health care for all. Graduates of the program are equipped to become leaders in nursing education and research, critical roles in today's health care environment.

### Contact Information

Eileen Swalling, Program Coordinator  
Nursing  
PO Box 1495 #422A  
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Cindy Fitzgerald, Director, DNP Program  
[cefitzgerald@wsu.edu](mailto:cefitzgerald@wsu.edu)

Roxanne Vandermause, Director, PhD Program  
WSU College of Nursing  
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Mel Haberman, Director, MN and Certificate Programs  
[mel.haberman@wsu.edu](mailto:mel.haberman@wsu.edu)

## College of Pharmacy

### Pharmaceutical Sciences, PharmD

Please contact the College of Pharmacy about this professional degree.  
[pharmacy.wsu.edu/prospectivestudents/index.html](http://pharmacy.wsu.edu/prospectivestudents/index.html).

### Pharmaceutical Sciences, PhD

College of Pharmacy  
Website:  
[http://www.pharmacy.wsu.edu/prospectivestudents/graduateprogram\\_phd-pharmsci.html](http://www.pharmacy.wsu.edu/prospectivestudents/graduateprogram_phd-pharmsci.html)  
Number of graded credits: 15  
Number of S/F credits: 37  
Required research credits 20  
**Other requirements:** 72 hours minimum total credits: 15 hours minimum from graded (No P/F) graduate-level (500-level) courses (6 units of required core courses listed below and 9 graded units of electives). Required Core Courses: PharmSci 577 Introduction to Research-3 units graded, PharmSci 578, Biomedical Statistics-3 units graded, PharmSci 597 Graduate Seminar-1 unit S/F every semester, PharmSci 600, Research Rotation, 6 units S/F per semester, up to 3 rotations. 20 hours minimum 800-level research credits, 9 hours maximum of non-graduate courses; dissertation. Students entering the program should have completed undergraduate work that includes biology, chemistry (including organic chemistry and biochemistry), mathematics (through calculus), and organ/mammalian physiology course. Students working toward the Ph.D. in Pharmaceutical Science are expected to develop an area of research emphasis that is consistent with the capabilities and interests of the faculty.  
Avg time to complete degree: 4-6 years  
Location(s): Spokane

**Tests required:** GRE (Combined), TOEFL, IELTS, TOEFLI

Deadline: Jan 9

**Description:** The mission of the Graduate Program in the Pharmaceutical Sciences is to prepare graduates for careers in academia, industry, and other public and private institutions dedicated to the promotion of human health. Faculty in the program utilize multi-disciplinary and translational research approaches to (1) understand mechanisms of disease, (2) identify novel therapeutic targets, (3) develop and optimize pharmaceutical treatment approaches, and (4) promote the prevention and management of chronic diseases. Pharmacogenomics, drug metabolism, pharmacokinetics, gene therapy, molecular therapeutics, medicinal chemistry, and systems pharmacology are emphasized. We strive to prepare students to become independent and creative problem solvers who will develop into leaders in their respective fields.

A PharmD/PhD combined degree option is available to train clinician scientists. Interested students may apply for PhD admission concurrently with their PharmD application, or alternatively during the first two years of their progression through the PharmD program.

### Contact Information

Bennett Carrothers, Graduate Program Coordinator  
College of Pharmacy  
PBS, Room 323  
PO Box 1495  
Spokane, WA 99210-1495  
Telephone: 509-358-7730  
E-mail: [bcarrothers4@wsu.edu](mailto:bcarrothers4@wsu.edu)

## College of Veterinary Medicine

### Molecular Biosciences, PhD

A Ph.D. interdisciplinary degree in Molecular Biosciences with discipline areas in Biochemistry, Genetics and Cell Biology and Microbiology  
School of Molecular Biosciences  
College of Veterinary Medicine  
**Website:** <http://molecular.biosciences.wsu.edu/>  
Number of graded credits: 15  
Required research credits 5-7  
Students admitted to the Ph.D. program will be required to complete the required coursework, two proposals and three departmental seminars in addition to the submission of a final dissertation and dissertation defense.  
**Avg time to complete degree:** 5 years  
Location(s): Pullman  
**Tests required:** TOEFL, TOEFLI, GRE (Quantitative), GRE (Verbal)  
**Deadline:** December 15  
**Description:** The Ph.D. and M.S. degrees in SMB are interdisciplinary degrees in Molecular Biosciences. Trainees for Ph.D. and Master's degrees will choose one of three discipline-specific areas in Biochemistry, Genetics, or Microbiology to ensure that their interdisciplinary training

in molecular, cellular and structural biology builds on a solid discipline-specific foundation.

#### Contact Information

Tami Breske, Academic Coordinator  
School of Molecular Biosciences  
PO Box 647520  
Biotechnology Life Sciences, Room 102C  
Pullman, WA 99164-7520  
Telephone: 509-335-4318  
Fax: 509-335-1907  
E-mail: [smbgrad@wsu.edu](mailto:smbgrad@wsu.edu)

#### Molecular Biosciences, MS

College of Veterinary Medicine

**Website:** <http://molecular.biosciences.wsu.edu/>

Number of graded credits: 21

**Number of S/F credits:** Students admitted to the Master of Sciences in Molecular Biosciences thesis program will be required to complete the required coursework, first proposal and one departmental seminar in addition to the submission of a final thesis and thesis defense.

Required research credits 9

**Avg time to complete degree:** 3 years

**Location(s):** Pullman

**Tests required:** TOEFL, TOEFLI, GRE (Quantitative), GRE (Verbal)

**Deadline:** December 15

**Description:** Faculty in the School of Molecular Biosciences (SMB) explore the cellular, molecular, and structural basis of processes essential for the proper function of bacteria, archaea, and eukaryote. The Ph.D. and M.S. degrees in SMB are interdisciplinary degrees in Molecular Biosciences. Trainees for Ph.D. and Master's degrees will choose one of three discipline-specific areas in Biochemistry, Genetics, or Microbiology to ensure that their interdisciplinary training in molecular, cellular and structural biology builds on a solid discipline-specific foundation. SMB also offers a Graduate Certificate in Molecular Biosciences. This certificate is geared for working professionals who seek additional training, or educators requiring continued education for accreditation.

#### Contact Information

Tami Breske, Academic Coordinator  
School of Molecular Biosciences  
PO Box 647520  
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Pullman, WA 99164-7520  
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Fax: 509-335-1907  
E-mail: [smbgrad@wsu.edu](mailto:smbgrad@wsu.edu)

#### Molecular Biosciences, PSM

**Website:**

<http://molecular.biosciences.wsu.edu/graduates/psm.htm>

**Location(s):** Pullman, Global Campus

**Tests required:** TOEFL, TOEFLI

**Deadline:** Fall: June 15, Spring: November 1, Summer: March 1

**Description:** The Professional Science Master's in Molecular Biosciences (PSM-MB) is designed to help students transition into the workplace by training them in skills that employers need. This master's degree (PSM-MB) combines science with training in ethics and business, bridging the gap between academia and the workplace. An important career-oriented aspect of the program is that it requires an internship with practical training, rather than a thesis.

Tamera Breske

Academic Coordinator, MBioS – PSM Program  
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#### Neuroscience, PhD

Department of Neuroscience

College of Veterinary Medicine

**Website:** [ipn.vetmed.wsu.edu/neuroscience](http://ipn.vetmed.wsu.edu/neuroscience)

Number of graded credits: 21 credits

Number of S/F credits: 5-9 credits

Required research credits variable

Location(s): Pullman

**Tests required:** GRE (Combined), TOEFL, TOEFLI

**Deadline:** Fall: December 15

**Description:** Neuroscience, the study of the brain and central nervous system, is a multidisciplinary program leading to the Master of Science and Doctor of Philosophy degree. The neuroscience field plays an important role in both human and animal biomedical science. Innovations by Washington State University neuroscientists advance the world's understanding of how nerves and brain chemicals produce our feelings and behaviors and how poor health results from disturbances in the delicate organization of the brain. Neuroscience seeks to answer questions that touch on nearly every aspect of human life, including feeling, eating, sleeping, remembering, sensing, and maintaining health.

#### Contact Information

Becky Morton, Manager  
Integrative Physiology and Neuroscience, Program in Neuroscience  
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#### Neuroscience, MS

Department of Neuroscience

College of Veterinary Medicine

**Website:** [ipn.vetmed.wsu.edu/ipn-home](http://ipn.vetmed.wsu.edu/ipn-home)

**Number of graded credits:** 22 credits

**Number of S/F credits:** 4 credits



**Required research credits** variable  
**Avg time to complete degree:** 2 years  
**Location(s):** Pullman

**Tests required:** GRE (Combined), TOEFL, TOEFLI

**Deadline:** Fall: December 15

**Description:** Neuroscience, the study of the brain and central nervous system, is a multidisciplinary program leading to the Master of Science and Doctor of Philosophy degree. The neuroscience field plays an important role in both human and animal biomedical science. Innovations by Washington State University neuroscientists advance the world's understanding of how nerves and brain chemicals produce our feelings and behaviors and how poor health results from disturbances in the delicate organization of the brain. Neuroscience seeks to answer questions that touch on nearly every aspect of human life, including feeling, eating, sleeping, remembering, sensing, and maintaining health.

#### **Contact Information**

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#### **Veterinary Science, DVM**

Contact the College of Veterinary Medicine about this professional degree program. [Dvm.vetmed.wsu.edu](http://Dvm.vetmed.wsu.edu).

#### **Veterinary Science, MS**

##### **Veterinary Clinical Training Program**

**Options: Thesis or Non-Thesis**  
Department of Veterinary Clinical Services  
College of Veterinary Medicine

**Website:** <http://www.vetmed.wsu.edu>

**Number of graded credits:** 21 thesis; 26 non-thesis

**Required research credits:** 4

**Other requirements:** In addition to course requirements, each student will be required to submit a minimum of one manuscript for publication to a peer-reviewed veterinary medical, human medical or basic science journal. This manuscript should be representative of some aspect of the specialty emphasis of that program. Courses: VET\_CLIN 582 for every enrolled semester. VET\_CLIN 576, STAT 412 or equivalent.

**Avg time to complete degree:** 2-3 years

**Location(s):** Pullman

**Tests required:** TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** The objectives of the program are to promote highstandards of scholarly creativity, proficiency in a clinical discipline and professional service, experience in teaching, and independent and critical research. Areas of service and research may include: internal medicine, cardiology, ophthalmology, anesthesiology, neurology, surgery, radiology, clinical pathology, theriogenology, equine exercise physiology, exotic animal medicine,

pharmacogenetics, epidemiology, mastitis, and production medicine.

#### **Contact Information**

Kathy Dahmen, CFO  
Veterinary Clinical Sciences  
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E-mail: [dahmen@vetmed.wsu.edu](mailto:dahmen@vetmed.wsu.edu)

#### **Veterinary Science, MS**

##### **Combined Anatomic Pathology Residency**

Department of Veterinary Microbiology and Pathology,  
College of Veterinary Medicine

**Website:** <http://vmp.vetmed.wsu.edu/graduate-programs/combined-programs-phd/pathology>

**Number of graded credits:** 21

**Transfer credit limit:** 5

**Additional Requirements:** Residency in the Washington Animal Disease Diagnostic Laboratory

**Location(s):** Pullman

**Tests required:** IELTS, TOEFL, TOEFLI

**Deadline:** Fall: Rolling Deadline; Spring: Rolling Deadline

**Description:** The program's research and training programs are focused in the immunology, epidemiology and host-pathogen interactions at the molecular level of bacterial, parasitic, and viral infections of animals and humans. The residency training occurs within the Washington Animal Disease Diagnostic Laboratory (WADDL), a full service veterinary diagnostic laboratory staffed by faculty of the Departments of Veterinary Microbiology and Pathology and Veterinary Clinical Sciences. WADDL has 3 primary facilities, a primary full service laboratory in Pullman, an Aquatic Health laboratory in Pullman and an Avian Health and Food Safety Laboratory branch in Puyallup. The faculty includes 12 ACVP- and ACLAM- certified pathologists with training focused on close interaction among faculty and trainees. The high level surgical biopsy and necropsy caseloads provide direct experiential learning and are supported by specialized pathology seminars.

#### **Contact Information**

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Veterinary Microbiology and Pathology  
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E-mail: [szumwalt@vetmed.wsu.edu](mailto:szumwalt@vetmed.wsu.edu)

#### **Veterinary Science, MS**

##### **Combined Clinical Microbiology Residency**

Department of Veterinary Microbiology and Pathology,  
College of Veterinary Medicine

**Website:** <http://vmp.vetmed.wsu.edu/graduate-programs/combined-programs-phd/microbiology>

**Number of graded credits:** 21

**Transfer Credit Limit:** 5

**Additional Requirements:** Residency in the Washington Animal Disease Diagnostic Laboratory  
Location(s): Pullman  
Tests required: IELTS, TOEFL, TOEFLI

**Deadline:** Fall: Rolling Deadline; Spring: Rolling Deadline  
**Description:** Training occurs under the direction of ACVM-certified microbiologists and is enriched by faculty with expertise in infectious diseases, including zoonotic agents and emerging pathogens. Trainees are expected to conduct original research leading to a significant contribution to knowledge in the trainee's area of emphasis and culminating in publication in leading international scientific journals. This publication is required for and constitutes the MS thesis. The final MS examination is preceded by a public presentation of the research, attended by the faculty, graduate students, and post-doctoral fellows, followed by an oral examination.

#### Contact Information

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### Veterinary Science, PhD Combined Anatomic Pathology Residency

Department of Veterinary Microbiology and Pathology  
College of Veterinary Medicine

**Website:** <http://vmp.vetmed.wsu.edu/graduate-programs/combined-programs-phd/pathology>

Number of graded credits: 16

Transfer credit limit: 5

Location(s): Pullman

**Tests required:** IELTS, TOEFL, TOEFLI

**Deadline:** Fall: Rolling Deadline; Spring: Rolling Deadline

**Description:** The program's research and training programs are focused in the immunology, epidemiology and host pathogen interactions at the molecular level of bacterial, parasitic, and viral infections of animals and humans. Training is tailored to the student's background and career goals. Core knowledge is advanced through research seminars and direct readings with graduate faculty. The goal of participation in the seminars is exposure to critical analysis of data, experimental design and discussion of research significance. Trainees are expected to conduct original research leading to a significant contribution to knowledge in the student's area of emphasis and culminating in publication in leading international scientific journals. The publications are required for and constitutes the PhD dissertation. The final PhD exam is preceded by a public presentation of the research followed by an oral exam.

#### Contact Information

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### Veterinary Science, PhD Combined Clinical Microbiology Residency

Department of Veterinary Microbiology and Pathology  
College of Veterinary Medicine

**Website:** <http://vmp.vetmed.wsu.edu/graduate-programs/combined-programs-phd/microbiology>

Number of graded credits: 16

Transfer credit limit: 5

Location(s): Pullman

**Tests required:** IELTS, TOEFL, TOEFLI

**Deadline:** Fall: Rolling Deadline; Spring: Rolling Deadline

**Description:** The program's research and training programs are focused in the immunology, epidemiology and host-pathogen interactions at the molecular level of bacterial, parasitic, and viral infections of animals and humans. Mentored laboratory research is the most critical part of the training and the strength of our program. Together the major professor and graduate student trainee develop a directed course of research. Throughout the training period, all graduate students attend weekly research seminars where faculty and trainees present recent results. Trainees are expected to conduct original research leading to a significant contribution to knowledge in the trainee's area of emphasis and culminating in publication in leading international scientific journals. This publication is required for and constitutes the PhD dissertation. The final PhD examination is preceded by a public presentation of the research, attended by the faculty, graduate students, and post-doctoral fellows, followed by an oral examination.

#### Contact Information

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E-mail: [szumwalt@vetmed.wsu.edu](mailto:szumwalt@vetmed.wsu.edu)

### Veterinary Science, MS Immunology and Infectious Diseases

Department of Veterinary Microbiology and Pathology  
College of Veterinary Medicine

**Website:** <http://vmp.vetmed.wsu.edu/graduate-programs/master-phd>

Number of graded credits: 21

Transfer credit limit: 5

Additional Requirements: The final MS oral exam is preceded by a public presentation of research.

**Location(s):** Pullman

**Tests required:** IELTS, TOEFL, TOEFLI

**Deadline:** Fall: Rolling deadline; Spring: Rolling deadline

**Description:** :

We offer outstanding education in the immunology, epidemiology and host-pathogen interactions of bacterial,

parasitic, and viral infections of animals and humans  
Training is tailored to the individual's background and career goals, with the proviso that a strong basic sciences foundation is indispensable in preparation for disease research. Core knowledge is advanced through regularly scheduled research seminars, special research seminar series, and through directed readings with the Graduate faculty. Mentored laboratory research is the most critical part of the training and the strength of our program. Together the major professor and graduate student trainee develop a directed course of research. Trainees are expected to conduct original research leading to a significant contribution to knowledge in the trainee's area of emphasis and culminating in publication in leading international scientific journals. This publication is required for and constitutes the MS thesis. The final MS examination is preceded by a public presentation of the research, attended by the faculty, graduate students, and post-doctoral fellows, followed by an oral examination.

**Contact Information:**

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E-mail: [szumwalt@vetmed.wsu.edu](mailto:szumwalt@vetmed.wsu.edu)

**Veterinary Science, PhD  
Immunology and Infectious Diseases**

Department of Veterinary Microbiology and Pathology  
College of Veterinary Medicine

**Website:** <http://vmp.vetmed.wsu.edu/graduate-programs/master-phd>

Number of graded credits: 16

Transfer credit limit: 5

Location(s): Pullman

Tests required: IELTS, TOEFL, TOEFLI

**Deadline:** Fall: Rolling Deadline; Spring: Rolling Deadline

**Description:** We offer outstanding doctoral education in the immunology, epidemiology and host-pathogen interactions of bacterial, parasitic, and viral infections of animals and humans. Together the major professor and graduate student trainee develop a directed course of research. Throughout the training period, all graduate students attend weekly research seminars where faculty and trainees present recent results. The goal of trainee participation in these seminars is exposure to critical analysis of data, experimental design and discussion of research significance. Trainees are expected to conduct original research leading to a significant contribution to knowledge in the trainee's area of emphasis and culminating in publication in leading international scientific journals. This publication is required for and constitutes the MS thesis. The final MS examination is preceded by a public presentation of the research, attended by the faculty, graduate students, and post-doctoral fellows, followed by an oral examination.

**Contact Information**

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**Veterinary Science, MS  
Integrative Physiology and Neuroscience**

**Website:** [ipn.vetmed.wsu.edu/ipn-home](http://ipn.vetmed.wsu.edu/ipn-home)

Number of graded credits: 21 credits

Number of S/F credits: 4 credits

Required research credits: variable

Additional Requirements:

Avg time to complete degree: 2 years

Location(s): Pullman

**Tests required:** GRE (Combined), TOEFL; TOEFLI

**Deadline:** Fall: December 15

**Description:** The master's program in Veterinary Sciences: Integrative Physiology and Neuroscience (IPN) is a very flexible program ideally suited for those students interested in pursuing master's level graduate work with a faculty member in IPN but not interested in the Neuroscience program. This often includes (but is not limited to) faculty in the muscle/biomechanical group in the department. Because of the wide range of potential thesis topics, the selection of appropriate class work for an individual student's program is left to the discretion of the student and their mentor. Classes typically include some background courses as well as graduate seminars, professional development opportunities, and a course in proposal writing and presentation. The primary difference between the MS and PhD programs is that the depth of the thesis project for a MS degree is significantly less than that for the PhD degree. Because of the short time to completion, students pursuing a MS degree do not participate in rotations and must have an identified mentor before they enter into the program.

**Contact Information**

Becky Morton, Manager  
Integrative Physiology and Neuroscience  
Washington State University  
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**Veterinary Science, PhD  
Integrative Physiology and Neuroscience**

Department of Veterinary Microbiology and Pathology  
College of Veterinary Medicine

**Website:** [ipn.vetmed.wsu.edu/ipn-home](http://ipn.vetmed.wsu.edu/ipn-home)

**Number of graded credits:** 21 credits

**Number of S/F credits:** 5-9 credits

**Required research credits:** variable

**Other requirements:** Students wishing to pursue graduate studies in Neuroscience need to have a strong math and

science background. Applicants need to submit an application on the Graduate School website. Applicants also need to submit: college transcripts (unofficial acceptable for initial review--upon admittance official are required), three (3) letters of reference, a resume or curriculum vita, a personal statement describing why you are interested in studying in the Veterinary Science program, a writing sample, and official Graduate Record Exam (GRE) scores (WSU code 4705). Include the % below as well as the raw score. Application review begins 12/15 each year. Only complete applications with all accompanying documents will be considered and reviewed for admission.

Avg time to complete degree: 5 years

Location(s): Pullman

Tests required: GRE (Combined), TOEFL, TOEFLI

**Deadline:** Fall: December 15

**Description:** The Department of Integrative Physiology and Neuroscience offers a course of study leading to the degrees of Master of Science and Doctor of Philosophy in Veterinary Science. These degrees are designed to provide broad training in specific aspects of veterinary science and related disciplines to prepare students for careers in teaching, research, and service. The curriculum is research intensive emphasizing the acquisition of theoretical understanding of a field and or research skills in preparation for a career in teaching and research. The veterinary science degree allows for maximum flexibility within the curriculum. Students will design their degree plan in consultation with a faculty mentor, emphasizing the specialty fields of anatomy, pharmacology or physiology. It is required that a student contact and arrange for a faculty mentor prior to admission to the program. The objectives for the Ph.D. level training are to prepare the candidate for a career as an independent investigator (i.e., can compete for extramural private and federal funds as the principal investigator).

#### Contact Information

Becky Morton, Manager

Integrative Physiology and Neuroscience

Washington State University

Pullman, WA 99164-7620

Telephone: 509-335-6624

Fax: 509-335-4650

E-mail: [bmorton@wsu.edu](mailto:bmorton@wsu.edu)

### Veterinary Science, PhD Veterinary Clinical Training Program

Department of Veterinary Clinical Sciences

College of Veterinary Medicine

**Website:** [vetmed.wsu.edu/](http://vetmed.wsu.edu/)

Number of graded credits: 15

Required research credits: 20

**Other requirements:** VMS 576 (Introduction to Veterinary Clinical Research-2 hours); VMS 582 (Seminar in Clinical Medicine-1 hour); VPH 505 (Design and Analysis of Biomedical Experiments-4 hours) or STAT 412 (Statistical Methods in Research-3 hours) or STAT 512 (Analysis of Variance of Designed Experiments-3 hours)

Avg time to complete degree: 4-5 years

Location(s): Pullman

Tests required: TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

**Description:** This degree program enables students to develop as successful professionals for highly competitive positions in academia, industry and government and prepare students to be effective researchers (clinical, translational, and basic sciences)

Veterinary Clinical Sciences (VCS) at Washington State University is a plan of study leading to a Ph.D. The objectives of the program are to promote high standards of scholarly creativity, and professional service, enable students to develop as successful professionals for highly competitive positions in academia, industry and government, prepare students to be effective researchers (clinical, translational, and basic sciences). Areas of research include: internal medicine, cardiology, ophthalmology, anesthesiology, neurology, surgery, radiology, clinical pathology, theriogenology, equine exercise physiology, exotic animal medicine, epidemiology, mastitis, food and water borne diseases, zoonotic disease and production medicine.

#### Contact Information

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Veterinary Clinical Sciences

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## Graduate Certificates

### Applied Educational Research Methods Certificate

**Website:**

<https://education.wsu.edu/graduate/edpsych/methods/certificate/>

College of Education

Department of Educational Leadership, Sports Studies, Education/Counseling Psychology

**Contact Information**

Olusola Adesope

Telephone: 509-335-2771

Email: [Olusola.adesope@wsu.edu](mailto:Olusola.adesope@wsu.edu)

Brian French

Telephone: 509-335-8584

[Frenchb@wsu.edu](mailto:Frenchb@wsu.edu)

### Bioethics Certificate

**Website:** [online.wsu.edu/cert/bioethics.aspx](http://online.wsu.edu/cert/bioethics.aspx)

**Description:** As science expands medical boundaries, society faces tough new questions on such topics as assisted suicide, genetic testing, and stem cell research. WSU's online graduate certificate in bioethics program

teaches students how to weigh competing social and individual interests using ethical theories. The certificate enhances employment opportunities in three main areas:

- Health care, including the biotech industry as well as hospitals, nursing homes, and public health organizations.
- Legal work, including law firms, hospital consulting, bioethics centers, medical societies, international organizations, and nongovernmental organizations.
- Academic, including such fields as philosophy, anthropology, biology, history, politics, and sociology.

#### Contact Information

William Kabasenche  
Department of Philosophy  
Brian Hall 316  
Washington State University  
Pullman, WA 99164-5130  
Telephone: 509-335-8719  
[wkabasenche@wsu.edu](mailto:wkabasenche@wsu.edu)

#### C-INSPIRE: Carbon and Nitrogen Systems Policy-Oriented Research and Education

College of Agriculture, Human and Natural Resource Sciences

Website: <https://cereow.su.edu/c-inspire-certificate-program/#Overview>

**Description:** This certificate program builds on the NSPIRE experience and seeks to train new scientists in the skills needed to recognize and navigate interdisciplinary problems such as nitrogen or carbon science and to understand the role it plays in science. Students will develop their science communication skills as they seek to discuss science with policy makers.

#### Contact Information

Stephanie Hampton, Director  
CEREO  
Email: [s.hampton@wsu.edu](mailto:s.hampton@wsu.edu)

#### Constraints Management Certificate

Website: [www.etm.wsu.edu](http://www.etm.wsu.edu)

#### Contact Information

Patti Elshafei, Program Support Supervisor  
Engineering and Technology Management  
Telephone: 509-335-0125  
E-mail: [engrmgt@wsu.edu](mailto:engrmgt@wsu.edu)

#### Construction Project Management Certificate

Website: [www.etm.wsu.edu](http://www.etm.wsu.edu)

#### Contact Information

Patti Elshafei, Program Support Supervisor  
Engineering and Technology Management  
ERTL 336, Spokane Street  
Washington State University  
Pullman, WA 99164-2785  
Telephone: 509-335-0125

Fax: 509-335-7290

E-mail: [pelshafei@wsu.edu](mailto:pelshafei@wsu.edu)

#### Digital Humanities and Culture

Website: <https://english.wsu.edu/graduate-certificates/>

**Description:** The graduate certificate in Digital Humanities and Culture emphasizes historical, rhetorical, and cultural knowledge by building expertise in the critical analysis and creative production of digital media. This understanding prepares students for problem solving and communicating both locally and globally. More than learning a specific technology or computing platform, a graduate certificate in Digital Humanities and Culture directs students to learn how, when, and most importantly why to use technology to solve a range of problems for digital classrooms, scholarly research methodologies, information technology companies, political advocacy groups, social justice projects and beyond. Merging theory and practice, the Digital Humanities and Culture certificate provides a foundation for critical digital literacy.

#### Contact Information

Kristin Arola, Director of Graduate Studies  
English  
Pullman, WA 99164  
Telephone: 509-335-8742  
[arola@wsu.edu](mailto:arola@wsu.edu)

#### Global Justice and Security Studies Certificate

School of Politics, Philosophy and Public Affairs

Website: <https://pppa.wsu.edu/graduate-studies/m-a-in-political-science-certificate-in-global-justice-security-studies/>

#### Contact Information

Dr. Thomas Preston, Professor & Director  
Johnson Tower, Room 801A  
Washington State University  
Pullman, WA 99164  
Telephone: 509-335-5225  
E-mail: [tpreston@wsu.edu](mailto:tpreston@wsu.edu)

Martha Cottam, Professor  
Johnson Tower, Room 813  
Washington State University  
Pullman, WA 99164  
Telephone: 509-335-7997  
E-mail: [cottam@wsu.edu](mailto:cottam@wsu.edu)

#### Global Justice and Security Certificate

Department of Criminal Justice and Criminology

Website: <https://crimj.wsu.edu/graduate-studies/m-a-in-criminal-justice/>

#### Contact Information

Noelle Simmons  
PO BOX 644872  
Pullman, WA 99179  
Telephone: 509-335-8611

Email: [nbeets@wsu.edu](mailto:nbeets@wsu.edu)

### Health-Assistive Smart Environment Design Certificate

Website:

[igert.eecs.wsu.edu/certificate-health-assistive-smart-environment-design](http://igert.eecs.wsu.edu/certificate-health-assistive-smart-environment-design)

**Program Location(s):** Pullman

Credits: 12

#### Contact Information

Diane Cook, Professor

School of Electrical Engineering and Computer Science  
Box 642752

Pullman, WA 99164-2752

Telephone: 509-335-4985

Fax: 509-335-3818

E-mail: [cook@eecs.wsu.edu](mailto:cook@eecs.wsu.edu)

### Manufacturing Leadership Certificate

**Website:** <http://www.engrmgt.wsu.edu/>

**Program Location(s):** Global

**Requirements:**

Students must apply for graduation for the certificate the final semester according to graduate school deadlines.

**Description:** Manufacturing and technical managers in today's manufacturing environments must demonstrate multifaceted leadership combined with a high level of technical expertise in order to compete in a world-class manufacturing arena. The four courses in this certificate provide a unique but essential foundation for understanding and optimizing a manufacturing organization. While many courses in manufacturing focus on the mechanical operations and processes, this certificate focuses on maximizing the performance of the entire system. Achieving the highest levels of performance starts with design of products and systems, integrating the contributions of a complex network of suppliers, and coordinating production according to key constraints throughout the supply chain. Finally, the most effective route to achieving continuous improvement in this environment is the integrated application of Lean, Six Sigma, and Theory of Constraints.

#### Contact Information

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Pullman, WA 99164-2785

Telephone: 509-335-0125

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E-mail: [pelshafei@wsu.edu](mailto:pelshafei@wsu.edu)

Dr. Hal Rumsey, Faculty

Engineering and Technology Management

Telephone: 509-358-7936

E-mail: [rumsey@wsu.edu](mailto:rumsey@wsu.edu)

### Molecular Biosciences Certificate

**Website:** <http://www.smb.wsu.edu/academic-training/undergraduate-studies/molecular-biosciences-certificate>

**Program Location(s):** Global, Pullman

**Tests required:** TOEFL, TOEFLI

**Description:** SMB offers a Graduate Certificate in Molecular Biosciences. This certificate is geared for working professionals who seek additional training or educators requiring continued education for accreditation.

#### Contact Information

Dr. Norah McCabe, Clinical Associate Professor

School of Molecular Biosciences

PO Box 647520

Pullman, WA 99164-7520

Telephone: 509-335-1134

Fax: 509-335-1907

E-mail: [nrmccabe@wsu.edu](mailto:nrmccabe@wsu.edu)

Tamera Breske

Academic Coordinator, Graduate Program

School of Molecular Biosciences

PO Box 7520

Pullman, WA 99164-7520

Telephone: 509-335-4138

Fax: 509-335-1907

E-mail: [tbreske@vetmed.wsu.edu](mailto:tbreske@vetmed.wsu.edu)

### Nuclear Materials Certificate

**Website:** <https://materials.wsu.edu/materials-science-and-engineering-program/nuclear-materials-certificate/>

**Requirements:** Current students in any WSU graduate degree program are eligible to earn the certificate if they meet the prerequisites of the courses needed for the certificate. Undergraduate students and international students who intend to enroll solely in certificate courses are not eligible to apply.

**Deadlines:** The application should be submitted at least one semester before graduation.

**Description:** This certificate program will benefit students who wish to pursue employment opportunities in the nuclear industry. The program provides formal academic coursework to engineers whose formal training is in a non-nuclear discipline.

#### Contact Information

Nathalie Wall, Professor

Department of Chemistry

Washington State University

Pullman, WA

Telephone: 509-335-8917

[nawall@wsu.edu](mailto:nawall@wsu.edu)

### Nurse Educator Certificate

**Website:** [nursing.wsu.edu](http://nursing.wsu.edu)

**Program Location(s):** Spokane, Tri-Cities, Vancouver

**Avg time to complete:** 1.5 years

**Credits:** 15

**Tests required:** TOEFL, TOEFLI

**Description:**

Washington State University College of Nursing offers Post-Master's Certificates in the specialty areas of Nursing Education and Nursing Leadership. Each certificate program has specific admission criteria and required course work. Interested applicants must apply through the WSU Graduate School.

**Contact Information**

Dawn Doutrich, Associate Professor  
WSU Vancouver Nursing  
Vancouver, WA 98686  
Telephone: 360-546-9464  
E-mail: [doutrich@vancouver.wsu.edu](mailto:doutrich@vancouver.wsu.edu)

Mel Haberman, Director, MN and Certificate Programs  
E-mail: [mel.haberman@wsu.edu](mailto:mel.haberman@wsu.edu)

**Nursing Leadership Certificate**

**Website:** [nursing.wsu.edu](http://nursing.wsu.edu)

**Program Location(s):** Spokane, Tri-Cities, Vancouver

**Avg time to complete:** 1.5 years

**Credits:** 15

**Tests required:** TOEFL, TOEFLI

**Contact Information**

Dawn Doutrich, Associate Professor  
WSU College of Nursing Vancouver  
Vancouver, WA 98686  
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E-mail: [doutrich@vancouver.wsu.edu](mailto:doutrich@vancouver.wsu.edu)

Mel Haberman  
Director, MN and Certificate Programs  
E-mail: [mel.haberman@wsu.edu](mailto:mel.haberman@wsu.edu)

**Nursing, Post MN Certificate Program  
Nursing Education**

College of Nursing

**Website:** [nursing.wsu.edu](http://nursing.wsu.edu)

Number of graded credits: 11

Other requirements: Masters in Nursing

Avg time to complete degree: 3 semesters taking 1-2 classes each semester

**Location(s):** Spokane, Tri-Cities, Vancouver

**Deadline:** Fall: Jan 10 preferential; Spring: July 1 preferential; admissions accepted until closed.

**Description:** The Post Master's Certificate Program in Nursing Education is comprised of three theory courses in nursing education and 2 credits of precepted/mentored nursing education practice. Students may enter the post-master's certificate program after completing a master's degree in nursing at WSU or another accredited institution.

**Contact Information**

Tami Kelley  
WSU Nursing  
Spokane, WA 99210-1495  
Telephone: 509-324-7334

Fax: 509-324-7336  
E-mail: [kelleyt@wsu.edu](mailto:kelleyt@wsu.edu)

**Project Management Certificate**

**Program Location(s):** Global

**Website:** [www.etm.wsu.edu](http://www.etm.wsu.edu)

**Deadline:** Fall: July (Jan 10 international)

Spring: November (July 1 international)

Summer: April (Default international)

**Description:** It is necessary for project managers to update their skills in modern project management techniques to effectively contribute to the continuing growth of the industry. The increasing complexity of project management requires the one in charge to understand the many facets to become/remain proficient in the field. The PM certificate provides the recipients the skills to manage any type of project. It is a fact that all technology managers will have to also manage projects, and it is necessary that these projects be managed professionally. Many professionals have reported that this certificate has allowed them to advance in their careers as a project manager and as a technology manager.

**Contact Information**

Patti Elshafei, Program Support Supervisor  
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ETRL 336, Spokane Street  
Pullman, WA 99164-2785  
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Luna Magpili, Faculty  
Engineering & Technology Mngmnt  
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**Protein Biotechnology Certificate**

**Program Location(s):** Pullman

**Website:** <http://www.nihbiotech.wsu.edu/biotech-training-home>

**Requirements:** Participation in the NIH Biotechnology Training Program at WSU including research rotations, an external industrial internship, three required courses and one elective, and involvement in the Program activities such as the monthly forum meetings and annual symposium during a PhD program in Chemistry, Chemical Engineering, Global Animal Health, Molecular Biosciences, Molecular Plant Sciences, or Veterinary Microbiology and Pathology.

**Deadlines:** Applications to join the Biotech Program are reviewed each March. Applicants must be accepted or enrolled in a PhD program at WSU before the deadline.

**Description:**

The Graduate Certificate in Protein Biotechnology was developed as part of the NIH Biotechnology Training Program at WSU. Students seeking the certificate need to participate in the Training Program as described above in the requirements and be enrolled in a PhD degree program in one of our participating units also listed above.

**Contact Information**

Susan Bentjen, Administrative Manager  
NIH Biotechnology Training Program  
Washington State University  
Pullman, WA 99164  
Telephone: 509-335-6881  
E-mail: [bentjen@wsu.edu](mailto:bentjen@wsu.edu)

### Six Sigma Quality Management Certificate

**Website:** <http://www.etm.wsu.edu>

**Program Location(s):** Global

**Deadline:** Fall: July 15 (Jan 10 international)

Spring: December 15 (July 1 international)

Summer: April 1 (Default international)

**Requirements**

Student must apply for the certificate and pay the required fee the first half of the final semester.

**Description:** A concentration of quality improvement courses can be taken as a part of the Quality Management Certificate. The certificate provides training in Six Sigma principles relevant to strategic and operational decisions using state-of-the-art knowledge, tools, and skills in improving quality. This certificate is for engineers and non-engineering professionals in technology management holding a bachelor's degree in engineering, technical, or management areas.

#### Contact Information

Patricia Elshafei, Program Support Supervisor I  
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Pullman, WA 99164-2785  
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Hal Rumsey, SIRTI  
Spokane, WA 99210-1494  
Telephone: 509-358-7936  
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### Supply Chain Management Certificate

**Website:** [etm.wsu.edu](http://etm.wsu.edu)

**Program Location(s):** Global

**Deadline:** Fall: July (Jan 10 international) Spring:

November (July 1 international)

**Requirements**

Student will apply to receive the certificate and pay the fee in first half of the final semester.

**Description:** Every organization has internal supply chains, and links to external suppliers and customers. Interlinking organizations span the spectrum from raw materials to finished products and services in the hands of the consumer. The supply chain extends even to final disposition of the commodities we consume from concept to grave. The structured dependency of such chains and the uncertainty of forecasts and systemic delays are amplified as individual links in the supply chain to try to optimize their performance. Even minor changes in the market can cause wild swings in economic performance. Modern design for manufacturability, six sigma quality, operation theories, information systems such as ERP systems, and

theory of constraints hold the promise of stabilizing some of the variability by providing visibility along the whole supply chain. Additional control and operational performance factors are needed to provide a complete solution. This course examines the strategy and tactics of supply chain management to include "how to" techniques to implement, measure and reward the individual links in the supply chain.

#### Contact Information

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509-335-0125  
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Dr. Bill Gray, Faculty  
E-mail: [drwjgray@msn.com](mailto:drwjgray@msn.com)

### Sustainable Agriculture Certificate

**Website:** [css.wsu.edu/graduate-studies/graduate-certificate-in-sustainable-agriculture/](http://css.wsu.edu/graduate-studies/graduate-certificate-in-sustainable-agriculture/)

**Program Location(s):** Pullman

Tests required: TOEFL, TOEFLI

**Deadline:** Fall: Jan 10; Spring: July 1

#### Contact Information

Deb Marsh, Sr Academic Coordinator  
Johnson Hall Graduate Center  
Pullman, WA  
Telephone: 509-335-2615  
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Dr. Lynne Carpenter-Boggs, Associate Professor  
Dept. of Crop and Soil Science  
Johnson 227  
Pullman, WA 99164-6420  
Telephone: 509-335-1553  
E-mail: [lcboggs@wsu.edu](mailto:lcboggs@wsu.edu)

### Systems Engineering Management Certificate

**Program Location(s):** Global

**Deadline:** Fall: July 15 (Jan 10 international)

Spring: November 15 (July 1 international)

Summer: April 1 (Default international)

#### Contact Information

Patti Elshafei, Program Support Supervisor I  
509-335-0125  
Fax: 509-335-7290  
E-mail: [pelshafei@wsu.edu](mailto:pelshafei@wsu.edu)

Dr. Bill Gray, Faculty  
ETM  
E-mail: [drwjgray@msn.com](mailto:drwjgray@msn.com)

### Teaching English as a Second Language Certificate

**Website:** <https://english.wsu.edu/graduate-certificates/>



**Requirements:** Bachelor's degree from accredited post-secondary institution

**Description:** The curriculum totals 15 credits. Three core courses provide a grounding in language form, second language acquisition, and teaching methodologies. An additional three credit elective allows students to focus on one of these areas in greater depth. **Students seeking to earn this certificate must be simultaneously enrolled in a graduate degree-granting program at Washington State University.** A total of nine-credit hours are required for the DHC graduate certificate: English/DTC 560 (three-credit hours) and DTC/English 561 (three-credit hours) are mandatory and the final three-credit hours are chosen by the students from a list of electives depending on their focus. The required two core courses bring together theory, practice, methods, and ethics.

#### **Contact Information**

Nancy Bell  
nbell@wsu.edu

#### **Global (Online) Master's Degrees**

Website: <http://online.wsu.edu/grad/Default.aspx>

Agriculture, MS  
Agriculture – Food Science and Management, MS  
Electric Power Engineering, PSM  
Engineering & Technology Management, METM  
Executive MBA  
Molecular Biosciences, PSM  
Software Engineering, MS  
Special Education, EdM  
Strategic Communication, MA

## Course List

### Explanation of SYMBOLS

- 2 Figure following course title indicates the hours of credit and the number of lectures per week.  
 ( ) Hours of lecture and laboratory required each week during the semester, with lecture being the first figure and laboratory the second.  
 (a/y) Indicates alternate years.  
 c// Indicates concurrent enrollment.

Courses listed in this catalog are subject to change through normal academic channels. New courses and changes are initiated by the cognizant departments or programs, approved through the appropriate academic dean, the Catalog Subcommittee, the Academic Affairs or Graduate Studies Committees, and the University Senate. Additions to the curriculum for the ensuing year are published each fall in the Catalog Supplement within the Fall Time Schedule. It is the obligation of the student to be acquainted with all the pertinent information in this Catalog and the Graduate School Policies and Procedures Manual to see that all departmental requirements are satisfied.

#### Animal Sciences

A S

#### **500 Seminar in Animal Sciences 1**

May be repeated for credit. Current developments in animal sciences.

#### **501 Milk, Meat, and Methane:**

#### **Contemporary Animal Production Issues**

3 Provides knowledge and understanding of livestock issues that affect contemporary livestock production.

**504 Special Topics V 1-4** May be repeated for credit; cumulative maximum 12 hours.

#### **507 Advanced Nutrient Metabolism**

3 Advanced topics in metabolic regulation of carbohydrate, fat and amino acid use by animals.

#### **510 Digestion and Nutrient**

#### **Utilization in Animals 3 (2-3)**

Gastrointestinal physiology, rate of passage, feed intake regulation, measures of digestibility, starch, fat and nonstarch polysaccharide, and digestion and utilization of nutrients.

#### **513 Mineral and Vitamin**

**Metabolism 4** Absorption, excretion, metabolism, dietary requirements and interactions of minerals and vitamins in animals and humans.

#### **520 Preparation of Scientific**

#### **Literature in Animal Sciences 2**

Preparation of grant proposals, manuscripts, and literature reviews on research topics.

#### **528 Topics in Animal Breeding 2**

May be repeated for credit; cumulative maximum 4 hours. Systems of selection and mating for genetic improvement in farm animals.

#### **551 Endocrine Physiology 3**

Anatomy, physiology, and biochemistry of endocrine systems and hormone action; emphasis on comparative, veterinary, and biomedical models. Credit not granted for both ANIM SCI 451 and ANIM SCI 551.

#### **558 Molecular and Cellular**

**Reproduction 3 (2-2)** State of the art

concepts of the molecular, cellular, and physiological aspects of mammalian reproduction. (Crosslisted course offered as MBIOS 528, ANIM SCI 558).

#### **581 Stem Cell Biology, Therapeutics**

#### **and Regenerative Medicine 3**

Provides information on the latest cutting edge research in the areas of stem cell biology and tissue regeneration; covers stem cell therapeutics, gene transfer vectors and methods for isolating, characterizing, and generating stem cells. (Course offered as PHARMSCI 581, ANIM SCI 581).

#### **582 Seminar in Reproductive**

#### **Biology 1**

Current developments in reproductive biology.

#### **588 Perspectives in Biotechnology 3**

Theory and application of biotechnology in agriculture, industry, and medicine; methodological, environmental, social, and economic concerns. Credit not granted for both ANIM SCI 488 and ANIM SCI 588.

#### **598 Advanced Topics in Animal**

**Sciences V 1-2** May be repeated for credit.

Recent research in various disciplines of animal sciences.

#### **700 Master's Research, Thesis,**

**and/or Examination V 1-18** May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

#### **800 Doctoral Research, Dissertation,**

**and/or Examination V 1-18** May be repeated for credit. Course Prerequisite: Admitted to the Animal Sciences PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

#### Accounting

ACCTG

#### **530 Accounting Theory 3**

Course Prerequisite: Admission to the Master of Accounting program. Recent developments with respect to the determination of income and the valuation of assets.

#### **532 Contemporary Accounting**

**Cases and Problems 3** Course Prerequisite:

Admission to the Master of Accounting program. Accounting theory applied to external financial reporting practices.

#### **533 Accounting, Performance**

**Measurement and Controls 3** Course

Prerequisite: Admission to the MBA program. Managerial evaluation of budgeting, cost accounting, and financial analysis techniques; their utilization in control of operations.

#### **535 Advanced Taxation 3**

Course Prerequisite: Admission to the Master of Accounting program. Federal income tax impact on corporations, S corporations, partnerships, estates, trusts and their beneficial owners.

#### **537 Professional Research 3**

Course Prerequisite: Admission to the Master of Accounting program. Methodology used by accounting professionals to research applied problems in taxation, accounting, and auditing; communicate results.

#### **538 Seminar in Cost/Managerial**

**Accounting 3** Course Prerequisite: Admission to the Master of Accounting program. Cost concepts, cost and managerial accounting systems; current issues and research in cost and managerial accounting.

#### **539 Seminar in Public Accounting**

**and Auditing 3** Course Prerequisite: Admission to the Master of Accounting program. Public accounting and auditing to present; current issues including statistical sampling and computers.

#### **540 Corporate Taxation 3**

Course Prerequisite: Admission to the Master of Accounting program. Application of federal

tax provisions and rules pertaining to corporations and shareholders; tax planning and consequences of corporate decisions.

**541 Flow Through Entities** 3 Course  
Prerequisite: Admission to the Master of Accounting program. Tax law and preparation requirements for entities in which tax elements pass through to the owner's individual income tax return.

**542 Gifts, Estates and Trusts** 3 Course  
Prerequisite: Admission to the Master of Accounting program. Estate and gift tax law.

**543 Special Topics in Accounting** 3  
May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Admission to the Master of Accounting program. Critical topics in accounting including new developments.

**544 Advanced Accounting Systems and Auditing** 3 Course  
Prerequisite: Admission to the Master of Accounting program. Advanced topics in accounting systems, auditing and controls.

**545 International Taxation** 3 Course  
Prerequisite: Admission to the Master of Accounting program. Tax issues for international transactions of businesses and individuals.

**546 Accounting for Income Taxes** 3 Course  
Prerequisite: Admission to the Master of Accounting program. Comprehensive coverage of accounting income taxes.

**550 Introduction to Financial and Managerial Accounting** V 2-3 Course  
Prerequisite: Admission to the MBA program. Fundamentals of financial and managerial accounting; primarily for graduate students who wish to meet the MBA core requirements in accounting.

**596 Doctoral Topics** 3 May be repeated for credit; cumulative maximum 15 hours. Course Prerequisite: Admission to PhD programs in business. Advanced topics in accounting.

**600 Special Projects or Independent Study** V 1-18 May be repeated for credit. Course Prerequisite: Admission to the MBA, Master of Accounting, or Business PhD programs. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**702 Master's Special Problems, Directed Study, and/or Examination** V 1-18 May be repeated for credit. Course Prerequisite: Admission to the Master of Accounting program. Independent research

in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination** V 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Business Administration - Accounting PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination.

Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Agricultural And Food Systems  
AFS

**501 Current Research in Organic and Sustainable Agriculture** 3  
Multidisciplinary framework to assess the sustainability of a range of farming and food systems.

**511 Statistical Methods for Graduate Researchers** 4 (3-2)  
Fundamentals of experimental design and statistical methods for graduate students in the sciences. Covers t-test for one and two means, ANOVA through completely randomized designs with one and two factors, chi-square tests and regression analysis using R. Recommended preparation: One prior course in statistics. Cannot be used for credit in the Department of Mathematics and Statistics graduate programs. (Crosslisted course offered as STAT 511, AFS 511).

**545 Field Analysis of Sustainable Food Systems** 3 Experiential course visiting farms, food processing and marketing sites to develop understanding of issues in food systems sustainability. Field trip required. Credit not granted for both AFS 445 and 545.

**590 Sociology of Agriculture and Food Systems** 3 Theories, concepts, debates, and methods associated with the sociology of agriculture and food systems. Agricultural Education  
AG ED

**504 Special Topics in Vocational Education** V 1-3 Special topics in agricultural education or agriculture that will provide advanced training for teachers of agriculture.

**508 Foundations of Vocational Education** 3 Historical, philosophical, social, political and economic factors that

influence education in vocational environments.

**511 Seminar in Career and Technical Education** V 1-2 Seminar addressing new and emerging legislation and educational programs in vocational education.

General Agriculture  
AGRI

**501 Agriculture Master's Practicum** V 2-3 May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Admission to graduate program in Masters of Science in Agriculture. Course individually designed to provide practical participation/experience under professional supervision in areas related to student's specialization.

**502 Graduate Seminar** 3  
Presentations and discussions of contemporary issues, trends, and recent research and development by graduate students, faculty, and visiting scholars.

**560 Contemporary Issues in Agricultural Technology and Policy** 3  
Contemporary issues in agricultural technology and policy implications.

**562 Advanced Topics** V 1-3 May be repeated for credit; cumulative maximum 4 hours. Directed group study of selected advanced topics in agriculture and related areas.

**587 Research and Extension in Agriculture** 3 Ways to effectively communicate research and extension information to diverse audiences; and to plan and assess effective extension programs.

**700 Master's Research, Thesis, and/or Examination** V 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination** V 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program.

Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

American Studies  
AM ST

**505 Pro Seminar in American Cultural Studies** 3 Critical theoretical

engagement within an interdisciplinary field; emphasis on professionalism.

**506 Frameworks in American Cultural Studies** 3 Critical framework for intellectual, theoretical, and political genealogies within American Studies.

**507 Contemporary Practices in American Cultural Studies** 3 Overview of contemporary practices in American cultural studies; important concepts and major insights within the field.

**515 The Neoliberal University** 3 Critically considers the pedagogical, professional, institutional, and social effects of neoliberalism on higher education.

**520 Colonization, Globalization and Decolonization** 3 Topics in the critical study of colonialism, neo-colonialism, imperialism, globalization and resistance to these forces.

**521 Critical Studies in Sexuality** 3 Topics in the critical analysis of normative sexualities and forces shaping US and global cultures.

**522 Digital Cultures, Digital Divides** 3 Critical analysis of the social and cultural dimensions of the digital divide and use of digital technologies by dominant and subaltern communities.

**523 Environmental Justice Cultural Studies** 3 Critical analysis of the cultural dimensions of environmental justice and injustice.

**524 Critical Studies in Popular Culture** 3 Interdisciplinary approaches to historical and contemporary trends and issues in US popular culture.

**525 Social Movements in American Studies** 3 Theoretical and historical study of the role of social movement in United States culture.

**526 Contemporary Theories of Race and Ethnicity** 3 Major theoretical readings and key recent texts in U.S. and transnational ethnic studies scholarship.

**527 Contemporary Feminist Theories and Practices** 3 Major theoretical readings and key recent texts in U.S. and transnational feminist scholarship.

**528 Cultural Studies** 3 Basic theory and core methods of the field of cultural studies through a cross discipline approach.

**529 Cultural Politics of the Body** 3 An interdisciplinary investigation of the historical, sociopolitical, biotechnical, and economic materialities of the human body within and across an array of identity categories.

**590 Seminar in American Studies** 3 May be repeated for credit; cumulative maximum 9 hours. Interdisciplinary topics in American culture.

**596 Topics in American Studies** 3 May be repeated for credit; cumulative maximum 9 hours. American Studies Summer Institute. (Crosslisted course offered as AMER ST 596, HISTORY 596).

**600 Special Projects or Independent Study** V 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination** V 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination** V 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination** V 1-18 May be repeated for credit. Course Prerequisite: Admitted to the American Studies PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit. Apparel, Merchandising, Design, And Textiles  
AMT

**508 Environmental and Social Issues in the Apparel Industry** 3 Exploration of current environmental and social issues in the global apparel industry.

**509 Technical Apparel Design** 3 (0-6) Advanced understanding of technical applications in apparel production, development, and construction related to modern manufacturing. Credit not granted for both AMDT 409 and 509.

**512 Apparel Design Graduate Studio** 3 Course Prerequisite: AMDT 508. Integration of consumer demand target market research with the development,

application, and testing of prototype products for specific end uses.

**515 Textile Product Development and Innovation** 3 Apply knowledge of textile component and emerging materials/techniques to innovative textile product development. Recommended preparation: AMDT 210.

**517 Theory and Methods of Culture, Gender and Dress** 3 Exploration of appearance issues, theory, and research from the perspective of social science, feminist theory, postmodern and poststructural discourses.

**518 Apparel Merchandising Analysis** 3 Analysis of marketing and retailing strategies, trends and technological developments in relation to business and consumer aspects within a global context.

**519 Research Methods** 3 Analysis and understanding of research methods, exploration of thesis topic as applicable to the fields of apparel, merchandising, design and textiles.

**520 Aesthetic Analysis of Fashion Design** 3 In-depth analysis of apparel fashion design provided through exploration of aesthetic and human perception theories within a socio-historic context.

**596 Advanced Instructional Practicum** 3 Information and direction for graduate student teaching assistants seeking professional development in classroom teaching.

**598 Topics in Apparel and Textiles** V 1-3 May be repeated for credit; cumulative maximum 8 hours. Current topics in apparel and textile theory and research.

**600 Special Projects or Independent Study** V 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination** V 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study and/or Examination** V 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a

non-thesis master's degree program.

Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

Anthropology

ANTH

**500 Field Methods V 2** (0-6) to 8 (0-24) Course Prerequisite: By instructor permission. Training in gathering and analyzing field data.

**504 Culture, Ecology, and International Development 3** Sociocultural properties of ecological systems in developing nations; cultural transformation in dynamic systems; ethnographic **Description:** , comparison; mixed and collaborative methods.

**507 Advanced Studies in Culture Theory 3** May be repeated for credit; cumulative maximum 6 hours. Evaluation of major theories and methods and their relationship to problems in cultural-social analysis.

**510 Fundamentals of Cultural Anthropology 3** Overview of basic concepts and theory in cultural anthropology based on in-depth analysis of selected theoretical and ethnographic materials.

**513 Lithic Technological Organization 4** (3-3) Methods and theory of lithic technology.

**514 Ceramic Analysis 4** (3-3) Basic concepts, methods, and approaches used in the analysis of archaeological pottery.

**519 International Development and Human Resources 3** History of and recent changes in international development emphasizing anthropological perspectives. (Crosslisted course offered as ANTH 519, POL S 538, SOC 519).

**521 Psychological Anthropology 3** Psychological and anthropological aspects of personhood, self, human development, gender, sexuality, emotion and cognition in various cultures.

**522 Culture and Mind 3** Examination of cultural variation in mind and mental processing, and how shared ideas and personal perceptions are necessarily co-constitutive of one another.

**525 Medical Anthropology 3** Examination of the interactions between culture and well-being, including illness concepts, distributions, prevention, and treatments in global perspective.

**528 Historical Ethnography 3** May be repeated for credit; cumulative maximum 9 hours. Culture history, ethnography, theoretical, and contemporary problems of selected culture areas.

**529 Seminar in Ethnography 3** May be repeated for credit; cumulative maximum 6 hours. Methodological, stylistic and craft issues in the process and product of ethnography.

**530 Theory in Archaeology 3** History of archaeological method and theory; analysis of current literature.

**535 Cultural Resource Management 3** Role of archaeology in historic preservation and resource conservation; legal and institutional frameworks; research and interpretation in a CRM context.

**537 Quantitative Methods in Anthropology 4** (3-3) May be repeated for credit; cumulative maximum 8 hours. Sampling, exploratory data analysis, inferential statistics, and use of statistical software in anthropological research.

**539 Prehistory of the Southwest 3** Prehistory of the American Southwest; emphasis on Pueblo, Mogollon and Hohokam traditions and relationships to historic native groups.

**540 Prehistory of the Northwest Coast 3** Prehistoric cultures, chronologies, and interrelationships on the northwest coast of North America.

**543 Prehistory of the Plateau and Basin 3** Archaeology of the interior Northwest and Great Basin.

**546 Complexity in Small Scale Societies 3** Seminar focused on classic literature and current issues relevant to complexity in small scale societies, predominately covering hunter-gatherer systems. Recommended preparation: ANTH 530.

**547 Models and Simulation 3** Models and model-building as an anthropological approach to present and past cultures.

**548 Hunters and Gatherers: Past and Present 3** Introduction to hunter-gatherer studies in anthropology and archaeology exploring uses of evolutionary approaches to modeling and reconstructing hunter-gatherer behavior in contemporary and prehistoric contexts.

**549 Settlement and Agro-Pastoralism 3** Development of settled communities and food production through evaluation of their social, economic and spatial configurations. Recommended preparation: ANTH 530.

**550 Ethnolinguistics 3** Anthropological theory and methods applied to the study of cognitive linguistics, or the interrelation of language, mind, and culture. (Crosslisted course offered as ANTH 450, FOR LANG 450). Credit not granted for more than one of ANTH 450 and ANTH 550.

**554 Anthropological Field Methods Seminar 3** Elicitation, recording techniques and analysis of sociocultural and linguistic field data. Recommended preparation: ANTH 450 or 550.

**561 Current Trends in Physical Anthropology 3** May be repeated for credit. Intensive review of major current trends in physical anthropology. Recommended preparation: ANTH 465.

**562 Evolutionary Method and Theory in Anthropology and Archaeology 3** A graduate-level seminar-based course focusing on the evolutionary analysis of past and present human behavior.

**563 Anthropology of Life and Death 3** Demography, dynamics of evolution, human ecology, and their relationships to the biology of living, historical, and archaeological populations. Credit not granted for both ANTH 463 and ANTH 563. Recommended preparation: ANTH 260.

**564 Advances in Evolution and Human Behavior 3** Recent trends in the study of evolution and human behavior.

**565 Human Evolution 3** Human origins in the light of the fossil record and evolutionary theory. Credit not granted for both ANTH 465 and ANTH 565. Recommended preparation: ANTH 260.

**566 Evolutionary Psychology 3** Overview of evolutionary psychology; theoretical foundations, insights, and key research contributions and applications from this interdisciplinary field.

**567 Primate Behavioral Ecology 3** Seminar-based course focusing on evolutionary analysis of primate behavior, morphology and ecology.

**568 Research Design and Grant Writing 3** Project development, research design, and successful proposal writing.

**569 Evolutionary Cultural Anthropology 3** Evolutionary nature of culture and its interactions with human biology (genes) and ecology.

**570 Sediments in Geoarchaeology 4** (3-3) Sediment-forming processes, sedimentological techniques, reconstruction of Quaternary environments, and sedimentology of site-forming processes.

**571 Stable Isotope Analysis in Anthropology 4** (3-3) Lab and seminar course on stable isotope applications, methods, and interpretations within the field of Anthropology.

**572 Residue Analysis and Experimental Archaeology 4** (3-3) The science of archaeological residues, identification of organic and inorganic compounds, method and theory of

interpretation, experimental archaeology, ethnoarchaeology.

**573 Zooarchaeology 4 (2-6)**

Identification of animal bones from archaeological sites, methodological and theoretical techniques for interpreting faunal remains.

**576 Paleoethnobotany 4 (3-3)**

Methods of analysis and interpretation of botanical remains recovered from archeological sites, including pollen, phytoliths, starch, wood, and macro-botanical remains.

**581 Comparative Biology of Social Traditions 3**

Phylogenetic and modeling perspectives used to examine the evolution of social learning and cultural transmission in humans and other animals. (Crosslisted course offered as ANTH 581, BIOLOGY 581).

**591 Special Topics in Anthropology 3**

May be repeated for credit; cumulative maximum 9 hours. Examination of current areas of anthropological theory and research.

**593 Publishing and Professional Communication 3**

Preparation of original research reports; survey of types of professional communication, and of standards and techniques.

**598 Advanced Anthropology Internship V 1-15**

May be repeated for credit; cumulative maximum 15 hours.

Course Prerequisite: By instructor permission. Participation as archaeological or cultural anthropological intern in public or private sectors; requires special arrangement with faculty advisor.

**599 Archaeological Field School V 2-8**

Course Prerequisite: By instructor permission. Training in methods of archaeological data recovery and analysis.

**600 Special Projects or Independent Study V 1-18**

May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V 1-18**

May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**800 Doctoral Research, Dissertation, and/or Examination V 1-18**

May be repeated for credit. Course Prerequisite:

Admitted to the Anthropology PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Architecture

ARCH

**510 Summer Graduate Design Studio 6 (0-12)**

Intensive summer studio focusing on design projects that address prevailing issues in a particular context and locale (regional, national, or international city) outside of Pullman.

**511 Graduate Design Studio I 6 (0-12)**

Graduate studio experience researching a single topic of architectural relevance. Travel for site visit required.

**513 Graduate Design Studio II 6 (0-12)**

Course Prerequisite: ARCH 511 with a C or better. Graduate studio experience researching a single topic of architectural relevance. Travel for site visit required.

**515 Research Methods and Programming 3**

Exploration of traditional research methods and investigations for architects.

**520 Directed Topics in Architecture V 1-3**

May be repeated for credit; cumulative maximum 6 hours. Topics related to areas of emphasis in the program and student specialization.

**525 History and Theory 3**

History and theory of 20th century architecture focusing on cultural and philosophical principles related to design.

**527 Site and Landscape Design 3**

Exploration of issues of site context analysis, topography, planning, and landscape design.

**530 Philosophies and Theories of the Built Environment 3**

Course Prerequisite: Graduate standing in Architecture, Interior Design, or Landscape Architecture. Focus on systematic thought which may describe behavior of the built environment. (Crosslisted course offered as ARCH 530, I D 530, LND ARCH 530).

**531 Advanced Tectonics 3** Tectonic theory of concrete and metal construction with focus on skin design and technology as formative elements in architecture.

**540 Research Methods 3** Research methods, from quantitative to technical to philosophical, directed toward qualitative research. (Crosslisted course offered as ARCH 540, I D 540, LND ARCH 540).

**542 Issues in Architecture 3**

Examination of issues in architecture related

to society, culture, environment, politics, and philosophy.

**560 Interdisciplinary Seminar 3**

Explores approaches to design thinking in the topic areas of people and place, history, theory and criticism, and physical design. (Crosslisted course offered as ARCH 560, I D 560, LND ARCH 560).

**563 Architectural Structures III 3**

Wind and seismic loads on architectural structures; high-rise systems; reinforced concrete and masonry structures. Credit not granted for both ARCH 463 and ARCH 563.

**564 Architectural Structures IV 3**

Course Prerequisite: ARCH 511 or concurrent enrollment. Deflection theory; classical and computer analysis for statically indeterminate architectural structure systems. Credit not granted for both ARCH 464 and ARCH 564.

**570 Advanced Architectural Design Studio I 6 (0-12)**

Advanced study of design problems relating to culture, environment, technology, urban planning, or other topics. Travel for site visit required.

**571 Advanced Architectural Design Studio II 6 (0-12)**

Course Prerequisite: ARCH 570. Advanced study of design problems relating to culture, environment, technology, urban planning, or other topics. Travel for site visit required.

**573 Ethics and Practice 3** Ethical and professional practice issues related to the business and practice of architecture; investigations into marketing client and business orientation.

**577 Theories and Methods of Urban Construction 3**

Morphology, theoretical concepts, planning and spatial structure of cities and analysis of the transformation of the city core in Europe and America.

**580 Architecture Practicum V 1-4**

May be repeated for credit. Course Prerequisite: Graduate student in M Architecture degree program. Internship, travel study, or independent study related to the field of architecture.

**600 Special Projects or Independent Study V 1-18**

May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V 1-18**

May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate

degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**701 Master's Independent Capstone Project and/or Examination V** 1-6 May be repeated for credit. Capstone project or final examination for professional master's degree under the Graduate School. The credits will include a balloted evaluation of the student's completion of the program's capstone/examination requirements by the program's graduate faculty. Students must have graduate degree-seeking status and obtain approval from their major advisor/committee chair before enrolling for 701 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V** 1-6 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

Astronomy  
ASTR

**581 Advanced Topics** 3 May be repeated for credit; cumulative maximum 12 hours. Topics of current interest in advanced physics. (Crosslisted course offered as PHYSICS 581, ASTRONOM 581).

Athletic Training  
ATH T

**560 Psychosocial Issues in Athletic Training** 3 Advanced look at psychology and its application in working with an athletic population.

**565 Clinical Application of Rehabilitation in Athletic Training** 3 Advanced application of therapeutic exercise techniques in athletic training.

**575 Pharmacology in Athletic Training** 3 Etiology, pathogenesis, clinical manifestations of common human dysfunction; athletic training implications for prevention and therapeutic approaches including pharmacologic therapies.

**585 General Medical Conditions in Athletic Training** 3 Current medical issues pertaining to athletic training including physiological considerations, common illnesses, and special concerns.

**590 Organization and Administration in Athletic Training** 3 The organization and administration of athletic training programs.

**592 Athletic Training Clinical Internship II** 3 (1-6) May be repeated for credit; cumulative maximum 6 hours. Intermediate techniques in management of

sport injury/illness under supervision of a licensed athletic trainer.

**593 Athletic Training Clinical Internship III** 5 (2-9) May be repeated for credit; cumulative maximum 10 hours. Course Prerequisite: 6 credits of ATH T 592 with a C or better. Intermediate techniques in management of sport injury/illness under supervision of a licensed athletic trainer.

**595 Leadership and Communication in Athletic Training** 3 Application of leadership, management, intercultural, and interprofessional communication within the athletic training discipline.

**598 Professional Preparation in Athletic Training** 3 Application of theory analysis and theory critique as applied to student's phenomenon of interest.

**599 Current Topics in Athletic Training** 3 Focus on current issues, transition to practice and athletic training across health care systems/delivery within a global context.

Business Administration  
B A

**500 Data Analysis for Managers V** 1-3 Course Prerequisite: Admission to the MBA program. Descriptive statistics, probability, common, discrete, and continuous distribution functions, sampling and estimation, and statistical inference.

**501 Foundations in Marketing V** 2-3 May be repeated for credit; cumulative maximum 6 hours. Foundation topics in marketing for MBA students.

**502 Foundations in Operations Management V** 2-3 May be repeated for credit; cumulative maximum 6 hours. Foundation topics in operations management for MBA students.

**503 Foundations in Business Law V** 2-3 May be repeated for credit; cumulative maximum 6 hours. Foundation topics in business law for MBA students.

**504 Foundations in Finance V** 2-3 May be repeated for credit; cumulative maximum 6 hours. Foundation topics in finance for MBA students.

**514 Business Analytics: Transforming Data into Decisions** 3 Course Prerequisite: Admission to the MBA program. Advanced decision-making concepts utilizing relevant datasets for data-driven problem-solving and formulating decision analyses to evaluate and recommend management action.

**520 Resources, Stakeholders and Competitive Advantage** 3 Course Prerequisite: Admission to the MBA program. Creating competitive advantage using resources provided by key stakeholders.

**579 MBA Capstone V** 1-3 May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Admission to the MBA program. Analyze, evaluate, and recommend management actions for a specific strategic business project (for an existing organization or new venture).

**596 Doctoral Topics V** 1-4 May be repeated for credit; cumulative maximum 15 hours. Course Prerequisite: Admission to PhD programs in business. Advanced topics in business research and theory.

**598 Research and Professional Development** 1 May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Admission to PhD programs in business. Ph.D.-level professional development colloquium designed to improve research, teaching, and presentation skills and to provide professional socialization.

**600 Special Projects or Independent Study V** 1-18 May be repeated for credit. Course Prerequisite: Admission to the MBA program. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**702 Master's Special Problems, Directed Study, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: Admission to the MBA program. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Business Administration PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Bioengineering  
B E

**525 Biomechanics** 3 Methods for analysis of rigid body and deformable mechanics; application to biological tissue, especially bone, cartilage, ligaments, tendon and muscle. (Crosslisted course offered as BIO ENG 425/525, ME 525). Credit not

granted for more than one of BIO ENG 425, BIO ENG 525, or ME 525.

**541 Systems Bioengineering 3**

Physiological systems emphasizing the cardiovascular, pulmonary, renal, endocrine, musculoskeletal, nervous and sensory systems.

**550 Cellular Bioengineering 3**

Cellular biology integrated with engineering science; cellular phenomena from an engineering perspective; quantitative engineering principles for cellular-based materials, diagnostic device and sensor designs.

Business Law

B LAW

**510 Business Law and Ethics 3**

Course Prerequisite: Admission to the MBA or Business PhD programs. Legal process and reasoning; commercial, managerial, and employment law; government regulations; contracts, torts, crimes; ethical conflicts and ethical decision making.

**511 Business Law II 3** Course

Prerequisite: Admission to the Master of Accounting program. Law of partnerships, corporations, securities regulations, negotiable instruments, secured transactions, property, insurance and bankruptcy; government regulation of businesses and professions.

Biology

BIOL

**500 Seminar 1** May be repeated for credit.

**501 Proposal Defense Seminar 2**

Research proposal defense as part of the preliminary examination for candidacy in the Ph.D. program.

**504 Experimental Methods in Plant**

**Physiology 3** (2-3) Advanced techniques and instrumental methods applicable to research in plant physiology.

**509 Plant Anatomy 4** (2-6)

Developmental anatomy and morphology of vascular plants; economic forms. Credit not granted for both BIOLOGY 409 and BIOLOGY 509.

**512 Molecular Mechanisms of Plant**

**Development 3** Physiology of growth; metabolism during development and reproduction.

**513 Plant Metabolism 3**

Metabolic processes unique to plants, including the primary incorporation of nitrogen, sulfur, carbon dioxide and phosphate into biomolecules.

**514 Fish Genetics 2**

Chromosomal, biochemical, quantitative, and ecological aspects of fish genetics with emphasis on applications to aquaculture and fish management.

**517 Stress Physiology of Plants 3**

Temperature, light, salinity, water effects on physiological processes; mechanistic understanding of stress.

**519 Introduction to Population**

**Genetics 3** Survey of basic population and quantitative genetics.

**520 Conservation Genetics 2**

Genetic studies and approaches relevant to efforts to conserve threatened and endangered populations of organisms.

**521 Quantitative Genetics 3** Course

Prerequisite: BIOLOGY 519. Fundamentals of quantitative genetics; evolutionary quantitative genetics.

**531 Principles of Systematic Biology**

3 Systematic theory; history and current views; approaches to phylogenetic analysis and classification.

**533 Modern Methods in**

**Phylogenetics 4** (2-6) Selecting, gathering, and analyzing morphological, cytological, molecular data for phylogenetic and evolutionary studies.

**534 Modern Methods in Population**

**Genomics 3** Course Prerequisite:

BIOLOGY 519. Problems and prospects of designing a study with genomic data: from raw data to demography and selection inferences.

**537 Plant Cell Biology 3**

Structure and function of plant cells including membrane biology, protein targeting and molecular signaling with emphasis on current research.

**540 Stable Isotope Theory and**

**Methods 3** (2-3) Theory and practice of measuring stable isotope ratios of biologically important elements; training in the use of isotope mass spectrometers.

**544 Nitrogen Cycling in the Earth's**

**Systems 3** Nitrogen dynamics in terrestrial, aquatic, and atmospheric systems; nitrogen transformations in natural and managed systems and responses to human activities. (Crosslisted course offered as BIOLOGY 544, SOIL SCI 544).

**548 Evolutionary Ecology of**

**Populations 3** Evolutionary dynamics of natural populations and the co-evolution of species.

**556 Biochemical Adaptation 3**

Relationships between enzyme/macromolecule adaptation and animal performance.

**559 Hormones, Brain and Behavior**

3 Classical behavioral endocrinology from molecular to whole organisms, integrating evolutionary ecology, neuroethology and behavioral neuroendocrinology.

**560 Plant Ecophysiology 3**

Relationships of biotic and abiotic

environment to plant distribution and evolution through study of physiological processes.

**561 Environmental Physiology 3**

Individual and evolutionary adaptations to changing environments with emphasis on recent literature.

**562 Community Ecology 3**

Assembly, essential properties, levels of interactions, succession, and stability of natural communities; emphasizes an experimental approach to community investigation.

Credit not granted for both BIOLOGY 462 and BIOLOGY 562. Recommended preparation: BIOLOGY 372.

**563 Field Ecology 2** (0-6)

Field implementation of descriptive and experimental techniques to quantify the structure, composition, and interactions within natural communities. Field trips required.

**564 Molecular Ecology and**

**Phylogeography 3** Use of genetic markers for the study of ecological phenomena, including kinship, population structure, and phylogeography.

**565 Ecology and Evolution of**

**Disease 3** Disease ecology and evolution with a focus on current literature. Recommended preparation: BIOLOGY 372; BIOLOGY 405.

**566 Mathematical Genetics 3**

Mathematical approaches to population genetics and genome analysis; theories and statistical analyses of genetic parameters. (Crosslisted course offered as MATH 563, BIOLOGY 566). Required preparation must include multivariate calculus, genetics, and statistics.

**567 Ecological Restoration 3**

Introduction to major issues in restoration ecology; major ecological dimensions of restoration.

**568 Conservation Ecology 3**

Diagnosis of endangered species, population viability analysis, invasive species ecology, landscape ecology and ecosystem management.

**569 Ecosystem Ecology and Global**

**Change 3** Historic and current factors controlling the function of ecosystems and their responses to natural and human caused global change. (Crosslisted course offered as BIOLOGY 469, ENVR SCI 469, BIOLOGY 569, ENVR SCI 569). Credit not granted for both BIOLOGY 469 and 569, or ENVR SCI 469 and 569.

**570 Diversity of Plants 3**

Morphological, life history, and ecological diversity of major plant clades; emphasis on principles of homology, character transformation, and macroevolution.



**571 Quantitative Toolkit for Biologists** 3 Course Prerequisite: STAT 512. Hands-on experience in the exploration, analysis, and interpretation of patterns in modern biological datasets.

**572 Quantitative Methods and Statistics in Ecology** 4 (3-3) Course Prerequisite: By permission only.

Philosophy and methods of formulating hypotheses as mathematical models and confronting them with data.

**573 Ancient DNA** 3 The prospects and problems associated with the study of ancient DNA are explored through reading and discussing primary literature.

**575 Systems Biology of Reproduction** 3 Current literature based course on systems biology with a molecular/epigenetic to physiological level understanding of cell, development, disease, and evolutionary biology. Credit not granted for both BIOLOGY 475 and 575.

**576 Epigenetics and Systems Biology** 3 Current literature based course on epigenetics and systems biology with topics in environmental epigenetics, disease etiology, and role epigenetics in evolutionary biology. Credit not granted for both BIOLOGY 476 and 576.

**579 Mathematical Modeling in the Biological and Health Sciences** 3 Techniques, theory, and current literature in mathematical modeling in the biological and health sciences, including computational simulation. (Course offered as BIOLOGY 579, MATH 579).

**581 Comparative Biology of Social Traditions** 3 Phylogenetic and modeling perspectives used to examine the evolution of social learning and cultural transmission in humans and other animals. (Crosslisted course offered as ANTH 581, BIOLOGY 581).

**582 Professional Communication in Biology - Grant Writing** 2 Mechanics and style of publishing biological research and findings; adaptation of writing to various venues and audiences with emphasis on grant writing.

**585 Professional Development and Training for College and University Teaching** 2 Preparation for roles as teaching assistants and as instructors of undergraduate classroom education.

**589 Advanced Topics in Biology** V 1-3 May be repeated for credit; cumulative maximum 6 hours. Recent advances in biology.

**591 Seminar in Molecular Plant Sciences** 1 May be repeated for credit; cumulative maximum 4 hours. A cross-discipline seminar, including botany, crop

and soils sciences, horticulture, plant pathology, and molecular plant sciences.

**593 Seminar I** 1 May be repeated for credit. Literature and problems.

**597 Teaching Practicum** V 1-4 May be repeated for credit; cumulative maximum 4 hours. Zoology laboratory teaching internship.

**600 Special Projects or Independent Study** V 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination** V 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study and/or Examination** V 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination** V 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Biology, Plant Biology, Botany, or Zoology PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit. Biological Systems Engineering BSYSE

**512 Research and Teaching Methods** 3 (2-3) Graduate research with an emphasis on biological systems engineering and college instruction.

**530 Machine Vision for Biological Systems** 3 Image analysis techniques as applied to machine vision applications integrated into autonomous equipment used in specialty crops.

**532 Electrohydraulic Systems Control** 3 Fluid power transmission, E/H

control, control systems and controller design.

**541 Instrumentation and Measurements** 3 (2-3) Basic engineering concepts involving instrumentation including measurement systems, sensors, data acquisition, signal processing, and analysis.

**550 Soil and Water Conservation Engineering** 3 Land, water and air conservation emphasizing on soil and water engineering concepts, state of science solution techniques, and engineering design.

**551 Advanced Biological Systems Engineering Topics** V 1-4 May be repeated for credit; cumulative maximum 6 hours. Directed group study of selected advanced topics in biological systems engineering.

**552 Advanced Biological Systems Engineering Topics** V 1-4 May be repeated for credit. Directed group study of selected advanced topics in biological systems engineering.

**554 Aquatic System Restoration** 3 Study of natural, damaged and constructed ecosystems with emphasis on water quality protection and restoration of lakes, rivers, streams and wetlands. (Crosslisted course offered as CE 585, BSYSE 554, ENVR SCI 585). Required preparation must include CHEM 345; MBIOS 101.

**555 Natural Treatment Systems** 3 Principles and design procedures of natural systems for wastewater treatment for agricultural and non-agricultural applications. (Crosslisted course offered as CE 555, BSYSE 555).

**556 Surface Hydrologic Processes and Modeling** 3 (2-3) Fundamental hydrologic processes, governing equations and solution methods, GIS techniques commonly used in hydrology, class project on modeling surface hydrology.

**557 Nutrient Cycling and Transport** 3 Cycling of carbon, nitrogen and phosphorus at global and watershed scales; modeling of transportation and transport in agricultural systems

**558 Groundwater Flow and Contaminant Transport** 4 (3-3) Physics of flow and contaminant transport in saturated porous media including governing equations, well hydraulics and computer modeling.

**560 Aquatic Chemistry** 3 Chemical principles as applied to natural environmental system, water supply and pollution and control engineering. (Crosslisted course offered as CE 583, BSYSE 560).

**564 Agricultural Waste and Air Quality Management** 3 Detailed analyses

of agricultural wastes and their potential adverse impacts on the environment; current management systems; reuse and recycle.

**581 Advanced Physical Properties of Foods** 3 Analysis, modeling, and experimental procedures to measure food physical properties for use in food processing system design.

**582 Food Process Engineering I** 3 Design of food processing systems; design and simulation of sterilization and pasteurization processes in foods.

**583 Food Process Engineering II** 3 Design of food separation unit operations including concentration, dehydration, and membrane processes.

**584 Thermal and Nonthermal Processing of Foods** 3 Food preservation methods based on application of thermal and nonthermal processes.

**585 Food Packaging** 3 Properties of packaging materials, manufacturing of packages, shelf-life testing and food packaging interaction.

**593 Renewable Energy Technologies** 3 Thermochemical biorefinery technologies for biofuels and bioproducts; facility operations, analysis, and design of integrated processes for biofuel and bioproduct production

**594 Design and Analysis of Biomass Conversion Processes and Systems** 3 Analysis of bioprocessing and biotreatment processes including energetics, stoichiometry, species competition, process infiltration, product separation and optimization.

**595 Biosystems Engineering for Fuel and Chemicals** 3 Design and optimization of biological systems for industrial functions, modeling and simulation of cell processes, bioreactors and system integration.

**596 Biomass Thermo-Chemical Conversion** 3 Biomass chemistry, analytical thermo-chemistry, torrefaction, pyrolysis, gasification and combustion; characterization and uses of thermochemical products.

**597 Biomass Biological Process Engineering** 3 Technical issues in the biological process engineering field, commercial application and evaluation of new technologies in resource, environment and economic contexts.

**598 Graduate Seminar** 1 May be repeated for credit. Required of all graduate students in biological systems engineering.

**700 Master's Research, Thesis, and/or Examination** V 1-18 May be repeated for credit. Independent research and advanced study for students working on

their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study and/or Examination** V 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination** V 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Biological and Agricultural Engineering or Engineering Science PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit. Civil Engineering  
C E

**501 Advanced Topics in Transportation Engineering** V 2-4 May be repeated for credit; cumulative maximum 9 hours. Special topics course in transportation engineering.

**502 Applied Meteorology** 3 Atmospheric physical behavior across spatial scales linking concepts of meteorological phenomena to engineering design principles. Credit not granted for both CE 402 and CE 502.

**503 Air Quality Management** 3 Air pollution from the perspective of an environmental manager; regulatory framework, management strategies, monitoring, modeling tools, and control technologies. Credit not granted for both CE 403 and CE 503.

**504 Sustainability Engineering I** 3 Green building and sustainable development topics including low impact development (LID) stormwater design and environmental life cycle assessment (LCA).

**505 Sustainability: Green Engineering** 3 Focus on the LEED green building rating system with topics on sustainable site selection, alternative transportation, heat island effect, light pollution, water and energy efficiency/use, regional and global climate/air issues, use/reuse of many material and resources, and indoor environmental quality. Credit not granted for both CE 405 and CE 505.

**506 Theory and Measurement of Turbulent Fluxes** 3 Fundamental concepts of turbulence and turbulent fluxes in the atmospheric surface layer, the statistical **Description:** of turbulence and turbulent fluxes, eddy covariance systems, and post-processed of flux data.

**507 Sustainability: Life Cycle Assessment** 3 Principles of life cycle assessment (LCA), environmental impacts categories, LCA system models, and methods for life cycle inventory.

**508 Concrete Durability** 3 Introduction to concrete durability, serviceability, and life cycle assessment; physical and chemical mechanisms of concrete degradation; corrosion of steel reinforcement in concrete; materials selection, specification, proportioning, and construction for durable concrete; testing and appraisal for durable concrete; and repair and rehabilitation of concrete structures.

**509 Numerical Modeling of Geomaterials** 3 Modeling of the response of geomaterials to changes in imposed stresses or strains under both static and dynamic conditions.

**510 Advanced Geomaterial Characterization** 3 Advanced mechanics of geomaterials; compressibility, concept of stress and strain; shear strength, stress/strain and time-dependent behavior; dynamic properties.

**511 Advanced Topics in Geotechnical Engineering** V 2-4 May be repeated for credit; cumulative maximum 9 hours. Soil dynamics, theoretical soil mechanics, numerical methods in soil mechanics, and geohydrology, engineering geology, cold regions geoengineering. Required preparation must include CE 317.

**512 Dynamics of Structures** 3 Equations of motion, free vibration, damping mechanisms, harmonic, impulse, and seismic loading; shock and seismic response spectra, time and frequency domain analysis, modal analysis, structural dynamics in building codes.

**514 Advanced Mechanics of Materials** 3 Elastic stress-strain relations, shear center, unsymmetrical bending, curved beams, elastic stability, elastically supported beams, energy methods, thin plates, shells.

**515 Environmental Measurements** 3 (1-6) Theory and laboratory measurement techniques used in analyzing environmental quality parameters. Credit not granted for both CE 415 and CE 515. Required preparation must include CE 341.

**517 Mechanics of Sediment Transport** 3 Cohesive and non-cohesive

sediments; initiation of sediment motion; sediment transport; suspended and bed load entrainment; models of sediment transport for alluvial and gravel bed streams, sediment-flow interaction; river morphology and ecological restoration.

**518 Hazardous Waste Engineering**

V 3-4 Hazardous waste properties, chemodynamics, and health effects; introduction to risk assessment and hazardous waste remediation. Credit not granted for both CE 418 and CE 518.

**519 Hazardous Waste Treatment**

3 Principles of operation and application of processes in design of technologies used in hazardous waste treatment and remediation. Credit not granted for both CE 419 and CE 519.

**524 Geotechnical Earthquake**

**Engineering** 3 Faulting and seismicity; site response analysis; probabilistic seismic hazard assessment; influence of soil on ground shaking; response spectra; soil liquefaction; seismic earth pressures; seismic slope stability; earthquake resistant design.

**525 Soil and Site Improvement**

3 Compaction theory and methods; deep densification of soils; advanced consolidation theory, preloading, vertical drains, chemical stabilization, grouting; design with geosynthetics. Credit not granted for both CE 425 and CE 525. Required preparation must include CE 317.

**527 Engineering Properties of Soils**

3 Physical properties, compressibility and consolidation, shear strength, compaction, saturated and unsaturated soils, laboratory and field methods of measurement, relations of physical and engineering properties, introduction to critical-state soil mechanics. Required preparation must include CE 317.

**530 Advanced Design of Steel**

**Structures** 3 Plate girder design; local and global buckling; plastic collapse analysis; shear and Moment-resisting connections; eccentrically-loaded connections. Required preparation must include CE 431.

**531 Probability and Statistical**

**Models in Engineering** 3 Engineering applications of probability and statistics; Monte Carlo simulation; model estimation and testing; probabilistic characterizations of loads and material properties; risk and reliability analyses.

**532 Finite Elements**

3 Theory of finite elements; applications to general engineering systems considered as assemblages of discrete elements. (Crosslisted course offered as CE 532, ME 532).

**533 Advanced Reinforced Concrete**

**Design** 3 Composite design; slab design; limit state design; footings; retaining walls; deep beams; brackets and corbels; torsion; seismic design; shear walls. Required preparation must include CE 433.

**534 Prestressed Concrete and**

**Reinforced Masonry Design** 3 Behavior, analysis, and design of pretensioned and post-tensioned prestressed concrete structures; behavior and design of reinforced masonry structures. Credit not granted for both CE 434 and CE 534.

**535 Advanced Finite Elements**

3 Plate and shell analysis; nonlinear solution methods for finite strain/rotation and nonlinear materials.

**536 Nondestructive Testing of**

**Structural Materials** 3 Principles of nondestructive testing applied to wood-based materials, steel, concrete, and masonry.

**537 Advanced Topics in Structural**

**Engineering** 3 May be repeated for credit; cumulative maximum 9 hours. Elastic stability, plates and shells, other relevant topics.

**538 Earthquake Engineering**

3 Seismology, size of earthquakes, seismic ground motion, seismic risk, behavior of structures subjected to earthquake loading seismic response spectra, seismic design codes, lateral force-resisting systems, detailing for inelastic seismic response. Recommended preparation: CE 512.

**539 Advanced Design of Timber**

**Structures** 3 Engineering properties of wood materials; theory and design of wood composites, connections and load-sharing systems; performance criteria and durability. Required preparation must include CE 436.

**540 Instrumental Analysis of**

**Environmental Contaminants** 3 (1-6) Course Prerequisite: CE 515. Theory and methods of analysis of water and water suspensions for contaminants using electrometric, spectrophotometric, and chromatographic techniques.

**541 Physicochemical Water and**

**Wastewater Treatment** 3 Principles of physical and chemical operations used in water and wastewater treatment, including chemical reactor theory, sedimentation, filtration, precipitation, mass transfer, coagulation/flocculation, disinfection, adsorption and ion exchange. Recommended preparation: CE 442.

**542 Biochemical Wastewater**

**Treatment** 3 Principles of biochemical operations used in wastewater treatment including biochemical energetics, kinetics, activated sludge and fixed film reactors,

nutrient removal, and sludge handling and treatment.

**543 Advanced Topics in**

**Environmental Engineering Practice V** 1-

4 May be repeated for credit; cumulative maximum 9 hours. Analysis and evaluation of air/water/soil pollution problems, new measurement methods, hazardous waste treatment, global climate change, and water/wastewater treatments.

**550 Hydroclimatology**

3 Water and energy budgets as they relate to climate, dynamics; and remote sensing, statistical, and modeling techniques for hydroclimatology.

**551 Open Channel Flow**

3 Steady, non-uniform flow; controls and transitions in fixed-bed channels. Credit not granted for both CE 451 and CE 551.

**552 Advanced Topics in Hydraulic**

**Engineering V** 1-3 May be repeated for credit; cumulative maximum 9 hours. Cavitation, air entrainment, hydraulic machinery, similitude, mixing in rivers and estuaries, hydraulic design. Required preparation must include CE 351.

**555 Natural Treatment Systems**

3 Principles and design procedures of natural systems for wastewater treatment for agricultural and non-agricultural applications. (Crosslisted course offered as CE 555, BSYSE 555).

**560 Advanced Hydrology**

3 Principles of the hydrologic cycle including precipitation, lower atmosphere, evaporation, fluid mechanics of free surface flow, overland flow, flow routing, infiltration, baseflow. Recommended preparation: Introductory hydrology and differential equations.

**562 Advanced Subsurface Flow and**

**Transport** 3 Analysis of the dynamics of subsurface fluid flow in porous media that give rise to contaminant transport behaviors at multiple scales; emphasis on developing a qualitative knowledge of the features that cause deviations from idealized transport behaviors and the mathematical tools required to model transport in natural, heterogeneous aquifers for both passive and reactive solutes.

**564 Numerical Methods**

3 Numerically assisted solution of linear and nonlinear systems of equations with an emphasis on environmental applications. Eulerian and Lagrangian solutions of systems of steady-state and transient partial differential equations including various flow, transport, and geochemical problems; fundamentals of parallel solution techniques. Recommended preparation: fluid mechanics,

differential equations, and basic knowledge of computer programming.

**567 Properties of Highway Pavement Materials** 3 Physical and mechanical properties of asphalt and Portland cement concrete materials; design of asphalt concrete mixes; introduction to viscoelastic theory; characterization methods, emphasizing fatigue, rutting, and thermal cracking; modification and upgrading techniques. Three 1-hr lect a wk and variable number of lab hrs for demonstration.

**572 Advanced Pavement Design and Analysis** 3 Design of new and rehabilitated asphalt and Portland Cement concrete pavements; mechanistic-empirical design procedures, performance models; deflection-based structural analysis, overlay design, environmental effect; long-term pavement performance (LTPP), and introduction to research topics in pavement engineering. Required preparation must include CE 473.

**580 Graduate Seminar** 1 May be repeated for credit; cumulative maximum 4 hours. Lectures and reports on current developments in research and practice.

**583 Aquatic Chemistry** 3 Chemical principles as applied to natural environmental system, water supply and pollution and control engineering. (Crosslisted course offered as CE 583, BSYSE 560).

**584 Environmental Microbiology** 3 Provides a fundamental understanding of microbiology to engineering and environmental science students; cell structure and metabolism; microbial ecology and diversity.

**585 Aquatic System Restoration** 3 Study of natural, damaged and constructed ecosystems with emphasis on water quality protection and restoration of lakes, rivers, streams and wetlands. (Crosslisted course offered as CE 585, BSYSE 554, ENVR SCI 585). Required preparation must include CHEM 345; MBIOS 101.

**586 Bioremediation of Hazardous Waste** 3 Applications of bioremediations to in situ subsurface treatment of hazardous waste; subsurface microbial degradation as related to microbial ecology.

**588 Atmospheric Turbulence and Air Pollution Modeling** 3 Physical aspects of atmospheric turbulence, theoretical developments in atmospheric diffusion, and applied computer modeling with regulatory and research models.

**589 Atmospheric Chemical and Physical Processes** 3 Processes of removal of pollutants from the atmosphere; radical

chain reactions, particle formation, model calculations.

**590 Spectroscopy and Radiative Transfer of the Atmosphere** 3 Concepts of radiative transfer and molecular spectra in the troposphere and stratosphere with applications to trace gas measurements.

**591 Aerosol Dynamics and Chemistry** 3 Chemical and physical properties of atmospheric aerosols; sources, sinks, and transformation processes.

**593 Polymer Materials and Engineering** 3 Preparation and structure-property relationship of polymer materials with emphasis on fracture mechanics and toughening. (Crosslisted course offered as MSE 543, CE 593). Required preparation must include MSE 402.

**594 Natural Fibers** 3 Structural aspects and properties of natural fibers including anatomy, ultrastructure, and chemistry. (Crosslisted course offered as CE 594, MSE 544).

**595 Polymer and Composite Processing** 3 Polymer and composite processing from fundamental principles to practical applications. (Crosslisted course offered as MSE 545, CE 595).

**596 Engineered Wood Composites** 3 Theory and practice of wood composite materials, manufacture and development. (Crosslisted course offered as CE 596, MSE 546).

**597 Polymers and Surfaces for Adhesion** 3 Physical chemistry of polymers and surfaces needed to understand interface morphology, adhesion mechanisms and bond performance. (Crosslisted course offered as CE 597, MSE 547). Required preparation must include MSE 402 or 404.

**598 Natural Fiber Polymer Composites** 3 Fundamentals, development and application of composite materials produced from polymers reinforced with natural fibers and wood as major components. (Crosslisted course offered as CE 598, MSE 548).

**600 Special Projects or Independent Study** V 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis and/or Examination** V 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate

degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination** V 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination** V 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Civil Engineering or Engineering Science PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit. Chemical Engineering  
CH E

**510 Transport Processes** 3 Transport of mass, energy, and momentum; unsteady and steady states as applied to chemical processing; macroscopic and microscopic analyses.

**527 Chemical Thermodynamics** 3 Thermodynamic laws for design and optimization of thermodynamic systems, equations of state, properties of ideal and real fluids and fluid mixtures, stability, phase equilibrium, chemical equilibrium; applications of thermodynamic principles.

**529 Chemical Engineering Kinetics** 3 Interpretation of kinetic data and design of nonideal chemical reactors; fundamentals of heterogeneous catalysis, catalyst preparation, characterization, and theory.

**541 Chemical Engineering Analysis** 3 Mathematical analysis of chemical engineering operations and processes; mathematical modeling and computer application.

**549 Biochemical Conversion Laboratory** 2 (1-3) Analytical techniques in biomass characterization; bioproduct/biofuel production from renewable biomass including biochemical processes.

**560 Biochemical Engineering** 3 Chemical engineering applied to biological systems; fermentation processes, biochemical reactor design, downstream processing, transport phenomena in biological systems, biochemical technology.

**574 Protein Biotechnology** 3 Biotechnology related to the isolation,

modification and large scale commercial production, patenting and marketing of useful recombinant proteins and products. (Crosslisted course offered as MPS 574, CHE 574, MBIOS 574). Recommended preparation: MBIOS 513.

**581 Advanced Topics in Chemical Engineering V** 1-3 May be repeated for credit; cumulative maximum 9 hours.

Filtration, reaction engineering, two-phase flow, non-Newtonian fluids, interfacial phenomena, fluidization, novel separations, biomedical engineering.

**585 Interfacial Phenomena 3**

Chemical and physical nature of the interface including the molecular basis for interfacial forces and resulting macroscopic phenomena. Credit not granted for both CHE 485 and 585.

**596 Research Methods and**

**Presentation I 2** Establish sound practices for graduate research and presentation of results; techniques used for performing through literature searching and establishing and testing research hypotheses.

**597 Research Methods and**

**Presentation II 2** Establishing sound practices for presentation of research programs and research results.

**598 Research Seminar 1** May be repeated for credit. Seminar presentations on current topics in chemical engineering research.

**700 Master's Research, Thesis,**

**and/or Examination V** 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems,**

**Directed Study, and/or Examination V** 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program.

Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation,**

**and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Chemical Engineering or Engineering Science PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with

their major advisor/committee chair before enrolling for 800 credit.

Chemistry

CHEM

**501 Advanced Inorganic Chemistry**

**I 3** Periodic table survey, typical compounds and their reactivity; models and reactivity, acid-base, oxidation-reduction, and electronic structure contributions.

**503 Advanced Topics in Inorganic**

**Chemistry V** 1-3 May be repeated for credit. Recent significant developments.

**509 Chemical Group Theory 3**

Mathematical definitions of groups and representations, applications to chemical structure and spectra, ligand field theory, chemical reactions and selection rules.

**510 Introduction to Proteomics 2**

Techniques and applications for the analysis of the proteome. Recommended preparation: MBIOS 303 or equivalent.

**514 Mass Spectrometry 2** Current methods, techniques and interpretation of mass spectrometric analysis. Recommended preparation: CHEM 425 or equivalent.

**517 Chromatography 2** Survey of major forms of chromatography, operating principles of common chromatographic detectors, and current case studies.

Recommended preparation: CHEM 425 or equivalent.

**518 Electrochemistry 2** Execution and interpretation of a variety of interfacial electroanalytical techniques. Recommended preparation: CHEM 425 or equivalent.

**520 Advanced Analytical Chemistry**

**3** Statistics in chemical analysis; sampling; control of contamination and losses in analysis; electrochemical methods; separation in analysis; spectroscopic techniques. Recommended preparation: CHEM 425 or equivalent.

**521 Radiochemistry and**

**Radiotracers 2** Nuclear stability, and decay modes, interactions of radiation with matter, radioanalytical instrumentation, health physics, neutron activation, and tracer level chemistry. Recommended preparation: CHEM 425 or equivalent.

**522 Radiochemistry Laboratory 1**

(0-3) Theory and application of basic radiochemistry instrumentation. Required preparation must include CHEM 222, CHEM 331, and PHYSICS 202 or equivalent.

**527 Environmental Chemistry 2**

Natural water chemistry, AGRI processes, kinetics, thermodynamics, modeling in lake, river, and sea water.

**528 Data Analysis for Chemistry 3**

Data analysis methods for large data sets encountered in chemistry, programing using

a scripting language, graphical and statistical analyses, chemometric methods.

**529 Selected Topics in Analytical**

**Chemistry V** 1-3 May be repeated for credit. Selected current developments.

**531 Advanced Physical Chemistry I**

**3** Classical physical chemistry including basic thermodynamics and kinetics; an introductory discussion of surface chemistry and electrochemistry. Recommended preparation: CHEM 331 or equivalent.

**532 Advanced Physical Chemistry II**

**3** Introduction to quantum mechanics; postulates of quantum mechanics; exact solutions and approximation methods. Recommended preparation: CHEM 332 or equivalent.

**534 Chemical Statistical Mechanics**

**3** Statistical theory of thermodynamic variables and chemical equilibrium; calculation of equilibrium properties from spectral data; fluctuations about equilibrium; quantum statistics.

**535 Applied Spectroscopy 3**

Application of optical (UV-visible, Fourier transform infrared, Raman, and fluorescence) and NMR spectroscopies to problem solving in chemical research. Recommended preparation: CHEM 331, 332, 345, and 425.

**536 Quantum Chemistry 3** Course

Prerequisite: CHEM 532. Quantum mechanics applied to chemical problems: states of atoms and molecules, transitions and spectra, ladder operators and many electron methods.

**537 Advanced Topics in Physical**

**Chemistry V** 1-3 May be repeated for credit. Selected subjects; irreversible thermodynamics; chemical bonding; NMR; ligand field theory; x-ray diffraction; neutron diffraction.

**540 Physical Organic Chemistry 3**

Course Prerequisite: CHEM 542. The major classes of organic reaction mechanisms and their significance; kinetics and introductory theory.

**542 Advanced Organic Chemistry 3**

Synthesis of organic compounds; recent developments from current literature.

**543 Bioorganic Chemistry 3** Course

Prerequisite: CHEM 542. Chemistry of biological systems, medicinal chemistry, protein chemistry, enzyme mechanisms and inhibitors.

**544 Advanced Topics in Organic**

**Chemistry V** 1-3 May be repeated for credit. Current research in organic chemistry.

**545 Synthetic Organic Chemistry 3**

Course Prerequisite: CHEM 542. Modern synthetic methods and strategies; detailed

reaction mechanisms, reaction scope and issues in catalysis will be discussed.

**546 Spectroscopic Identification of Organic Compounds** 3 Structural interpretation of mass spectrometry and IR, UV-VIS and NMR spectrometry of small molecule organic compounds.

**550 Special Topics in Nuclear Processes and Radioactive Waste Management** V 1-3 May be repeated for credit; cumulative maximum 6 hours. Fundamental chemistry of the nuclear industry, chemical processing and waste management.

**555 Teaching Chemistry** 1 Teaching chemistry; workshops for new graduate teaching assistants in chemistry focusing on tutorials and labs.

**564 Molecular Phenomena** 3 Phenomena which yield information on structures, energy levels, and interactions of molecules in solid, liquid, and gaseous phases.

**572 Enzyme Reaction Mechanisms** 3 Course Prerequisite: CHEM 542. Methods used to explore enzyme mechanisms; how enzymes catalyze reactions; overview of enzyme co-factors and exploration of differing classes of enzyme catalyzed reactions.

**581 Environmental Chemistry I** 3 Chemistry of natural and pollutant species and their reactions in the atmospheric environment.

**590 Introduction to Research Topics** 1 Presentation and **Description:** of research areas and projects of current interest to faculty.

**591 Seminar in Inorganic Chemistry** 1 May be repeated for credit; cumulative maximum 6 hours. Presentation and discussion of topics in inorganic chemistry taken from research in progress or current literature.

**592 Seminar in Analytical Chemistry** 1 May be repeated for credit; cumulative maximum 6 hours. Presentation and discussion of topics in analytical chemistry taken from research in progress or current literature.

**593 Seminar in Physical Chemistry** 1 May be repeated for credit; cumulative maximum 6 hours. Presentation and discussion of topics in physical chemistry taken from research in progress or current literature.

**594 Seminar in Organic Chemistry** 1 May be repeated for credit; cumulative maximum 6 hours. Presentation and discussion of topics in organic chemistry taken from research in progress or current literature.

**600 Special Projects or Independent Study** V 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination** V 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination** V 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination** V 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Chemistry PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit. Communication COM

**500 Communication Colloquium** 1 May be repeated for credit; cumulative maximum 8 hours. Written and oral presentation of research topics in Communication; college colloquium.

**501 Theory Building in Communication** 3 Relationship of research to theory development; evaluation of current theory and research; planning and executing research within specified theoretical frameworks.

**502 Consumer Analysis and Brand Development** 3 Consumer analysis and brand development; skills to make strategic communication campaigns successful.

**504 Instructional Practicum** 1 May be repeated for credit; cumulative maximum 4 hours. Course Prerequisite: By interview only.

**506 Persuasion and Social Influence** 3 Theories, concepts strategies and processes of persuasion and social influence.

**507 Communication Ethics Seminar** 3 Topics in communication ethics.

**509 Quantitative Research** 3 Introduction to quantitative research in communication; hypothesis development, testing; basic statistics, interpretation; field surveys, laboratory and field experiments, content analysis.

**514 Health Communication Theories and Campaigns** 3 Health communication theories with a focus on campaign construction and evaluation.

**516 Health Communication and Society** 3 3 Reviews, critiques and applications of research regarding the impact of social and cultural environments on health communication.

**517 Youth and the Media** 3 Explores how children, adolescents, and emerging adults use media in decision making and identity formation, health, and civic affairs.

**521 Foundational Perspectives in Intercultural Communication** 3 Overview of three current foundational research perspectives in intercultural communication; functionalist (post-positivist), interpretive and critical.

**522 Theoretical Perspectives on Intercultural Communication** 3 Advanced readings in intercultural communication theory and methods; paradigms in current theorizing.

**524 Intercultural/International Communication and Social Change** 3 Application of communication theory, research and technologies aimed at fostering social change in intercultural and international contexts.

**526 Current Topics in Intercultural Communication** 3 Topics in current intercultural communication research.

**535 Organizational Communication Theory** 3 May be repeated for credit; cumulative maximum 6 hours. Traditional and emerging theories in organizational communication.

**537 Organization and Society** 3 Historical foundations, theoretical developments, contemporary issues and practical implications of communicative processes of organizations within society.

**540 Risk Communication** 3 Research and practice in risk communication.

**541 Science Communication** 3 Introduction to the role of communication in the formation of attitudes, opinions, and knowledge about important science issues.

**550 Micro Media/Communication Theories** 3 Introduction to basic concepts

and theories at the intra-individual level of analysis in communication and media psychology.

**561 Multimedia Content Creation 3**

Course Prerequisite: Admitted to the online master's program in strategic communication. Exploration and application of strategies to communicate ideas clearly, concisely, and effectively through multimedia content.

**562 Crisis Communication in Global Contexts 3**

Course Prerequisite: Admitted to the online master's program in strategic communication. Prepare, plan, and execute crisis communication and management to protect the continuity of an organization's image and mission.

**563 Ethics for Professionals 3**

Course Prerequisite: Admitted to the online master's program in strategic communication. The understanding, discussion, and application of key theories of individual and institutional ethics; the articulation and defense of ethical reasoning.

**564 Research Methods for Professionals 3**

Course Prerequisite: Admitted to the online master's program in strategic communication. Understanding the role of research in media and related organizations and its application to organizational decision making through quantitative and qualitative research methods including research design, questionnaire construction, sampling, data collection techniques, and variable measurement.

**570 Communication Theory 3**

Relevant theories and research from mass and interpersonal communication.

**571 Theoretical Perspectives on Media and Society 3**

Theories explaining the social and cultural environments of communication processes emphasizing in mass communication.

**572 Mass Media, Social Control, and Social Change 3**

Study of the forces that influence the media's role as an agent of social control or social change.

**573 Media and Public Discourse 3**

Historical and contemporary concepts, questions and dynamics constituting the role of media and discourse among various publics.

**574 Survey of Political Communication 3**

Introduction to the field of political communication including agenda-setting, framing, political advertising, entertainment media and politics, political discussion, and selective exposure.

**580 Topics in Communication 3** May be repeated for credit; cumulative maximum

12 hours. Contemporary, specialized, or technical topics in communication.

**591 Qualitative Research Methods 3**

Historical, textual, and legal methodologies for theory-based evaluative and discourse studies in communication.

**599 Seminar in Communication 3**

May be repeated for credit; cumulative maximum 6 hours. Special topics in rhetoric, communication, and public address.

**600 Special Projects or Independent Study V 1-18**

May be repeated for credit. Course Prerequisite: By interview only. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V 1-18**

May be repeated for credit. Course Prerequisite: By interview only. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V 1-18**

May be repeated for credit. Course Prerequisite: By interview only. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination V 1-18**

May be repeated for credit. Course Prerequisite: Admitted to the Communication PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit. Strategic Communication COMSR

**561 Persuasion for Professional Communicators 3**

Course Prerequisite: Admitted to the online master's program in strategic communication. Introduction to theories, concepts, strategies, and processes of persuasion and social influence.

**562 Creative Media Strategies and Techniques 3** Course Prerequisite:

Admitted to the online master's program in strategic communication. The strategies, processes, procedures and steps involved in creating marketing communications materials for a variety of different media.

**563 Professional Digital Content Promotion 3**

Course Prerequisite: Admitted to the online master's program in strategic communication. The application of writing, critical thinking, and persuasion skills to the practice and promotion of PR and advertising in both digital and social media outlets.

**564 Consumer Behavior and Brand Development 3**

Course Prerequisite: Admitted to the online master's program in strategic communication. Tactics and strategies for consumer analysis and brand development; skills necessary for uncovering consumer insights to link client objectives, account management, creative development, and media planning.

**565 Professional Marketing Communication Management and Campaigns 3**

Course Prerequisite: Admitted to the online master's program in strategic communication. An overview of behavior change theories with a focus on strategic marketing campaign design and evaluation; learning to use theory and research to more effectively plan, design, execute and evaluate strategic communication campaigns.

**701 Master's Independent Capstone Project and/or Examination V 1-6**

May be repeated for credit. Capstone project or final examination for professional master's degree under the Graduate School. The credits will include a balloted evaluation of the student's completion of the program's capstone/examination requirements by the program's graduate faculty. Students must have graduate degree-seeking status and obtain approval from their major advisor/committee chair before enrolling for 701 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V 1-18**

May be repeated for credit. Course Prerequisite: Admitted to the online master's program in strategic communication. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

Counseling Psychology

COPSY

**501 Historical and Philosophical Foundations of Counseling Psychology** 3

Course Prerequisite: Admission to Counseling Psychology PhD program. History of counseling psychology; philosophical and psychological systems; current identity of counseling psychology as an academic discipline and a profession.

**502 Social Psychology Foundations in Educational and Counseling Psychology** 3

Social psychology with a special emphasis on the relevance to education and counseling psychology.

**503 Community Counseling** 3

Course Prerequisite: Graduate student in Community Counseling program. Counseling in community settings.

**505 Reverence for Life** 1

Evaluates and presents cross-disciplinary research regarding the human-animal relationship.

**511 Theories, Research, and Techniques in Counseling Psychology I** 3

Philosophical assumptions, theory of personality, counseling process, techniques and relevant research in the major theories of counseling and personality.

**512 Counseling Techniques and Microskills** 3

Course Prerequisite: COUN PSY 511. Foundation course for all clinical experiences in counseling; communication and interpersonal skills under faculty supervision will be emphasized.

**513 Career Counseling: Theories and Methods** 3

Theories, concepts, methods and findings in career counseling; vocational assessment and prediction.

**515 Ethics and Professional Problems in Counseling Psychology** 3

Professional problems; ethical, legal, and training issues, practices, and new issues.

**516 Life Span Development and Counseling Issues** 3

Major theories and issues in human development and their application to counseling practice including case conceptualization, treatment and intervention planning and psychological assessment and research.

**517 Diagnoses, Psychopathology and Counseling Psychology** 3

Course Prerequisite: COUN PSY 511.

Psychopathology and the application of counseling theories to diagnoses, case conceptualization, assessments, treatment plans and research.

**518 Theoretical Foundations of Group Counseling** 3

Course Prerequisite: COUN PSY 511. History, philosophy and theoretical foundations; the group counselor, members, and issues in group counseling.

**519 Family Therapy** 3

Course Prerequisite: COUN PSY 511; COUN PSY 512. Introduces family therapy, its

respective theories and models to clinical practice, assessment, and research.

**520 Substance Abuse Counseling and Interventions** 3

Course Prerequisite: COUN PSY 511; COUN PSY 512. Substance abuse issues, theory, and counseling techniques and interventions.

**523 Topics in Counseling Psychology** V

1-4 May be repeated for credit; cumulative maximum 8 hours. Recent research, developments, issues, and/or applications in selected areas of counseling psychology.

**525 Counseling Diverse Populations** 3

Course Prerequisite: COUN PSY 512. Research and theories regarding the influence of culture, gender, and lifestyle on counseling processes; application of appropriate assessment/treatment strategies.

**527 Individual Appraisal I** 3

Course Prerequisite: ED PSYCH 508; ED PSYCH 509. Cognitive assessment of individuals, with an emphasis on the theoretical background and practical skills needed to administer, score, and interpret individual intelligence tests; assessment of learning disabilities, AD/HD, and individual achievement.

**528 Individual Appraisal II** 3

Course Prerequisite: ED PSYCH 508; ED PSYCH 509. Interpretation of representative personality assessment inventories and symptom checklists used in counseling practice; integration of results in psychological reports.

**529 Counselor Supervision: Theory, Research, and Practice** 3

Course Prerequisite: Admission to Counseling Psychology PhD program. Survey of major theoretical approaches, techniques, and research in models of counselor supervision and training.

**531 Current Issues in School Counseling I** 3

Course Prerequisite: Admission to MA program in School Counseling. Issues of immediate concern to school counselors: drug abuse, family violence, adolescent suicide, sexual orientation, crisis intervention, consultation and referral.

**532 Current Issues in School Counseling II** 3

Course Prerequisite: COUN PSY 531. Additional coverage of contemporary issues of concern to school counselors; comprehensive developmental school programs, school community dynamics, parental involvement, consultation.

**533 Master's Internship in Community Counseling** 4

May be repeated for credit; cumulative maximum 16 hours. Course Prerequisite: COUN PSY 512;

COUN PSY 513 or concurrent enrollment; COUN PSY 515 or concurrent enrollment. Supervised experience in the application of counseling theory and techniques in an agency setting.

**535 Master's Internship in School Counseling** 4

May be repeated for credit; cumulative maximum 16 hours. Course Prerequisite: COUN PSY 512; COUN PSY 513 or concurrent enrollment; COUN PSY 515 or concurrent enrollment. Supervised experience in the application of guidance and counseling theory and techniques in a school setting.

**537 Professional Development in Counseling Psychology** 3

NBCC requirements; growth and development, social and cultural foundations, the helping relationship, group dynamics, career, appraisal and research.

**541 Clinical and Experimental Hypnosis Seminar** 3

Course Prerequisite: Student in counseling, educational, experimental, or clinical psychology. Clinical and experimental hypnosis, emphasizing applied research and clinical methods.

**542 Cross-cultural Research in Counseling and Assessment** 3

Cross-cultural research methods, concepts, and findings in counseling and assessment.

**551 Doctoral Practicum in Counseling Psychology I** 4 (2-6)

Course Prerequisite: Admission to Counseling Psychology PhD program; COUN PSY 512; COUN PSY 513 or concurrent enrollment; COUN PSY 515 or concurrent enrollment; COUN PSY 517 or concurrent enrollment. Supervised experiences in the application of counseling psychology theory and techniques.

**552 Doctoral Practicum in Counseling Psychology II** 4 (2-6)

Course Prerequisite: COUN PSY 551. Supervised experiences in the application of counseling psychology theory and techniques.

**553 Doctoral Practicum in Counseling Psychology III** 4 (3-3)

May be repeated for credit; cumulative maximum 16 hours. Course Prerequisite: COUN PSY 552. Supervised experiences in the application of counseling psychology theory and techniques.

**561 Continuing Counseling ESA Certification** V

2-6 May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Initial Counselor Certification; equivalent of 180 full days of school counselor experience; by department consent only. Peer review requirements for continuing level ESA Counselor Certification.



- 590 Seminar in Research in Counseling Psychology** 3 Course  
Prerequisite: COUN PSY 512; COUN PSY 515; COUN PSY 527; ED RES 565; ED PSYCH 568. Recent developments in counseling psychology research and design applied to PhD dissertation proposals.
- 596 Pet Loss and Human Bereavement** 1 Addresses human bereavement and grief in the context of the human/animal relationship.
- 597 Counseling Psychology Internship** V 2-4 May be repeated for credit; cumulative maximum 8 hours. Supervised internship experience, individual and group counseling, evaluation, assessment, supervision, and teaching.
- 600 Special Projects or Independent Study** V 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.
- 700 Master's Research, Thesis, and/or Examination** V 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.
- 702 Master's Special Problems, Directed Study, and/or Examination** V 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.
- 800 Doctoral Research, Dissertation, and/or Examination** V 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Counseling Psychology PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit. Computer Science  
CPT S
- 500 Proseminar** 1 Faculty research interests, departmental computer systems, computer science research, report preparation.
- 515 Advanced Algorithms** 3 Advanced algorithms and data structures, design and analysis, intractability.
- 516 Algorithmics** 3 Discrete structures, automata, formal languages, recursive functions, algorithms, and computability.
- 527 Computer Security** 3 Examines cyber vulnerabilities and attacks against computer systems and networks; includes security protection mechanisms, cryptography, secure communication protocols, information flow enforcement, network monitoring, and anonymity techniques. Credit not granted for both CPT S 427 and CPT S 527.
- 530 Numerical Analysis** 3 Fundamentals of numerical computation; finding zeroes of functions, approximation and interpolation; numerical integration (quadrature); numerical solution of ordinary differential equations. (Crosslisted course offered as MATH 448, MATH 548, CPT S 430, CPT S 530). Required preparation must include differential equations and a programming course.
- 531 Advanced Matrix Computations** 3 Advanced topics in the solution of linear systems and eigenvalue problems, including parallel matrix computations. (Crosslisted course offered as MATH 544, CPT S 531). Required preparation must include numerical analysis.
- 534 Neural Network Design and Application** 3 Hands-on experience with neural network modeling of nonlinear phenomena; application to classification, forecasting, identification and control. Credit not granted for both CPT S 434 and CPT S 534.
- 538 Scientific Visualization** 3 Data taxonomy; sampling; plotting; using and extending a visualization package; designing visualizations; domain-specific techniques.
- 540 Artificial Intelligence** 3 An introduction to the field of artificial intelligence including heuristic search, knowledge representation, deduction, uncertainty reasoning, learning, and symbolic programming languages. Credit not granted for both CPT S 440 and CPT S 540.
- 542 Computer Graphics** 3 Raster operations; transformations and viewing; geometric modeling; visibility and shading; color. Credit not granted for both CPT S 442 and CPT S 542.
- 543 Human-Computer Interaction** 3 Concepts and methodologies of engineering, social and behavioral sciences to address ergonomic, cognitive, social and cultural factors in the design and evaluation of human-computer systems. Credit not granted for both CPT S 443 and CPT S 543.
- 548 Advanced Computer Graphics** 3 Solid modeling, visual realism, light and color models, advanced surface generation techniques.
- 550 Parallel Computation** 3 Parallel machine models, principles for the design of parallel algorithms, interconnection networks, systolic arrays, computational aspects to VLSI. Required preparation must include differential equations and a programming course.
- 553 Graph Theory** 3 Graphs and their applications, directed graphs, trees, networks, Eulerian and Hamiltonian paths, matrix representations, construction of algorithms. (Crosslisted course offered as MATH 453, MATH 553, CPT S 453, CPT S 553). Required preparation must include linear algebra. Required preparation must include linear algebra.
- 555 Computer Communication Networks** 3 Packet switching networks; multi-access and local-area networks; delay models in data networks; routing and flow control. (Crosslisted course offered as E E 555, CPT S 555).
- 557 Advanced Computer Networks** 3 ATM networks, optical WDM networks, and wireless/mobile networks; access, transport, and routing protocols.
- 560 Operating Systems** 3 Structure of multiprogramming and multiprocessing; efficient allocation of systems resources; design implementation and performance measurement.
- 561 Advanced Computer Architecture** 3 Instruction set architectures, pipelining and super pipelining, instruction level parallelism, superscalar and VLIW processors, cache memory, thread-level parallelism and VLSI. (Crosslisted course offered as E E 524, CPT S 561).
- 562 Fault Tolerant Computer Systems** 3 Fault tolerance aspects involved in design and evaluation of systems; methods of detection and recovery; multicast, middleware, and reconfiguration. (Crosslisted course offered as CPT S 562, E E 562).
- 564 Distributed Systems Concepts and Programming** 3 Concepts of distributed systems; naming, security, networking, replication, synchronization, quality of service; programming middleware. Credit not granted for both CPT S 464 and CPT S 564.
- 566 Embedded Systems** 3 (2-3) The design and development of real-time and dedicated software systems with an introduction to sensors and actuators. Credit

not granted for both CPT S 466 and CPT S 566.

**570 Machine Learning 3** Introduction to building computer systems that learn from their experience; classification and regression problems; unsupervised and reinforcement learning.

**571 Computational Genomics 3** Fundamental algorithms, techniques and applications. Credit not granted for both CPT S 471 and CPT S 571.

**572 Numerical Methods in Computational Biology 3** Computational methods for solving scientific problems related to information processing in biological systems at the molecular and cellular levels.

**573 Bioinformatics Software Development 3** Provides programming skills needed to address current computational problems in bioinformatics; emphasis on mathematical development and software design.

**575 Data Science 3** The data science process, data wrangling, exploratory data analysis, linear regression, classification, clustering, principal components analysis, recommender systems, data visualization, data and ethics, and effective communication. Credit not granted for both CPT S 475 and CPT S 575. Recommended preparation for 575: Familiarity with algorithm design and analysis, basic linear algebra, and basic probability and statistics.

**580 Advanced Topics in Computer Science 3** May be repeated for credit.

**581 Software Maintenance 3** Software maintenance, refactoring, reengineering, reverse engineering.

**582 Software Testing 3** Software testing, testing levels, testing objectives, testing techniques.

**583 Software Quality 3** Software quality, quality assurance, process and product quality, software measures, quality attributes, quality management.

**591 Elements of Network Science 3** Fundamental elements of the emerging science of complex networks, with emphasis on social and information networks. Recommended preparation: CPT S 350 with a C or better.

**595 Directed Study in Computer Science V 1 (0-3) to 3 (0-9)** May be repeated for credit; cumulative maximum 6 hours. Current topics in computer science.

**600 Special Projects or Independent Study V 1-18** May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600

credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V 1-18** May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V 1-18** May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination V 1-18** May be repeated for credit. Course Prerequisite: Admitted to the Computer Science PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Criminal Justice  
CRM J

**505 Comparative Criminal Justice 3** Comparative study of crime laws and criminal justice systems in selected foreign countries.

**510 Leadership in Criminal Justice 3** Study of leadership models and theories as they apply to criminal justice institutions.

**511 Criminal Justice Management 3** Examines the theoretical framework for understanding criminal justice organizations through examining management theory, organizational dynamics, and administration research.

**512 Juvenile Justice 3** Examination of the major theories and contemporary issues related to juvenile delinquency, the juvenile justice system, gangs, and juvenile corrections.

**513 Multicultural Issues in Criminal Justice 3** Critical examination of race, gender, and other diversity and cultural issues within the U.S. criminal justice system.

**514 Professional Development in Criminal Justice and Criminology 1** Professional aspects of research, teaching,

and service activities in criminal justice and criminology.

**520 Criminal Justice Research Methods 3** The design and execution of criminal justice research; critical examination of current research methods in criminal justice.

**521 Advanced Topics in Criminal Justice Research Methods 3** May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: CRM J 520. Exploration of specialized topics in research methodology; topics may include qualitative methods, GIS, ethnography, and survey design.

**522 Foundations of Quantitative Methods 4** Application of foundational quantitative methods utilized in the field of Criminal Justice and Criminology.

**523 Intermediate Quantitative Methods 4** Course Prerequisite: CRM J 522. Intermediate-level quantitative methods including logistic regression, factor analysis, propensity scoring and model building.

**524 Advanced Topics in Quantitative Methods 3** May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: CRM J 523. Advanced quantitative methods used in criminal justice, including time series, HLM, multi-level modeling, spatial analysis, and repeated measures analysis.

**530 Criminal Justice: Process and Institutions 3** Processes of criminal justice in the context of the social, political, and economic environments.

**531 Drugs, Alcohol, and Crime 3** Examination of the research and theory surrounding the relationship between alcohol, drugs, crime, and the criminal justice system.

**540 Seminar in Evaluation Research 3** Interrelationship of ideology, data, policy development, and policy implementation in public policy analysis. (Crosslisted course offered as CRM J 540, POL S 541).

**541 Seminar in Corrections 3** Current issues related to the control, management, and sanctioning of criminal offenders.

**542 Community Corrections 3** Examines correctional processes in a community setting, including probation, parole, and innovative community-based strategies for dealing with the offender.

**555 Seminar in Criminological Theory 3** Individual, situational and ecological correlates of criminal behavior; data sources and empirical research.

**560 Prosecution and Adjudication 3** The function of courts and the behavior of

prosecutors, defense attorneys and judges within the criminal justice system.

**570 The Police and Society 3**

Community and selected social institutional factors as related to their influence on police systems.

**572 Seminar in Comparative**

**Policing 3** Study of the history, organization, and policies of policing systems in selected countries and of transnational policing.

**580 Gender and Justice 3** Criminal justice system's treatment of women offenders, victims, and professionals.

**591 Seminar in the Administration of Criminal Justice 3**

May be repeated for credit; cumulative maximum 6 hours.

Current issues, problems, and critical concerns within the field of administration of criminal justice.

**592 Proseminar in Administration, Justice, and Applied Policy Studies 3**

May be repeated for credit; cumulative maximum 6 hours. Same as POL S 542.

**594 Special Topics in Comparative Criminology and Criminal Justice 3**

May be repeated for credit; cumulative maximum 6 hours. Intensive study of specific topics in comparative criminal justice or criminology.

**595 Advanced Topics in Criminal Justice Institutions and Processes 3**

May be repeated for credit; cumulative maximum 6 hours. In-depth study of issues associated with criminal justice institutions and processes.

**596 Special Topics: Criminal Justice and Public Health 3**

May be repeated for credit; cumulative maximum 6 hours.

Examination of public health ramifications of criminal justice policy and practice; public health approaches to violence and substance abuse prevention.

**600 Special Projects or Independent Study V 1-18**

May be repeated for credit.

Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V 1-18**

May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V 1-**

18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program.

Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination V 1-18**

May be repeated for credit. Course Prerequisite:

Admitted to the Criminal Justice and Criminology PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination.

Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Crop Science

**CROPS**

**503 Advanced Cropping Systems 3**

Understanding the management of constraints to crop production and quality; biological, physical, and chemical approaches to crop health management.

Field trips required. (Crosslisted course offered as CROP SCI 403, CROP SCI 503, PL P 403, PL P 503.) Credit not granted for both CROP SCI 403 and 503, or PL P 403 and 503. Recommended preparation: CROP SCI 305; PL P 429.

**504 Plant Transmission Genetics 3**

Transmission of genes across generations; detailed study of the basic laws of genetics to predict and describe inheritance.

**505 Advanced Classical and Molecular Breeding 3**

Characterization and principles of improving crop quality and adaptation traits with emphasis on molecular breeding strategies. Required preparation must include upper-division course in biology, genetics, or plant breeding.

**510 Seminar 1**

May be repeated for credit. Literature review; preparation and presentation of reports in crop science.

**511 Science Writing Workshop 2**

Instruction, tools, and peer review support to write graduate research proposal or journal article. (Crosslisted course offered as CROP SCI 511, ENTOM 511, SOIL SCI 511).

**512 Topics in Crop Science V 1-2**

May be repeated for credit. Concepts of plant breeding, seed physiology, and technology; crop physiology and management.

**545 Statistical Genomics 3 (2-3)**

Develop concepts and analytical skills for modern breeding by using Genome-Wide Association Study and genomic prediction in framework of mixed linear models and

Bayesian approaches. Recommended preparation: BIOLOGY 474; MBIOS 478.

**555 Epigenetics in Plants 2**

Understanding principles of epigenetics in plants with a focus on its role in understanding and improving plant genomes and their adaptation to the changing environment. Recommended preparation: General genetics.

**600 Special Projects or Independent Study V 1-18**

May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V 1-18**

May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V 1-18**

May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program.

Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination V 1-18**

May be repeated for credit. Course Prerequisite: Admitted to the Crop Science PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Computer Science - Vancouver  
CS

**501 Cloud Systems 3**

Fundamental concepts of cloud computing and their applications within commercial systems; exposure to current research topics in this area.

**515 Advanced Algorithms 3**

Advanced algorithms and data structures, design and analysis, intractability.

**516 Theory of Computation 3**

Discrete structures, automata, formal languages, recursive functions, algorithms, computability, and complexity. Required

preparation must include a strong background in discrete mathematics, automata, and formal languages.

**518 Advanced Analysis of Algorithms** 3 Advanced Study in design and analysis of algorithms, including randomized and approximation algorithms, linear programming, network flow and string matching.

**521 Software Engineering Analysis** 3 Research in software engineering; application of quantitative techniques in the software life cycle; current software engineering literature; exploration of techniques of mathematical modeling and solutions to software engineering problems. Required preparation must include a familiarity with the use and theory behind current software engineering practices.

**527 Computer Security** 3 Computer security concepts, models and mechanism; encryption technology, formal models, policy and ethical implications. Credit not granted for both CS 427 and CS 527.

**541 Artificial Intelligence** 3 Intelligent computer programs; simulation of cognitive processes. Required preparation must include prior knowledge and experience in artificial intelligence.

**542 Computer Graphics** 3 Raster operations; transformations and viewing; geometric modeling; visibility and shading; color. Credit not granted for both CS 442 and CS 542.

**547 Computer Game Design** 3 Design and implementation of computer games. Credit not granted for both CS 447 and CS 547.

**548 Advanced Computer Graphics** 3 Solid modeling, visual realism, light and color models, advanced surface generation techniques. Required preparation must include a prior knowledge and understanding of linear algebra and the graphics pipeline.

**558 Wireless Sensor Networks** 3 Design and implementation of sensor networks. Required preparation must include a prior knowledge and understanding of communication protocols such as TCP/IP and experience in network programming.

**563 Concurrent Programming** 3 Multithreaded programming; parallel programming; distributed programming; theory of concurrency; synchronization techniques; libraries and tools.

**564 Distributed Systems** 3 Distributed systems concepts; distributed systems models; socket programming; remote procedure call; distributed file

systems; transactions and concurrency control; fault tolerance.

**565 File and Storage Systems** 3 Design and implementation of file and storage systems, introduction of the architecture and characteristics of the components on which storage systems are built.

**566 Embedded Systems** 3 (2-3) Design and development of real-time and dedicated software systems with an introduction to sensors and actuators. Credit not granted for both CS 466 and CS 566.

**570 Machine Learning** 3 Introduction to building computer systems that learn from their experience; classification and regression problems; unsupervised and reinforcement learning.

580 Advanced Topics in Computer Science 3 May be repeated for credit.

**582 Software Testing** 3 Software testing, testing levels, testing objectives, testing techniques.

**595 Directed Study in Computer Science** V 1 (0-3) to 3 (0-9) May be repeated for credit; cumulative maximum 3 hours. Current topics in computer science.

**700 Master's Research, Thesis, and/or Examination** V 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

Cultural Studies And Social Thought In Education  
CSSTE

**530 (TCH LRN 559) Readings in Cultural Studies and Social Thought in Education** 1 May be repeated for credit; cumulative maximum 3 hours. Current scholarship in the field of cultural studies in education and practices of schools.

**531 (TCH LRN 536) Cultural Studies in Education** 3 Historical and conceptual background of the field of cultural studies.

**532 (TCH LRN 535) Gender, Power, and Education** 3 Interdisciplinary focus on the relationships among gender, power, and education.

**533 (TCH LRN 589) Race, Identity, and Representation in Education** 3 Interdisciplinary research in race, identity and representations in education.

**534 (TCH LRN 592) Social Theory in Education** 3 Social theory and how it applies to intellectual work in education. Recommended preparation: Admission to a doctoral program.

**535 Multicultural Education in a Global Society** 3 Multicultural and multilingual education from a global perspective; development of multicultural curriculum. (Crosslisted course offered as TCH LRN 580, CSSTE 535, MIT 552). Credit not granted for both TCH LRN 480 and TCH LRN 580.

**536 (TCH LRN 587) Environment, Culture and Education** 3 Role of education in the social, ecological, and political conflicts between culture and environment.

**537 (TCH LRN 529) Place-Based Education** 3 Theory and practice of place-based education with an emphasis on community-based action research and curriculum planning.

**538 (TCH LRN 576) Youth Cultures in Education** 3 Analysis of how youth cultures operate in society and how they are practiced in schools.

**539 Curriculum Theory** 3 Curriculum theory as the interdisciplinary study of educational experience. (Crosslisted course offered as TCH LRN 577, CSSTE 539).

**540 (TCH LRN 575) Globalization and Identity in Education** 3 Issues relating to the complexities of globalization and identity in education.

**544 (ED RES 567) Discourse Analysis** 3 Course Prerequisite: ED RES 562; ED RES 564. Examination of and preparation for discourse analysis research approach.

**545 Critical Ethnography in Education** 3 Course Prerequisite: ED RES 562; ED RES 564. In-depth focus on issues in qualitative research and ethnography and critical ethnography. (Formerly ED RES 568.)

**800 Doctoral Research, Dissertation, and/or Examination** V 1-18 May be repeated for credit. Course Prerequisite: Admitted to Cultural Studies and Social Thought in Education PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Design  
DESGN

**550 Applications: Using Research in the Inquiry Process** 3 Application of scientific research in the advanced design process.

**561 Seminar in Design Thinking** 3 Course Prerequisite: Doctoral standing in Design. Understanding design thinking or

design knowing and translating research and theory into practice.

**562 Area Readings** 3 Course

Prerequisite: DESIGN 561. Forum for the advancement of understanding and discussion of readings related to interdisciplinary design.

**563 Directed Readings** 3 Course

Prerequisite: DESIGN 562. Advanced critical and comprehensive reviews of literature pertinent to student's focus area; development of specialization and expertise in identified area.

**564 Design Research Methods** 4

Course Prerequisite: DESIGN 562.

Development and preparation of research proposals; identification of theories, exploration of research methods and strategies; development of thesis statement and literature review. Recommended preparation: Concurrent enrollment in DESIGN 563; DESIGN 565.

**590 Teaching Practicum** V 1-3 May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Doctoral standing in Design. Supervised teaching experience integrating application of design knowledge and approaches.

**598 Topics in Design** V 1-3 May be repeated for credit; cumulative maximum 9 hours. Course Prerequisite: Doctoral standing in Design. Topical issues in design responding to the shifting demands and needs of the design professions.

**600 Special Projects or Independent Study** V 1-18 May be repeated for credit.

Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**800 Doctoral Research, Dissertation, and/or Examination** V 1-18 May be

repeated for credit. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Digital Technology And Culture  
DTC

**560 Critical Theories, Methods, and Practice in Digital Humanities** 3

History, theory, and practice of digital humanities, with attention paid to how digital humanities are transforming disciplinary knowledge. (Crosslisted course offered as ENGLISH 560, DTC 560).

**561 Studies in Technology and Culture** 3

Foundation examination of key concepts, tools, and possibilities afforded by engaging with technology through a critical cultural lens. (Crosslisted course offered as DTC 561, ENGLISH 561).

Electrical Engineering

E E

**501 Linear System Theory** 3

Dynamic systems from the state variable approach; observability, controllability, stability, and sensitivity of differential and nondifferential systems.

**502 Linear Multivariable Control** 3

Course Prerequisite: E E 501. Optimal linear feedback control, optimal stochastic observers, LQG/LTR design methodology, modern Wiener-Hopf design, robust controllers.

**503 Structure, Dynamics and Control of Large-scale Networks** 3

Course Prerequisite: E E 501; E E 507. Introduction and development of computational and analytical methods required to characterize large-scale networks.

**504 Modern Optics** 3 Diffraction theory, Fourier transforming and imaging properties of lenses, spatial filtering, holography, temporal and spatial coherence, imaging through random media.

**505 Nonlinear System Theory** 3

Course Prerequisite: E E 501. Overview of nonlinear phenomena, Lyapunov stability, input-output stability, periodic orbits, singular perturbation, differential geometric methods, bifurcations and complex behaviors.

**507 Random Processes in Engineering** 3 Functions of random variables; random sequences; stochastic processes; mean-square stochastic calculus; ergodicity; spectral density; linear transformations, filtering, dynamic systems.

**508 Estimation Theory for Signal Processing, Communications, and Control** 3

Course Prerequisite: E E 501; E E 507. Principles of statistical estimation; LLSE; Kalman filtering; smoothing; prediction; maximum-likelihood and Bayesian estimation.

**509 Adaptive Control** 3

Course Prerequisite: E E 501. Model reference adaptive systems (MRAS), adaptive observers, adaptive control, on-line identification, robustness issues, self-tuning regulators.

**511 Protection of Power Systems II** 3

Protection of electrical equipment as related to electric power systems with emphasis on digital algorithms.

**518 Advanced Electromagnetic Theory I** 3

Electromagnetic waves,

electromagnetic theorems and concepts, solutions to the wave equation in rectangular, cylindrical and spherical coordinates.

**520 Plasma Engineering** 3

Electromagnetics, kinetic theory, and fluid mechanics of plasmas in space, arcs, plasma processing, coronas, and fusion reactors.

**521 Analysis of Power Systems** 3

Concepts and practices of modern power engineering, including steady-state and dynamic analysis, economics and control design.

**522 High Voltage Engineering** 3

High voltage engineering concepts and techniques that facilitate design, research, and development of modern electric power apparatus and interconnected components.

**523 Power Systems Stability and Control** 3

Course Prerequisite: E E 521 with a B- or better. Dynamic analysis of interconnected electric power system; modeling of synchronous generators, loads and transmission network; small-signal stability and transient stability analysis; dynamic stability controls. Recommended preparation: E E 489 with a B- or better.

**524 Advanced Computer Architecture** 3

Instruction set architectures, pipelining and super pipelining, instruction level parallelism, superscalar and VLIW processors, cache memory, thread-level parallelism and VLSI. (Crosslisted course offered as E E 524, CPT S 561).

**525 Power System Applications of Power Electronics** 3

Course Prerequisite: E E 521. Power electronic converters in modern power systems, FACTS devices, HVDC, compensation; microgrids and integration renewable energy resources; modeling and control.

**526 High Voltage Overhead Transmission Lines** 3

Course Prerequisite: Graduate standing in Electrical Engineering. Electrical analysis, performance, and design of high voltage transmission lines; power capacity, electromagnetic environment, electromagnetic compatibility, measurements, grounding.

**527 Antenna Theory and Design** 3

Antenna fundamentals, analytical techniques, characteristics and design procedures for selected types of wire, broadband, and aperture antennas.

**528 Advanced Topics in Electromagnetics** 3

May be repeated for credit; cumulative maximum 6 hours. Advanced topics of current interest in wave propagation (electromagnetics, acoustics, or optics).

**530 Digital Signal Processing II** 3

Course Prerequisite: E E 507. Frequency

selective digital filtering, least-squares filtering, adaptive filtering, multirate signal processing.

**535 Numerical Solutions to EM Problems** 3 Theory and use of finite-difference time-domain; numeric dispersion; absorbing boundary conditions; scattering; radiation; time-domain vs. frequency-domain.

**536 Power Systems Economics and Electricity Markets** 3 Economic dispatch and optimal power flow; electricity market; short-term load forecasting; electricity price forecasting; price-based unit commitment; arbitrage in electricity markets; market power analysis.

**545 Data Compression** 3 Course Prerequisite: E E 507. Source coding with a fidelity criterion; quantization theory; predictive, transform and subband coding; noiseless source codes.

**548 Information Theory and Channel Coding** 3 Course Prerequisite: E E 507. Information theory; entropy, mutual information, source and channel coding theorems, channel capacity, Gaussian channels; channel coding: block and convolutional codes.

**551 Data Communication Systems** 3 Course Prerequisite: E E 507. Digital communications; multi-amplitude/phase signal constellations; probability of error performance; cutoff rate; Viterbi algorithm; trellis coded modulation.

**555 Computer Communication Networks** 3 Packet switching networks; multi-access and local-area networks; delay models in data networks; routing and flow control. (Crosslisted course offered as E E 555, CPT S 555).

**562 Fault Tolerant Computer Systems** 3 Fault tolerance aspects involved in design and evaluation of systems; methods of detection and recovery; multicast, middleware, and reconfiguration. (Crosslisted course offered as CPT S 562, E E 562).

**571 Advanced Wireless Integrated Circuits and Systems** 3 Analysis and design methodologies of state-of-the-art wireless integrated circuits and systems.

**576 Analog Integrated Circuits** 3 Analysis and design of analog integrated circuits in CMOS and BiCMOS technologies; current mirrors, gain stages, operational amplifiers, frequency response, and compensation. Credit not granted for both E E 476 and 576.

**581 Advanced Topics in Power Systems** V 2-3 May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: E E 521. Power system

operations including AGC, economic dispatch and security; power system dynamics; intelligent systems applications.

**582 Advanced Topics V** 1-3 May be repeated for credit.

**586 VLSI Systems Design** 3 VLSI models, layout algorithms, design methodologies, simulation and layout tools, algorithm design for VLSI implementation.

**587 System on Chip (SoC) Design and Test** 3 System on Chip (SoC) and sub-micron integrated circuit design and testing.

**595 Directed Study in Electrical Engineering** V 1 (0-3) to 3 (0-9) May be repeated for credit. Current topics in electrical engineering. (Crosslisted course offered as E E 595 and ECE 595.)

**596 Advanced Analog Integrated Circuits** 3 MOS and BiCMOS technologies; MOS and BiCMOS operational amplifiers; A/D, D/A converters; switched-capacitor filters; continuous-time filters.

**600 Special Projects or Independent Study** V 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination** V 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**701 Master's Independent Capstone Project and /or Examination** V 1-6 May be repeated for credit. Capstone project or final examination for professional master's degree under the Graduate School. The credits will include a balloted evaluation of the student's completion of the program's capstone/examination requirements by the program's graduate faculty. Students must have graduate degree-seeking status and obtain approval from their major advisor/committee chair before enrolling for 701 credit.

**702 Master's Special Problems, Directed Study, and/or Examination** V 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major

advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination** V 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Electrical Engineering PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit. Engineering Management E M

**501 Management of Organizations** 3 Exploration of issues related to individual behavior in work organizations, including motivation, leadership, team-building, and team management skills. Credit not granted for both E M 401 and 501.

**503 Managing Variability Using Statistics** 3 Managing variability and uncertainty using statistics for engineering decision-making involving risk. Credit not granted for both E M 403 and 503.

**505 Finance for Technical Systems** 3 Time value of money, capital budgeting, accounting principles, cost, valuation, risk, cost accounting and sensitivity analyses: concepts for engineering decision-making.

**508 Legal Concepts for Engineering and Technical Managers** 3 Basic legal obligations of engineering/technical managers; identify, minimize and recognize risks and liability; contemporary legal environment and business law.

**520 Contract Project Management** 3 Contract project bids, proposals, contracts, project delivery/organization; estimating, scheduling, resource loading, project monitoring and controls, safety and quality. Credit not granted for both E M 420 and 520.

**522 Leadership, Supervision, and Management** 3 Strategies of supervision with practical application techniques presented to create individual and organizational motivation. Credit not granted for both E M 422 and 522.

**526 Constraints Management** 3 Identifies factors that block improvements in any system; effective breakthrough solutions; continual systems improvements for manufacturing, administration, projects. Credit not granted for both E M 426 and E M 526.

**530 Applications of Constraints Management** 3 Understanding and applying proved solutions developed by the theory of constraints in areas of production, project management, finance, and distribution.

Credit not granted for both E M 430 and E M 530.

**534 Contemporary Topics in Constraints Management** 3 May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: E M 526; E M 530. Contemporary teaching tools, software packages, current techniques and thought in managing complex systems using the theory of constraints.

**538 Lean Agility** 3 Integration of the best of Lean, Six Sigma, and Theory of Constraints to accelerate the continuous improvement process. Credit not granted for both E M 438 and 538.

**540 Operations Research for Managers** 3 Applying linear, integer, goal programming; network optimization; queuing analysis; dynamic programming; simulation; Markov analysis; and forecasting to engineering management decisions.

**545 Technical Decision Analysis** 3 Course Prerequisite: E M 503. Decision analysis provides a structured discipline for describing, analyzing, and finalizing decisions involving uncertainty. Recommended preparation: Basic STAT course.

**555 Enterprise Resource Management** 3 Focusing the flow of quality, timely products and cooperative supply chain operations and planning using simulation and effective enterprise resource management.

**560 Integrated Supply Chain Management** 3 Concepts and techniques for design and managing manufacturing and service, operations intended to develop a world class organization. Credit not granted for both E M 460 and 560.

**564 Project Management** 3 Technical tools, Critical Path Method (CPM), Program Evaluation Review Technique (PERT), cost/schedule control systems, behavioral issues and organizational structure. Credit not granted for both E M 464 and E M 564.

**565 Introduction to Systems Management** 3 Design manufacture, operation of complex system development for engineering managers; project planning, organizing, and controlling tools for engineering system constraints.

**566 Systems Analysis and Practice** 3 Course Prerequisite: E M 565. Problem-solving methodologies based on system concepts and design applications for complex, large-scale technical systems pertinent to program managers.

**567 System Supportability and Logistics Management** 3 Supportability and logistics engineering and management

in a system life cycle, from concept to retirement.

**568 Risk Assessment and Management** 3 Risk management strategies and techniques for the design and management of engineering and technology systems.

**570 Six Sigma Quality Management** 3 Quality management programs, quality assurance, statistical quality control concepts and product design reliability. Credit not granted for both E M 470 and 570.

**575 Performance Management in Technical Organizations** 3 Management of high technology organizations; planning, measurement, and human factors in improving high technology organizations; productivity, motivation and performance systems.

**580 Quality Control and Reliability** 3 Quality analysis, modeling process, product quality, statistical process control, process capability studies; sampling concepts, reality models, predictions, design testing. Credit not granted for both E M 480 and E M 580. Recommended preparation: STAT 430.

**585 Quality Improvement Using Design of Experiments** 3 Design for quality improved products; processes and services using designed experiments, including robust/parameter design. Credit not granted for both E M 485 and E M 585. Recommended preparation: Undergraduate statistics.

**587 Managing Work Design for Safety and Productivity** 3 An integrated approach to time-and-motion studies, human factors, and ergonomics to design work that simultaneously improves both productivity and safety.

**590 Leading Design and Innovation** 3 Techniques and tools to optimize cost, quality, time to market, and to improve comprehensive product design, manufacturability and service components. Credit not granted for both E M 490 and E M 590.

**591 Strategic Management of Technology and Innovations in Engineering** 3 Management of technological innovation; integrating strategy, new product development, corporate entrepreneurship, and innovation; features action-oriented cases.

**595 Advanced Topics in Engineering Management I** V 1-3 May be repeated for credit; cumulative maximum 9 hours. A wide range of current high-interest engineering management topics.

**596 Advanced Topics in Engineering Management II** 3 May be repeated for credit; cumulative maximum 9 hours. A wide range of current high-interest engineering management topics.

**600 Special Projects or Independent Study** V 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**701 Master's Independent Capstone Project and /or Examination** V 1-6 May be repeated for credit. Capstone project or final examination for professional master's degree under the Graduate School. The credits will include a balloted evaluation of the student's completion of the program's capstone/examination requirements by the program's graduate faculty. Students must have graduate degree-seeking status and obtain approval from their major advisor/committee chair before enrolling for 701 credit.

**702 Master's Special Problems, Directed Study, and/or Examination** V 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

Electron Microscopy  
E MIC

**586 Special Projects in Electron Microscopy** V 2 (0-6) to 3 (0-9) May be repeated for credit. Practical training in one or more areas of electron microscopy; TEM, SEM, ultramicrotomy, specimen processing; confocal fluorescent microscopy.

**587 Special Topics in Electron Microscopy** 1 May be repeated for credit; cumulative maximum 4 hours. Electrical Engineering - Vancouver  
ECE

**501 Fundamentals of Laboratory-on-Chip** 3 Operating principles of laboratory-on-chip (LoC) technologies, basics of design and fabrication, integration with microdevices, digital and high-frequency circuits, sensors, and power systems.

**522 High Voltage Engineering** 3 High voltage engineering concepts and techniques that facilitate design, research, and development of modern electric power apparatus and interconnected components.

**525 Experimental Methods for**

**Electrical Engineering 3** Design of experiments; data analysis methods; statistical testing; dynamic measurements; uncertainty analysis, yield concepts; data acquisition; probability distributions; and report writing. Recommended preparation: basic statistics knowledge.

**533 Advanced Antenna Design 3**

Advanced antenna types and design methods, small antennas, reconfigurable antennas, wideband microstrip antennas, millimeter-wave antennas, phased arrays, design of array feed, mutual coupling, system level implications such as full-duplex and MIMO. Recommended preparation: ECE 370; ECE 471.

**536 Power Systems Economics and**

**Electricity Markets 3** Economic dispatch and optimal power flow; electricity market; short-term load forecasting; electricity price forecasting; price-based unit commitment; arbitrage in electricity markets; market power analysis.

**537 High Frequency Circuit Design**

**3** Active microwave components (diodes, transistors); microwave transistor amplifiers; oscillators; mixers; stability criteria and circles; noise in microwave circuits; noise figure. Recommended preparation: ECE 370; ECE 425.

**543 Advanced Hardware**

**Verification 3** Contemporary methods of functional hardware verification for complex digital designs, including functional simulation, coverage metrics, event and assertion-based verification, property specification language, and formal verification techniques. Recommended preparation: ECE 324.

**569 Advanced Power Electronics 3**

Advanced design, analysis, modeling, and verification of applied power electronics and related control systems. Recommended preparation: ECE 327.

**576 Sensors 3 (2-3)** Classification of sensors, sensing modalities, comparison; figures of merit; sensing parameters; sensor miniaturization; sensor manufacturing; and case study: Pressure sensor, gas sensor, temperature sensor, and biosensor. Required preparation: Circuit analysis.

**586 Solid State Device Design and**

**Modeling 3** Design and modeling of solid-state devices such as PN diode, BJT, and MOSFET; Simulation and device design using TCAD tools for physical modeling and fabrication process integration. Recommended preparation: Basic semiconductor physics.

**595 Directed Study in Electrical Engineering V 1 (0-3) to 3 (0-9)** May be

repeated for credit. Current topics in electrical engineering. (Crosslisted course offered as E E 595 and ECE 595.)

**700 Master's Research, Thesis, and/or Examination V 1-18** May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V 1-18** May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

Economic Sciences  
ECONS

**500 Macroeconomic Theory I 3** Introduction to dynamics, growth and investment, overlapping generations models, Ramsey model, consumption and investment. (Crosslisted course offered as ECONS 500, FIN 500). Required preparation must include intermediate macroeconomics and one year of calculus. Required preparation must include intermediate macroeconomics and one year of calculus.

**501 Microeconomic Theory I 3** Microeconomic theory, multivariate optimization, consumer and producer theory, competitive partial equilibrium, introduction to imperfect competition. (Crosslisted course offered as ECONS 501, FIN 501). Required preparation must include intermediate microeconomics and one year of calculus. Required preparation must include intermediate microeconomics and one year of calculus.

**502 Macroeconomic Theory II 3** Course Prerequisite: ECONS 500.

Macroeconomic theory, short-run fluctuations and nominal rigidities, monetary economics and inflation, real business cycle models, unemployment international macroeconomics. (Crosslisted course offered as ECONS 502, FIN 502).

**503 Microeconomic Theory II 3** Course Prerequisite: ECONS 501. General equilibrium, welfare economics and social choice, market failure, game theory, economics of information. (Crosslisted course offered as ECONS 503, FIN 503).

**504 Production and Consumption Economics 3** Course Prerequisite: ECONS

502; ECONS 503. Advanced duality topics, demand and supply system modeling, financial economics and risk.

**505 Economics for Agricultural Decision Making 3** Managerial economics with specific applications to agricultural issues.

**506 Mathematics Primer for Economists 3** Intensive overview of the essential mathematical tools needed for graduate study in topics of economic sciences.

**510 Statistics for Economists 3** Statistical theory underlying econometric techniques utilized in quantitative analysis of problems in economics and finance. (Crosslisted course offered as ECONS 510, FIN 510). Required preparation must include college calculus and matrix algebra. Required preparation must include college calculus and matrix algebra.

**511 Econometrics I 3** Course Prerequisite: ECONS 510. Single equation linear and nonlinear models; estimation, inference, finite and asymptotic properties, effects and mitigation of violations of classical assumptions. (Crosslisted course offered as ECONS 511, FIN 511).

**512 Econometrics II 3** Course Prerequisite: ECONS 501; ECONS 511. Econometric methods for systems estimation; simultaneous equations, discrete and limited dependent variable, panel data, and time series data. (Crosslisted course offered as ECONS 512, FIN 512).

**513 Econometrics III 3** Course Prerequisite: ECONS 502; ECONS 503; ECONS 512. Linear and non-linear models and maximum likelihood estimation and inference; semi-parametric and parametric methods; limited dependent variable models.

**514 Econometrics IV 3** Course Prerequisite: ECONS 502; ECONS 503; ECONS 512. Constrained estimation, testing hypotheses, bootstrap resampling, BMM estimation and inference, nonparametric regression analysis, and an introduction to Bayesian econometrics.

**521 Topics in Economic Sciences V 1-3** May be repeated for credit; cumulative maximum 6 hours. Current topics in the development and application of the economic sciences. Required preparation must include intermediate micro- and macro-economics, and econometrics course work.

**522 Financial and Commodity Derivatives 3** Design, trading, structure, and pricing of derivatives; working knowledge of how derivative securities work, how they are used, and how they are priced.



**525 Master's Econometrics** 3 Theory and practice of multiple regression methods; applications to the study of economic and other phenomena; use of computer regression programs. Required preparation must include introductory statistics course.

**526 Mathematical Economics with Applications** 3 Linear algebra, matrix algebra, calculus-based analysis of consumer and producer theory, comparative statistics, and constrained optimization. Required preparation must include intermediate microeconomics and calculus course work.

**527 Microeconomic Analysis** 3 Consumer and producer behavior; partial and general equilibrium; game theory; imperfectly competitive markets; and market failures. Required preparation must include intermediate microeconomics and calculus course work.

**528 Master's Macroeconomics Analysis** 3 Master's-level course to develop a coherent theoretical framework to interpret macro data and to analyze macro policy.

**529 Research Methods** V 1-2 May be repeated for credit; cumulative maximum 3 hours. Prepare and communicate professional-quality research with an emphasis on learning how to identify, develop, write, and present research.

**532 Environmental and Natural Resource Economics** 3 Economic principles and models applied to natural resource and environmental problems, issues, and policies.

**533 International Trade and Policy** 3 International trade theories, policies, and research issues related to world trade with emphasis on agricultural commodity markets.

**534 Production Economics** 3 Course Prerequisite: ECONS 526. Production economics theory and methods applied to problems of production response, economic optimization, technology, policy, risk and dynamics.

**536 Applied Statistics and Econometrics for Economics and Finance** 3 Data and problem driven approach to formulating, estimating, and interpreting models that address problems in the area of finance and financial economics; review relevant basic statistics and probability concepts, and apply these to linear regression, regression diagnostics, and time series econometrics. Recommended preparation: 3-credit introductory statistics (MGTOP 215); 3-credit microeconomics or macroeconomics course; 3-credit mathematics with calculus course; 3-credit introductory finance course.

**555 Managerial Economics for Decision Making** 3 Course Prerequisite: Admission to the MBA program. Optimal economic decision making for business in a global environment. Not open to economics graduate students.

**571 International Trade** 3 Course Prerequisite: ECONS 502; ECONS 503; ECONS 511. Recent developments in trade theory and policy, including international factor movements, empirical analysis of trade flows and strategic trade policies.

**572 International Development** 3 Course Prerequisite: ECONS 502; ECONS 503; ECONS 511. Structural and two-sector growth models of developing countries and countries in transition; empirical estimation of sources of growth.

**581 Natural Resource Economics** 3 Course Prerequisite: ECONS 502; ECONS 503; ECONS 511. Economic dynamics of natural resource systems.

**582 Environmental Economics** 3 Course Prerequisite: ECONS 502; ECONS 503; ECONS 511. Economic theory for environmental issues; externalities, property rights, and welfare analysis; policy design and implementation; non-market valuation and cost/benefit analysis.

**583 Public Sector Economics** 3 Course Prerequisite: ECONS 502; ECONS 503; ECONS 511. Public sector and public choice economics, including government debt and tax policy, public decision making, bureaucratic behavior and rent-seeking, with applications.

**593 Applications in Microeconomic Topics** 3 Course Prerequisite: ECONS 502; ECONS 503; ECONS 511. Applied topics in healthcare, sports, transportation and other markets.

**594 Theory of Industrial Organization** 3 Course Prerequisite: ECONS 502; ECONS 503; ECONS 511. Theory of market structure and firm behavior, including price and non-price competition, information and strategic behavior, and technological change. (Crosslisted course offered as ECONS 594, FIN 594).

**596 Advanced Topics in Financial Economics** V 1-6 May be repeated for credit; cumulative maximum 12 hours. Course Prerequisite: Admission to PhD programs in business, or ECONS 500 and ECONS 501. Topics may include financial theory and empirical methods as applied to financial management, investments, international finance, and markets/institutions. (Crosslisted course offered as FIN 596, ECONS 596).

**598 PhD Research Seminar** 1 May be repeated for credit; cumulative maximum 4 hours. Seminar focusing on PhD students presenting their own research and critically assessing the research of other PhD students.

**599 Special Topics in Economics** 3 May be repeated for credit; cumulative maximum 3 hours.

**600 Special Projects or Independent Study** V 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination** V 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination** V 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination** V 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Agricultural Economics or Economics PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Educational Administration And Supervision  
ED AD

**501 Philosophy of Education** 3 Development of American educational philosophy.

**503 Values and Ethics for Educational Leaders** 3 Study of ethical theories, the moral dilemmas of public schooling, and the skills of ethical reasoning; professional code of ethics.

**506 Social Context of Education** 2 The interpretation of social context issues including historical, legal and cultural

factors as these influence policies and practice in education.

**507 Social Foundations of Education**

3 Educational adaptations to the economic and social trends and forces.

**509 Leading School Improvement**

3 Leadership functions and strategies used in planning, evaluating, and influencing school improvement.

**510 Improvement of Instruction**

3 Analysis and evaluation of instructional models with emphasis on information processing; implications for changing teaching style.

**512 Leadership Studies for Social Justice**

3 Leadership theories and approaches including present educational problems, leadership theories, and perspectives.

**513 Organizational Behavior**

3 Human behavior within various social and cultural organizational settings.

**514 Basic Principles of Curriculum Design**

3 The application of theoretical concepts and approaches in the planning and design of curricula.

**515 Curriculum Implementation**

3 Research and practice; innovation and change in curricular organization emphasizing implementation.

**516 Instructional and Curricular Leadership**

V 2-3 Theory, research, and practice of providing instructional and curricular leadership in schools and other educational settings.

**518 Media Literacy and Educational Technology**

3 Relates research and theory of media literacy to instructional resources and current leadership practices; problems of planning and administering programs.

**520 Seminar in Curriculum and Instruction**

V 2-3 Contemporary issues, analyses and developments of educational programs.

**521 Topics in Education**

V 1-4 May be repeated for credit; cumulative maximum 6 hours. Recent research, developments, issues, and/or applications in selected areas of education.

**522 Topics in Education**

V 1-4 May be repeated for credit; cumulative maximum 6 hours. Recent research, developments, issues, and /or applications in selected areas of education.

**531 Special Topics**

1 May be repeated for credit; cumulative maximum 3 hours. Topical issues in education responding to shifting demands and skills needed by parents, teachers, school administrators and community leaders.

**532 Special Topics**

1 May be repeated for credit; cumulative maximum 3 hours.

Topical issues in education responding to shifting demands and skills needed by parents, teachers, school administrators and community leaders.

**534 Special Topics**

1 May be repeated for credit; cumulative maximum 3 hours. Topical issues in education responding to shifting demands and skills needed by parents, teachers, school administrators and community leaders.

**537 Advanced Qualitative Research in Education**

3 Course Prerequisite: ED RES 564 or ED AD 536. Advanced theory and methods of qualitative research; theoretical foundations, data collection and analysis, and reporting.

**538 Special Topics in Qualitative Research in Education**

V 1-3 May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: ED RES 564 or ED AD 536.

**539 Applied Research for Educational Leaders**

3 Integrates the principles, skills, and tools of research into the leadership and managerial practices of educational leaders.

**560 Student Personnel Services in Higher Education**

V 2-3 Philosophy, structure, functions, and organization of student affairs administration.

**561 Introduction to College Student Development**

3 Student development theory, related research and the application of theory to practice in student affairs work.

**562 Professional Issues in Student Affairs Administration**

3 Course Prerequisite: ED AD 560; ED AD 561. The organization, programs and professional issues related to selected student affairs programs and units.

**563 Research in College Student Development**

3 Course Prerequisite: ED AD 561; admission to EdD program. Critique, understand, and apply college social identity models as they relate to teaching, advising, and working with diverse student populations.

**565 Practicum in Higher Education**

3 (0-9) Course Prerequisite: Graduate student with 15 hours of completed course work in TCH LRN, ED AD, ED PSYCH, or ED RES courses. Selected supervised experiences in general higher education and student affairs settings provide for the investigation/application of theory/methods gained through formal course work.

**567 Diversity in Higher Education**

3 Reflection on experience and examination of the theory of practice or organizational leadership in the context of diversity.

**568 Finance and Budgeting in Higher Education**

3 Course Prerequisite:

By instructor permission. Exposes students to the fundamentals of higher education budgeting and finance.

**570 Community and Technical Colleges**

3 For teachers and administrators. Development and function of community and technical colleges.

**571 College Teaching** 3 Concepts, principles, issues, and procedures in college curriculum development, and college teaching.

**572 History of Higher Education**

3 History, philosophy, objectives, and issues of colleges and universities as social institutions.

**573 Issues in Higher Education**

3 Selected contemporary issues in higher education.

**578 Higher Education Law and Ethics**

3 Legal and ethical aspects of higher education with special reference to administrators, faculty, and students in higher education institutions.

**579 Administration of Higher Education**

3 Organization, administration and leadership of universities, colleges, and community colleges.

**580 School Organization and Administration**

3 Readings and discussions on the theories and practices of school organization and administration.

**581 Politics in Education**

3 Examining the intrapersonal, organizational politics and political dilemma, particularly as they pertain to marginalized groups.

**582 Policy Formation and Analysis in Education**

3 Political and organizational policy formation processes in educational organizations; policy analysis in education.

**583 Community and Communications**

3 Social, political, and economic relationships between education and the community; methods of public polling and campaign strategy techniques.

**584 Human Resource Management**

3 Human relations in education; problems involved and practical solutions considered.

**585 Financial Management in Education**

3 Economics and financing of education; financial planning, budget development, investment analysis, bonding, cost effectiveness; current trends in educational finance.

**587 Seminar in School Administration**

V 1-6 May be repeated for credit; cumulative maximum 6 hours. Interdisciplinary seminars; related studies; discussions in several areas by specialists.

**588 The Law and Education**

3 Fundamental legal principles within which public education functions; applicable

school codes of Washington and other states; review important court cases.

**589 Leadership Development**

**Seminar 3** Improving knowledge and skills in strategic planning, decision making, leadership issues, conflict, motivation, staff development, productivity, and stress.

**590 Internship V 1-6** May be repeated for credit; cumulative maximum 12 hours.

Course Prerequisite: By interview only. Internship in professional positions.

**591 (ED RES 570) Action Research**

**3** Philosophical assumptions and methodological strategies of action research; theoretical and practical foundations for conducting action research studies in schools and other organizations.

**596 Preparing Grant Proposals 3**

Identification of funding sources; analysis, evaluation, and production of grant proposals.

**600 Special Projects or Independent**

**Study V 1-18** May be repeated for credit.

Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis,**

**and/or Examination V 1-18** May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V 1-18**

May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination V 1-18**

May be repeated for credit. Course Prerequisite: Admitted to the Educational Leadership PhD or EdD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Educational Psychology

EDPSY

**502 Theoretical Foundations of Learning and Instruction 3** Historical and contemporary theories of learning and instruction: application of theory in counseling and teaching settings.

**503 Advanced Educational Psychology 3** Contemporary theories, models, and empirical research in educational psychology.

**504 Classroom-focused Research Methods 2** Methods, design, implementation, and application of results in classroom context.

**505 Research Methods I 3** Research methods; literature review; design, implementation, and interpretation of results.

**507 Introduction to Qualitative Research 3** Introductory qualitative course for graduate students in behavioral sciences interested in diverse social and cultural contexts; prepares students for advanced qualitative track, ED PSYCH 564/ED RES 564. Recommended preparation: ED PSYCH 505.

**508 Educational Statistics 3** Introductory course for graduate students in applied statistics for the behavioral sciences. Recommended preparation: ED PSYCH 505.

**509 Educational Measurements: Test Development and Assessment V 2-3** Theory and use of standardized educational measurement instruments; intelligence, aptitude, and achievement tests; measurement of outcomes.

**510 Assessment of Learning 3** Assessment of student learning, school and district evaluation; particularly appropriate for school administrators.

**511 Classical and Modern Test Theory 3** Course Prerequisite: ED PSYCH 508; ED PSYCH 509. Large-scale educational assessment and test development and evaluation; history and policy uses of achievement tests.

**521 Topics in Educational Psychology V 1-4** May be repeated for credit; cumulative maximum 6 hours. Recent research, developments, issues, and/or applications in selected areas of educational psychology.

**568 Quasi-Experimental Design 3** Course Prerequisite: ED PSYCH 505 or ED RES 563; ED RES 565. Integration and application of research skills in writing proposals, dissertations, papers for publication; interpreting, critiquing, and synthesizing research studies.

**569 Seminar in Quantitative Techniques in Education V 2-3** May be repeated for credit; cumulative maximum 6

hours. Course Prerequisite: ED RES 565. Application of parametric and nonparametric statistics, data processing using computer packages in educational research.

**570 Introduction to Program Evaluation 3** Course Prerequisite: ED PSYCH 505 or ED RES 563. Introduction to strategies and techniques for evaluation of educational and social programs.

**571 Theoretical Foundations and Fundamental Issues in Program Evaluation 3** Course Prerequisite: ED PSYCH 570. Examine the history of the field, the ideas and practices of theorists who formed the field and how their work has influenced program evaluation.

**572 Introduction to Systematic Literature Reviews and Meta-Analyses 3** Course Prerequisite: ED PSYCH 505 or 508. Introduction to the steps involved in conducting systematic reviews and meta-analyses.

**573 Motivation Theories 3** Antecedents, consequences, and processes of motivated behavior examined from theoretical, empirical, and applied perspectives. (Crosslisted course offered as ED PSYCH 573, KINES 514.)

**574 Seminar in Educational Psychology 1** May be repeated for credit; cumulative maximum 8 hours. Course Prerequisite: Graduate student in Educational Psychology. Reading and discussion of papers in the educational psychology literature and the presentation of student's work.

**575 Multilevel Modeling 3** Course Prerequisite: ED PSYCH 565. Introduction to multilevel modeling techniques; examines the use of these techniques in the social sciences. Recommended preparation: ED PSYCH 569.

**576 Factor Analytic Procedures 3** Course Prerequisite: ED PSYCH 565. Introduction to factor analytic techniques; examines the use of factor analysis in the social sciences. Recommended preparation: ED PSYCH 569.

**577 Item Response Theory 3** Course Prerequisite: ED PSYCH 511. Introduction to item response theory and its use in the social sciences.

**597 Educational Psychology Internship 3** Development and application of structured strategies of investigative research for professional presentations and publications; capstone course for the Applied Educational Research Methods Certificate.

**600 Special Projects or Independent Study V 1-18** May be repeated for credit.

Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V** 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V** 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program.

Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Educational Psychology PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit. Educational Research EDRES

**562 Epistemology, Inquiry, and Representation** 3 Course Prerequisite: Doctoral standing in education; ED PSYCH 505 or concurrent enrollment. Epistemological assumptions and methodological strategies of research.

**563 Principles of Research** 3 Course Prerequisite: COUN PSY 501, ED RES 562, or admission to EdD program. The centrality of literature review and the understanding of methods used in educational research; practice in designing research questions.

**564 Qualitative Research** 3 Course Prerequisite: ED RES 563. Theoretical underpinnings of qualitative research; familiarity with published qualitative research in education; practical research skills.

**565 Quantitative Research** 3 Course Prerequisite: ED PSYCH 508; ED RES 563. Statistical literacy in educational research; parametric and non-parametric methods.

**566 Research Seminar** 1 May be repeated for credit; cumulative maximum 4 hours. Course Prerequisite: Doctoral standing in Education. Presentation and analysis of research; professional development in research presentation.

**569 Arts-Informed Perspectives in Educational Research** 3 Course Prerequisite: ED RES 562; ED RES 564. Exploration and application of alternative forms of qualitative research and representation through the arts.

**571 Doctoral Dissertation Preparation** 3 Conceptualization and development of a structured dissertation prospectus; socializes students to academic culture.

**572 Survey Design and Development Research Methods** 3 Course Prerequisite: ED PSYCH 508. Introduction to survey and questionnaire design and research techniques.

**573 Psychophysiological Measurement I** 3 Overview of principles, theory, and applications of psychophysiological assessment.

**574 Psychophysiological Measurement II** 3 Overview of principles, theory, and applications of psychophysiological assessment.

**575 Introduction to Neuroimaging and Electroencephalography** 3 Overview of principles, theory, and applications of psychophysiological assessment using neuroimaging and electroencephalography. Recommended preparation: ED PSYCH 508 or equivalent.

**576 Neurocognition Science Laboratory Rotation V** 1 (0-3) to 3 (0-9) May be repeated for credit; cumulative maximum 3 hours. Hands on applications of principles and theory of psychophysiological assessment in a laboratory setting. English ENGL

**501 Seminar in the Teaching of Writing: Methodology of Composition** 3 Development of a workable definition of the methods of composing through a review of relevant research and problem-solving exercises.

**502 Seminar in the Teaching of Writing: Contemporary Theories** 3 Course Prerequisite: ENGLISH 501. Contemporary theories of composition and their application to the classroom.

**506 Seminar in 16th Century English Literature** 3 May be repeated for credit; cumulative maximum 6 hours.

**507 Shakespeare** 3 Plays, poems, criticism, and background materials.

**508 Seminar in Assessment of Writing** 3 Problems involved in the diagnosis and assessment of student writing.

**509 Seminar in Classical Rhetoric and its Influences** 3 Study of GREEK and Roman rhetorical theories and their influences.

**510 Backgrounds of American Literature** 3 Studies of American writing in cultural contexts.

511 Seminar in 17th and 18th Century American Literature 3

512 Introduction to Graduate Study 3

**514 Seminar in 20th Century American Literature** 3 May be repeated for credit; cumulative maximum 6 hours.

**515 Contemporary Theories of Rhetoric** 3 Contemporary critical theory and cultural studies and reconsiderations of suasive discursive practices.

**521 Seminar in British Romantic Literature** 3 May be repeated for credit; cumulative maximum 6 hours.

**522 Seminar in Victorian Literature** 3 May be repeated for credit; cumulative maximum 6 hours.

**525 Seminar in English Literature of the 17th Century** 3 May be repeated for credit; cumulative maximum 6 hours.

527 Seminar in English Literature of the Restoration and 18th Century 3 May be repeated for credit; cumulative maximum 6 hours.

**529 Seminar in 19th Century American Literature** 3 May be repeated for credit; cumulative maximum 6 hours.

**531 Administering a Writing Program** 3 Combining theory and practice in writing program supervision and management. Interns will work under direct faculty supervision.

**532 Teaching Writing to Nontraditional Students** 3 Course Prerequisite: ENGLISH 501. Theory and practice of the teaching of basic writers.

**534 Theories and Methods of the Teaching of Technical and Professional Writing** 3 Historical and theoretical bases for production of scientific discourse; training in its practical applications.

**543 Phonology** 3 Technical introductions to the analysis of the sound systems of human languages. Credit not granted for both ENGLISH 443 and 543.

**544 Syntax** 3 Technical introduction to the generative analysis of sentence structure with a focus on English. Credit not granted for both ENGLISH 444 and 544.

**545 ESL Graduate Student Writing Workshop** 3 May be repeated for credit; cumulative maximum 6 hours. Workshop for graduate students in any discipline to

improve proficiency in writing academic genres such as dissertations, abstracts, articles, and grant proposals. For non-native speakers of English.

**546 Topics in Teaching English as a Second Language** 3 May be repeated for credit; cumulative maximum 6 hours. Topics and controversies related to second language acquisition theory and pedagogy.

**547 Introduction to Critical Theory** 3 May be repeated for credit; cumulative maximum 6 hours. Foundational theories and critical approaches relevant to advanced scholarship in all areas of English studies.

**548 Seminar in Critical and Cultural Theory** 3 May be repeated for credit; cumulative maximum 6 hours. Critical and cultural theory relevant to advanced literary studies and /or the advanced study of rhetoric and composition.

**549 Seminar in 20th Century British Literature** 3 May be repeated for credit; cumulative maximum 6 hours.

**550 Seminar in Poetry or Non-fiction Prose** 3 May be repeated for credit; cumulative maximum 6 hours. Historical and generic studies in poetry and non-fiction prose.

**554 History of the English Language** 3 Language related to the origin, history, and literature of its speakers. Credit not granted for both ENGLISH 454 and ENGLISH 554.

**560 Critical Theories, Methods, and Practice in Digital Humanities** 3 History, theory, and practice of digital humanities, with attention paid to how digital humanities are transforming disciplinary knowledge. (Crosslisted course offered as ENGLISH 560, DTC 560).

**561 Studies in Technology and Culture** 3 Foundation examination of key concepts, tools, and possibilities afforded by engaging with technology through a critical cultural lens. (Crosslisted course offered as DTC 561, ENGLISH 561).

**562 Writing and Rhetoric in Science and Technology** 3 The study and practice of written, visual, and verbal conventions of STEM disciplines for academic, scientific, technical, and public audiences.

**567 Seminar in Prose Fiction** 3 May be repeated for credit; cumulative maximum 6 hours. Historical and generic studies of prose fiction.

**573 Seminar in American Literature** 3 May be repeated for credit; cumulative maximum 12 hours. Major topics and figures.

**580 Seminar in Medieval Literature** 3 May be repeated for credit; cumulative

maximum 6 hours. The literature of western Europe from 450 to 1500.

**584 English Literature of the 16th Century** 3 Advanced study of English Renaissance literature, including More, Sidney, Spenser, Marlowe, and Shakespeare, in age of Humanism and Reformation. Credit not granted for both ENGLISH 484 and ENGLISH 584.

**590 Research in English Studies** 1 May be repeated for credit; cumulative maximum 6 hours. Directed reading and interpretive problems in English studies.

**591 Topics in Pedagogy** 3 Theory and practice of designing and teaching courses in literature, rhetoric, composition, theory, or cultural studies.

**595 Topics in English** 3 May be repeated for credit; cumulative maximum 6 hours. Language, English pedagogy, or literature of special or current interest; reading theories, teaching of writing, current literary theories.

**597 Topics in Composition and Rhetoric** 3 May be repeated for credit; cumulative maximum 6 hours. Rhetoric and composition theory and praxis.

**598 Teaching Apprenticeship** 1 May be repeated for credit.

**600 Special Projects or Independent Study** V 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination** V 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination** V 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination** V 1-18 May be repeated for credit. Course Prerequisite: Admitted to the English PhD program. Independent research and advanced study

for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Engineering  
ENGR

**530 Interdisciplinary Research and Design I** 3 (1-4) Literature review, resource flows, research proposal, and multidisciplinary team development.

**531 Interdisciplinary Research and Design II** 3 (1-4) Design analysis, sustainability analysis, research and scholarly work development; multidisciplinary team development. Entomology  
ENTOM

**511 Science Writing Workshop** 2 Instruction, tools, and peer review support to write graduate research proposal or journal article. (Crosslisted course offered as CROP SCI 511, ENTOM 511, SOIL SCI 511).

**539 Taxonomic Entomology** 4 (2-6) Survey of approximately 200 major families; collecting and preservation techniques.

**540 Taxonomy of Immature Insects** V 2-4 Identification of eggs, larvae, nymphs, and pupal stages of insects. Insect collection required.

**548 Medical and Veterinary Entomology** 3 Biology and ecology of parasitic arthropods and their direct impacts on human and animal health; transmission of pathogens. Credit not granted for both ENTOM 448 and ENTOM 548.

**550 Insect Physiology** 3 General principles of insect physiology; the mechanisms of vital processes in insects; organ, cellular, subcellular, chemical and physical levels. Required preparation must include BIOLOGY 332, 352, CHEM 345, ENTOM 340, or 343.

**555 Agricultural Chemical Technology for Crop Protection & Production** 3 Mechanistic examination of agricultural chemical technology; synthetic and biological pesticides and fertilizers; mechanism of biological activity; deployment; management.

**556 Insecticides: Toxicology and Mode of Action** 1 Insecticides in terms of historical perspective, classification, synthesis, toxicity, mode of action, and metabolism. Required preparation must include MBIOS 303; CHEM 345; BIOLOGY 352, 420, or 350.

**557 Herbicides: Toxicology and Mode of Action** 1 Herbicides in terms of historical perspective, classification,

synthesis, toxicity, mode of action, and metabolism. Required preparation must include MBIOS 303; CHEM 345; BIOLOGY 352, 420, or 350.

**558 Pesticide Topics 1** Current issues concerning pesticides in terms of toxicity, mode of action, and metabolism. Required preparation must include MBIOS 303; CHEM 345; BIOLOGY 352, 420, or 350.

**590 Special Topics in Entomology V** 1-4 May be repeated for credit; cumulative maximum 10 hours. Credit not granted for both ENTOM 490 and ENTOM 590.

**593 Seminar 1** May be repeated for credit. Reporting and discussing problems and research in entomology.

**700 Master's Research, Thesis, and/or Examination V** 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V** 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program.

Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Entomology PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Entrepreneurship  
ENTRP

**501 Technology Entrepreneurship 3**  
Course Prerequisite: Admission to the MBA program. Basic business concepts and processes applied to technology commercialization and venture creation.

**588 Management of Innovation 3**  
Course Prerequisite: Admission to the MBA program. Technological transitions and technology strategy; knowledge and creativity in organizations; managing innovation processes, technical employees, and cross-functional cooperation. (Crosslisted course offered as MGMT 588, ENTRP 588).

**600 Special Projects or Independent Study V** 1-18 May be repeated for credit.

Course Prerequisite: Admission to the MBA program. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

Environmental Science  
ES/RP

**501 Graduate Skills Seminar 1**  
Seminar designed to introduce first year graduate students to the science graduate program; roles and responsibilities of graduate students, teaching assistants and researchers.

**504 Ecosystem Management 3**  
Analysis of ecosystem processes; dual emphasis on ecological principles and development of methods and concepts to evaluate policies for management.

**510 Species Distribution Modeling 3**  
Theory and application of species distribution models, including niche, occupancy, and spatial capture-recapture models; manipulation of spatial data and software packages (ArcGIS, R, MaxEnt, PRESENCE).

**520 Radiation Instrumentation 3 (2-3)** Methods for analysis of radiation and radiative materials, including use of radiation monitoring equipment and analysis of instrument data. Required preparation: ENVR SCI 406.

**521 Uses and Regulation of Radiation 3** Uses and regulation of radiation and radioactive materials in medicine, industry, power production, and scientific research. Required preparation: ENVR SCI 406.

**522 Radiation Biology and Ecology 3**  
Biology and physics of the irradiation of living systems, using past and present radiological studies as examples. Required preparation: 3 hours of general biology; ENVR SCI 406.

**523 Environmental and Internal Dosimetry 3 (2-3)** Critical analysis of environmental and individual radiation doses, including use of dose estimation models based on international standards. Required preparation: ENVR SCI 406.

**531 Fundamentals of Environmental Toxicology 3** Fundamentals of toxicology; environmental fate and biological deposition and effects of natural products, drugs, food chemicals, and pollutants.

**532 Applied Environmental Toxicology 3** Course Prerequisite: ENVR SCI 531 or PHARMSCI 505. Overview of

the field of environmental toxicology; interactions of xenobiotics with natural systems.

**535 Integrated Water Resources Science and Management 3** Introduction to the physical, social, and cultural drivers that shape how water is managed within the larger environmental and human landscape.

**540 Agroecology 3** Social and ecological aspects of agriculture and human food systems.

**544 Environmental Assessment 3**  
Environmental impact statements and their national and state policy frameworks, methods of assessment, and team preparation of an impact statement. Credit not granted for both ENVR SCI 444 and ENVR SCI 544.

**545 Hazardous Waste Management 3** Environmental, technical, and political aspects of hazardous waste management; evaluative methods, risk assessment, and current management requirements. Credit not granted for both ENVR SCI 445 and ENVR SCI 545.

**550 System Dynamics Models of Environmental Systems 3** Analysis of environmental system dynamics; development and uses of simulation models using the Stella software on Macintosh.

**569 Ecosystem Ecology and Global Change 3** Historic and current factors controlling the function of ecosystems and their responses to natural and human caused global change. (Crosslisted course offered as BIOLOGY 469, ENVR SCI 469, BIOLOGY 569, ENVR SCI 569). Credit not granted for both BIOLOGY 469 and 569, or ENVR SCI 469 and 569.

**577 Advanced Environmental Hydrology 3** Principles, dynamics, interactions, and calculations of water flow in the environment (rivers, lakes, groundwater, soil and plant water, atmospheric boundary layer). Recommended preparation: college-level physics, multivariate calculus, and introduction to hydrology.

**585 Aquatic System Restoration 3**  
Study of natural, damaged and constructed ecosystems with emphasis on water quality protection and restoration of lakes, rivers, streams and wetlands. (Crosslisted course offered as CE 585, BSYSE 554, ENVR SCI 585). Required preparation must include CHEM 345; MBIOS 101.

**586 GIS Spatial Analysis 4 (2-6)**  
Geographic information systems applied to analysis of landscape data; maps, geographic coordinate systems and projections, geodatabases. (Crosslisted course offered as SOIL SCI 468, SOIL SCI 568, ENVR SCI

486, ENVR SCI 586.) Credit not granted for both SOIL SCI 468 and 568, or ENVR SCI 486 and 586.

**590 Special Topics 2** May be repeated for credit; cumulative maximum 6 hours.

**592 Special Topics V 1-4** May be repeated for credit; cumulative maximum 4 hours.

**593 Seminar in Environmental Science and Regional Planning 1** May be repeated for credit; cumulative maximum 8 hours.

**600 Special Projects or Independent Study V 1-18** May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V 1-18** May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V 1-18** May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination V 1-18** May be repeated for credit. Course Prerequisite: Admitted to the Environmental and Natural Resource Sciences PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Fine Arts

F A

**500 Graduate Art History 2** May be repeated for credit; cumulative maximum 6 hours.

**510 Graduate Drawing 3** May be repeated for credit; cumulative maximum 9 hours.

**511 Graduate Drawing 3** May be repeated for credit; cumulative maximum 9 hours.

**512 Graduate Drawing 3** May be repeated for credit; cumulative maximum 9 hours.

**520 Graduate Painting 3** May be repeated for credit; cumulative maximum 9 hours.

**521 Graduate Painting 3** May be repeated for credit; cumulative maximum 9 hours.

**522 Graduate Painting 3** May be repeated for credit; cumulative maximum 9 hours.

**530 Graduate Digital Media 3** May be repeated for credit; cumulative maximum 9 hours.

**531 Graduate Digital Media 3** May be repeated for credit; cumulative maximum 9 hours.

**532 Graduate Digital Media 3** May be repeated for credit; cumulative maximum 9 hours.

**540 Graduate Ceramics 3** May be repeated for credit; cumulative maximum 9 hours.

**541 Graduate Ceramics 3** May be repeated for credit; cumulative maximum 9 hours.

**542 Graduate Ceramics 3** May be repeated for credit; cumulative maximum 9 hours.

**550 Graduate Sculpture 3** May be repeated for credit; cumulative maximum 9 hours.

**551 Graduate Sculpture 3** May be repeated for credit; cumulative maximum 9 hours.

**552 Graduate Sculpture 3** May be repeated for credit; cumulative maximum 9 hours.

**555 Critical Practices 9 (4-10)** May be repeated for credit; cumulative maximum 36 hours. Studio practice, critical analysis of the student's own and others' work, investigation of critical theory and visual culture through display and making art via a variety of disciplines.

**570 Graduate Printmaking 3** May be repeated for credit; cumulative maximum 9 hours.

**571 Graduate Printmaking 3** May be repeated for credit; cumulative maximum 9 hours.

**572 Graduate Printmaking 3** May be repeated for credit; cumulative maximum 9 hours.

**580 Graduate Photography 3** May be repeated for credit; cumulative maximum 9 hours.

**581 Graduate Photography 3** May be repeated for credit; cumulative maximum 9 hours.

**582 Graduate Photography 3** May be repeated for credit; cumulative maximum 9 hours.

**598 Graduate Seminar 2** May be repeated for credit; cumulative maximum 6 hours. Topics in contemporary issues, theory, and criticism.

**600 Special Projects or Independent Study V 1-18** May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V 1-18** May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

Finance

FIN

**500 Macroeconomic Theory I 3** Introduction to dynamics, growth and investment, overlapping generations models, Ramsey model, consumption and investment. (Crosslisted course offered as ECONS 500, FIN 500). Required preparation must include intermediate macroeconomics and one year of calculus. Required preparation must include intermediate macroeconomics and one year of calculus.

**501 Microeconomic Theory I 3** Microeconomic theory, multivariate optimization, consumer and producer theory, competitive partial equilibrium, introduction to imperfect competition. (Crosslisted course offered as ECONS 501, FIN 501). Required preparation must include intermediate microeconomics and one year of calculus. Required preparation must include intermediate microeconomics and one year of calculus.

**502 Macroeconomic Theory II 3** Course Prerequisite: ECONS 500. Macroeconomic theory, short-run fluctuations and nominal rigidities, monetary economics and inflation, real business cycle models, unemployment international macroeconomics. (Crosslisted course offered as ECONS 502, FIN 502).

**503 Microeconomic Theory II 3** Course Prerequisite: ECONS 501. General equilibrium, welfare economics and social choice, market failure, game theory,

economics of information. (Crosslisted course offered as ECONS 503, FIN 503).

**510 Statistics for Economists 3**

Statistical theory underlying econometric techniques utilized in quantitative analysis of problems in economics and finance. (Crosslisted course offered as ECONS 510, FIN 510). Required preparation must include college calculus and matrix algebra. Required preparation must include college calculus and matrix algebra.

**511 Econometrics I 3 Course**

Prerequisite: ECONS 510. Single equation linear and nonlinear models; estimation, inference, finite and asymptotic properties, effects and mitigation of violations of classical assumptions. (Crosslisted course offered as ECONS 511, FIN 511).

**512 Econometrics II 3 Course**

Prerequisite: ECONS 501; ECONS 511. Econometric methods for systems estimation; simultaneous equations, discrete and limited dependent variable, panel data, and time series data. (Crosslisted course offered as ECONS 512, FIN 512).

**521 Interest Rates and Financial Markets 3 Course**

Prerequisite: Admission to the MBA program. Real and nominal interest rates; bond pricing; term and risk structure of interest rates; investment and commercial banking; financial futures.

**525 Advanced Financial**

**Management 3 Course** Prerequisite: Admission to the MBA program. Theory of financial management; quantitative analysis of financial problems of the firm; empirical studies on financing modern corporations.

**526 Financial Management 3 Course**

Prerequisite: Admission to the MBA program. Advanced topics in corporate finance, including capital budgeting, cost of capital, capital structure, pay-out policy, and enterprise valuation.

**527 Investment Analysis 3 Course**

Prerequisite: Admission to the MBA program. A decision-making approach to the problems of asset management for personal and business portfolio.

**528 Portfolio Theory and Financial Engineering 3 Course**

Prerequisite: FIN 527; admission to the MBA program. The theory of portfolio management and the use of derivative securities in portfolio risk management.

**581 International Finance 3 Course**

Prerequisite: Admission to the MBA program. Principles of international finance; financial management of multinational corporations; international investments.

**594 Theory of Industrial**

**Organization 3 Course** Prerequisite: ECONS 502; ECONS 503; ECONS 511.

Theory of market structure and firm behavior, including price and non-price competition, information and strategic behavior, and technological change. (Crosslisted course offered as ECONS 594, FIN 594).

**595 Advanced Topics in Resource and Production Economics V 1-6** May be repeated for credit; cumulative maximum 12 hours. Topics may include resource scarcity, decision making under risk, bioeconomics, production applications, welfare analysis.

**596 Advanced Topics in Financial Economics V 1-6** May be repeated for credit; cumulative maximum 12 hours. Course Prerequisite: Admission to PhD programs in business, or ECONS 500 and ECONS 501. Topics may include financial theory and empirical methods as applied to financial management, investments, international finance, and markets/institutions. (Crosslisted course offered as FIN 596, ECONS 596).

**600 Special Projects or Independent Study V 1-18** May be repeated for credit.

Course Prerequisite: Admission to the MBA, Master of Accounting, or Business PhD programs. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**702 Master's Special Problems, Directed Study, and/or Examination V 1-18** May be repeated for credit.

Course Prerequisite: Admission to the MBA program. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination V 1-18** May be repeated for credit.

Course Prerequisite: Admitted to the Business Administration - Finance PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit. Foreign Languages And Cultures FOR L

**540 Methods of Teaching Foreign Languages 3** Survey of current methodology with emphasis on practical

application in the classroom. Credit not granted for both FOR LANG 440 and FOR LANG 540.

**541 Research and Methods of Technology Enhanced Foreign Language Learning 3** Taught in English. The use of technology in the foreign language classroom; hands-on experience with equipment and multi-media materials. Credit not granted for both FOR LANG 441 and 541.

**550 Ethnolinguistics 3**

Anthropological theory and methods applied to the study of cognitive linguistics, or the interrelation of language, mind, and culture. (Crosslisted course offered as ANTH 450, FOR LANG 450). Credit not granted for more than one of ANTH 450 and ANTH 550.

**560 Seminar in Scholarly Methodology 2** Bibliography and formal aspects of scholarly writing; general introduction to literary criticism.

**600 Special Projects or Independent Study V 1-18** May be repeated for credit.

Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

Food Science

FS

**501 Topics in Food Science V 1-3**

May be repeated for credit; cumulative maximum 6 hours. Selected topics in food science.

**509 Principles of Environmental Toxicology 3**

Nature, properties, effects, and detection of toxic substances in the environment and in environmentally exposed species, including humans. Credit not granted for both FS 409 and 509. Recommended preparation: BIOLOGY 102 or 107; CHEM 102; CHEM 105; CHEM 106; STAT 212.

**510 Functional Foods and Health 3**

Benefits of foods beyond basic nutrition; bioactive compounds in functional foods and nutraceuticals relating to disease prevention and health promotion. Recommended preparation: BIOLOGY 101; BIOLOGY 102, or BIOLOGY 106; BIOLOGY 107; MBIOS 303.

**511 Food Lipids 3** Occurrence, structure, chemical and physical properties; functions of lipids in foods. Recommended preparation: FS 460; MBIOS 303.

**512 Food Proteins and Enzymes 2** Chemistry/biochemistry of proteins/enzymes applied to food research and industry;



protein functionality/enzyme technology application to food industry. Recommended preparation: FS 460; MBIOS 303.

**513 Food Carbohydrates 3** Structure function relationships of polysaccharides within food systems as a function of their respective molecular structures and physical characteristics.

**515 Food Fermentations -- Microbiology and Technology 3** Fundamental understanding of food fermentation science and technology knowledge and principles; application of scientific knowledge to assess and solve food fermentation science and technology problems. Recommended preparation: MBIOS 101 or 305; MBIOS 303.

**516 Food Laws 2** Become familiar with government statutes and regulations that contribute to a safe, nutritious, and wholesome food supply. Understand more about the law and the US legal system relevant to the regulation of the manufacture and sale of food and supplements, including jurisdictional issues, administrative law, and tort, contract, corporate, environmental, labor, and criminal law issues.

**517 Scientific Writing 2** May be repeated for credit. Fundamentals of good technical writing and presentation; preparing and writing thesis/dissertation, scientific publications, and research grants; bibliography organization and citing, statistical data analysis, and preparation of graphics, tables, and posters; reviewing and evaluating current research.

**518 Oral Seminar 1** May be repeated for credit. Development of skills and communication tools and techniques for oral presentations of current food science research.

**522 Sensory Evaluation of Food and Wine 3** Theory, principles and application of sensory evaluation techniques in appearance, aroma, flavor and texture of foods and wine. (Crosslisted course offered as FS 422, VIT ENOL 422) Credit not granted for both FS 422 and FS 522. Graduate student recommended preparation: STAT 212; FS 110 or VIT ENOL 113.

**529 Dairy Products 3** Dairy chemistry, microbiology, sanitation, product development and processing from cow to consumer. Credit not granted for both FS 429 and FS 529.

**530 Dairy Products Lab 1 (0-3)** Course Prerequisite: Concurrent enrollment in FS 529. Hands-on skills formulating, processing, evaluating and analyzing dairy products using communication and critical thinking skills.

**531 Advanced Food Safety and Quality 3** Analysis of the safety, regulation, protection, and quality of processed food products and their manufacturing environment.

**532 Advanced Food Microbiology 3** Current topics in food-borne pathogens, including novel detection method, virulence and pathogenesis, and their interaction with environment and host. Recommended preparation: BIOLOGY 107, MBIOS 305, or FS 416.

**536 Principles of Sustainability 3** Issues and processes in sustainability; resource management, waste generation and management; industrial approaches to sustainability; case studies. Credit not granted for both FS 436 and 536.

**538 Physical Properties of Food 2** Thermophysical behavior of foods and biopolymers, including water transport/activity, rheological, thermal, dielectric, and barrier properties; Newtonian and non-Newtonian flow; Viscous, viscoelastic, and Hookean behavior; relationship between rheology of food biopolymers and structure, composition, temperature, and plasticizer content.

**564 Food Toxicology 3** General principles of toxicological evaluation of chemicals which enter the food chain; toxicology of food additives, colors, preservatives, drugs, pesticides and natural toxins in foods and risk characterization. Credit not granted for both FS 464 and FS 564.

**565 Wine Microbiology and Processing 3** Technical principles related to the processing and fermentation of wines with an emphasis on microbiology. (Crosslisted course offered as FS 465, VIT ENOL 465). Credit not granted for both FS/VIT ENOL 465 and FS 565. Recommended preparation for graduate students: MBIOS 303; MBIOS 304; MBIOS 101 or 305.

**570 Advanced Food Technology 3** Physical principles of food preservation and recent advances in food technology. Credit not granted for both FS 470 and FS 570. Recommended preparation: FS 416; FS 432; FS 460.

**583 Advances in Cereal Chemistry and Technology 3** Chemistry and functionality of cereal grains as related to their processing, product development, and nutrition. Recommended preparation: CHEM 345, FS 460, or MBIOS 303.

**700 Master's Research, Thesis, and/or Examination V 1-18** May be repeated for credit. Independent research and advanced study for students working on

their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**800 Doctoral Research, Dissertation, and/or Examination V 1-18** May be repeated for credit. Course Prerequisite: Admitted to the Food Science PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Global Animal Health  
GAH

**500 Animal Health and Food System Policy and US State Government 1** Policy-making process relating to trade, animal health and food systems at the state and provincial levels.

**501 Animal Health and Food System Policy and US National Government 1** Policy-making process relating to trade, animal health and food systems at the national level.

**502 Animal Health and Food System Policy and Intergovernmental Organizations 1** International policy-making emphasizing the impact of international standards and policy of food safety, animal health, trade and public health.

**503 Animal Human Disease Interface 1** Use of evidence-based tools in addressing global animal health challenges at the human-animal interface.

**504 Multidisciplinary Approaches to Global Health Challenges 1** Multidisciplinary collaboration around an important global health problem that includes a significant animal health component.

**563 Deconstruction of Research 3** Course Prerequisite: Graduate standing in a WSU biomedical based graduate program. Nature and development of scientific investigation through oral and written avenues, and methods of critical analyses applied to questions of biomedical interest. (Crosslisted course offered as NEUROSCI 563, GLANHLTH 563, MBIOS 563, VET MICR 563, VET PATH 563, VET PH 563).

**564 Topics in Biomedical Experimentation V 1-3** May be repeated for credit; cumulative maximum 6 hours. Examination of the philosophy of experimental design and practical application and analysis of various experimental approaches in biomedical

research. Recommended preparation: graduate standing in a WSU biomedical-based program, and an advanced undergraduate or graduate statistics course. (Crosslisted course offered as NEUROSCI 564, GLANHLTH 564, MBIOS 564, VET MICR 564, VET PATH 564, VET PH 564).  
Geology  
GEOL

**505 Geophysics** 4 (3-3) Theory and application of geophysical methods for hydrology, environmental, engineering, exploration, and structural geology; review of techniques.

**516 Soil Processes in the Earth's Critical Zone** 3 Soil geochemistry and processes; theory and applications with a focus on reactions at the solid, liquid, and gaseous interface between the lithosphere, atmosphere, hydrosphere, and biosphere. (Crosslisted course offered as GEOLOGY 416/516, SOIL SCI 416/516). Credit not granted for both GEOLOGY/SOIL SCI 416 and GEOLOGY/SOIL SCI 516.

Recommended preparation: Basic knowledge of soils (e.g. SOIL SCI 201 or equivalent; CHEM 106; PHYSICS 102).

**520 Advanced Topics in Sedimentology** 3 (2-3) May be repeated for credit; cumulative maximum 6 hours.

Modern aspects of sedimentary rocks. Field trip required.

**521 Clastic Depositional Systems** 3 (2-3) Clastic sedimentary environments; architectural elements and facies analysis. Field trip required.

**523 Advanced Topics in Stratigraphy** 3 May be repeated for credit.

**525 Carbonate Depositional Systems** 3 (2-3) Modern carbonate environments and processes; ancient carbonate rock sequences; carbonate platform-to-basin transition; diagenesis of carbonate rocks. Field trip required.

**538 Orogenic Systems I** 3 Field-base course examines tectonic processes active in the northern Cordillera. Field trip required and final research paper.

**540 Tectonics** 3 Nature and origin of the Earth's major tectonic features.

**541 Orogenic Systems** 3 (2-3) Detailed analysis of the construction of mountain belts. Field trip required.

Recommended preparation: B.S. in Geology or related field.

**545 Astrobiology** 3 Origin, evolution, distribution and future of life in the universe; fundamental concepts of life and habitable environments on Earth and other planetary bodies within and outside of the solar system. Credit not granted for both GEOLOGY 445 and GEOLOGY 545.

**550 Advanced Mineralogy** 3 Elements of crystal chemistry and crystal physics.

**552 Analytical Methods in Earth Sciences** 3 (2-3) Theory and practical experience in EMPA, XRD, XRF, and ICPMS analysis.

**560 Advanced Igneous Petrology** 3 (2-3) Origin, evolution, and tectonic significance of igneous rocks. Field trip required.

**562 Watershed Biogeochemistry** 3 Sources, transformations, fates and impacts of biogeochemically important compounds as they move downstream through watersheds to the coastal zone.

**567 Volcanology** 3 (2-3) Volcanic process, eruption mechanisms, volcanic deposits, hazard assessment. Field trip required. Credit not granted for both GEOLOGY 467 and GEOLOGY 567.

**578 Groundwater Geobiology** 3 (2-3) Interaction of groundwater geology and the environment including microbial populations with emphasis on microbial transport in the sub-surface and bioremediation approaches.

**579 Groundwater Geochemistry** V 2-4 May be repeated for credit; cumulative maximum 4 hours. Organic and inorganic aqueous geochemistry; controls on groundwater contaminant fate.

**583 Radiogenic Isotopes and Geochronology** 3 Radiogenic isotopes and their uses as chronometers (radiometric dating) and as tracers of earth evolution and differentiation.

**584 Stable Isotope Geochemistry** 3 Principles and applications of isotope geochemistry in the geological sciences.

**588 Methods in Radiogenic Isotope Geochemistry** 3 (1-6) Course Prerequisite: GEOLOGY 583. Laboratory-based course in modern analytical methods in radiogenic isotope geochemistry.

**595 Advanced Topics in Geology** V 1-4 May be repeated for credit; cumulative maximum 6 hours. Topics of current interest in geology.

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**597 Advanced Topics in Geology** V 1-4 May be repeated for credit; cumulative maximum 6 hours. Topics of current interest in geology.

**598 Seminar** 1 May be repeated for credit; cumulative maximum 3 hours. Research papers presented by students, faculty, and visiting scientists on geological

research. Credit not granted for both GEOLOGY 498 and GEOLOGY 598.

**700 Master's Research, Thesis, and/or Examination** V 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination** V 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination** V 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Geology PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Human Development  
H D

**505 Developing Effective Leadership: Tidal Leadership** 2 Customized leadership course for acquiring essential skills beyond the discipline skills for professional and personal success; build a personal leadership platform.

**511 Theory and Substance of Human Development I** 3 Human development theories; application to life span development, cultural variations, resources, problem solving, interaction of families and individuals with other systems.

**514 Research Methods in Human Development II** 3 Course Prerequisite: H D 513. Integration of formal decision making into the social science research process; procedures appropriate for experimental, quasi-experimental and field research.

**520 Adolescence** 3 In-depth examination of theories and research, developmental issues and prevention and intervention programs for school-aged children and adolescents.

**550 Seminar on Family Relationships** 3 Survey of family studies topics and issues examined from a research point of view.

**558 Parent-Child Relationships 3**  
The reciprocal interactions among family members will be examined; theoretical perspectives and empirical findings will be explored in terms of implications for education and practice.

**560 Seminar in Child Development 3**  
Survey of literature on selected areas in child development; discussion of research and application related to current issues and trends.

**561 Advanced Curriculum for Early Childhood Programs 3**  
Opportunity to explore curriculum practices in early childhood education; discussion, evaluation and adaptation of curricula based on current research.

**562 Administration and Leadership in Programs 3**  
Examining early childhood administrator role; analysis and application of research to administration, developing concrete skills necessary for successful administration.

**580 Families, Community and Public Policy 3**  
Course Prerequisite: H D 560. Analysis of family policy research; role of family policy research in public policy and knowledge building processes.

**586 Special Topics in Human Development V 1-3**  
May be repeated for credit; cumulative maximum 6 hours. Assessment and evaluation of families and children.

**598 Professional Internship 3**  
Supervised individual experiences with related organizations, businesses, or government agencies; opportunities for interaction with professionals in related fields.

**600 Special Projects or Independent Study V 1-18**  
May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V 1-18**  
May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.  
Hospitality Business Management  
HBM

**535 International Tourism Strategy and Planning 3**  
Course Prerequisite: Admission to the MBA program. Tourism

components; social, economic, and cultural effects on societies; the management of tourism businesses.

**581 Services Management 3**  
Course Prerequisite: Admission to the MBA program. Design and management of service systems in hospitality operations; control of customer interaction, personnel activities and inventory.

**582 Hospitality Operations Analysis 3**  
Yield/revenue management and managerial accounting concepts within the hospitality industry.

**591 Service Management Seminar 3**  
Course Prerequisite: Admission to PhD programs in business. Survey of selected concepts, frameworks, theory, issues and empirical research in service management.

**592 Current Issues in Travel and Tourism 3**  
Course Prerequisite: Admission to PhD programs in business. Current issues, practices, principles and theory, research and methodologies that govern travel and tourism behavior.

**597 Special Topics 3**  
Course Prerequisite: Admission to PhD programs in business. Strategic business policy, concepts, and practices in hospitality management.

**600 Special Projects or Independent Study V 1-18**  
May be repeated for credit. Course Prerequisite: Admission to the MBA, Master of Accounting, or Business PhD programs. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**800 Doctoral Research, Dissertation, and/or Examination V 1-18**  
May be repeated for credit. Course Prerequisite: Admitted to the Business Administration - Hospitality and Tourism PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.  
History  
HIST

**509 Field Course: Foundations in US History 3**  
May be repeated for credit; cumulative maximum 12 hours. Chronological readings in US history.

**510 Field Course in American History 3**  
May be repeated for credit. Readings and interpretive problems of American history.

**511 American Diplomatic History, 1776-1914 3**  
Policies and principles characteristic of American diplomacy from 1776 to 1914. Credit not granted for both HISTORY 411 and HISTORY 511.

**512 American Diplomatic History in the 20th Century 3**  
Credit not granted for both HISTORY 412 and HISTORY 512.

**515 Jeffersonian-Jacksonian America 3**  
Social and political history of the United States from 1789 to 1845; Jeffersonian and Jacksonian eras. Credit not granted for both HISTORY 415 and HISTORY 515.

**516 Civil War and Reconstruction 3**  
The Civil War as a problem in historical causation and social, political, and economic impact of the war. Credit not granted for both HISTORY 416 and HISTORY 516.

**519 United States, 1945-Present 3**  
International and domestic impact of the Cold War, era of McCarthyism, American aspirations, tensions and conflicts in the post-industrial era. Credit not granted for both HISTORY 419 and HISTORY 519.

**520 Field Course in the American West 3**  
May be repeated for credit; cumulative maximum 9 hours. Readings and interpretive problems in the history of the American West.

**521 The American West 3**  
Multicultural exploration of the frontier experience and western America; environment, economic development, gender, class and race emphasized. Credit not granted for both HISTORY 421 and HISTORY 521.

**522 History of the Pacific Northwest 3**  
Political, social economic and environmental history of the Pacific Northwest. Fulfills the teaching certification requirement for Washington state history. Credit not granted for both HISTORY 422 and HISTORY 522.

**523 Radicals, Reformers, and Romantics: The Impact 3**  
Changing thought and its impact in the United States from colonial times to the present. Credit not granted for both HISTORY 423 and HISTORY 523.

**524 Seminar in the American West 3**  
May be repeated for credit; cumulative maximum 9 hours. Research seminar in the history of the American West.  
525 Seminar in American History 3  
May be repeated for credit.

**527 Public History: Theory and Methodology 3**  
An introduction to the broad range of non-traditional careers in history. Credit not granted for both HISTORY 427 and HISTORY 527.

**528 Seminar in Public History** 3 May be repeated for credit; cumulative maximum 6 hours. The development of skills at the graduate level to be used in nontraditional careers for historians.

**529 Interpreting History through Material Culture** 3 May be repeated for credit; cumulative maximum 6 hours.

Historical interpretation to work on major historic preservation and museum projects.

**530 History of Mexico** 3 War of independence, 19th century Mexico and the liberal-conservative struggle; modern Mexico since the Revolution of 1910. Credit not granted for both HISTORY 430 and HISTORY 530.

**532 20th Century Latin America** 3 Contemporary history of Latin America, analyzing political, economic, social, and cultural history through a thematic, comparative approach. Credit not granted for both HISTORY 432 and HISTORY 532.

**535 Field Course in Latin American History** 3 May be repeated for credit; cumulative maximum 9 hours. Readings and interpretive problems in Latin American history.

**539 Slavery, Abolition and Emancipation in World History** 3 History of slavery and abolition as a world-wide phenomena; trends and debates in historiographical literature. Credit not granted for both HISTORY 439 and HISTORY 539.

**540 Seminar in History** 3 May be repeated for credit.

**547 Europe in the French Revolutionary and Napoleonic Era, 1789 to 1815** 3 The history of Europe during the French Revolution and the Napoleonic Era (1789-1815). Credit not granted for both HISTORY 447 and HISTORY 547.

**549 Europe and Two World Wars, 1914-1945** 3 Political, intellectual, economic, and international aspects of European life during and between two world wars. Credit not granted for both HISTORY 449 and HISTORY 549.

**550 Europe Since 1945** 3 Europe from the end of World War II to the present; the Cold War, European integration, the fall of communism, social and intellectual life. Credit not granted for both HISTORY 450 and HISTORY 550.

**553 Age of Revolution: Europe, 1815-1871** 3 The consolidation of industrial society and the nation-state in 19th-century Europe. Credit not granted for both HISTORY 453 and HISTORY 553.

**554 Age of Empire: Europe, 1871-1914** 3 Consolidation of the nation-state, socialism and nationalism, war and

imperialism, the Russian Revolution, and the outbreak of World War I. Credit not granted for both HISTORY 454 and HISTORY 554.

**559 Modern Britain** 3 Britain and the Empire from the Napoleonic wars to the present. Credit not granted for both HISTORY 459 and HISTORY 559.

**560 Field Course in Early European History** 3 May be repeated for credit; cumulative maximum 9 hours. Readings and issues in early European history.

**561 Field Course in Early Modern European History** 3 Readings and interpretive problems in early modern European history (1450 - 1750).

**563 History of the Soviet Union** 3 The Russian revolutions and the Soviet regime: 1905 to the present. (Crosslisted course offered as HISTORY 463, RUSSIAN 463).

**564 Comparative Genocide** 3 Study of the concepts, history, and consequences of genocide in the global perspective through theoretical and case study analysis. Credit not granted for both HISTORY 464 and HISTORY 564.

**567 Modern France** 3 The history of France from the revolution of 1789 to the present. Credit not granted for both HISTORY 467 and HISTORY 567.

**568 Hitler and Nazi Germany** 3 Origins and rise of Nazism; state, society and culture in the Third Reich; Nazi racial ideology; world war; the Holocaust. Credit not granted for both HISTORY 468 and HISTORY 568.

**569 Field Course in Modern European History** 3 May be repeated for credit; cumulative maximum 9 hours. Readings and interpretive problems in modern European history.

**570 World History Theory and Methods** 3 May be repeated for credit; cumulative maximum 9 hours. Historiographic overview of the field of world history.

**571 Topics in World History** 3 May be repeated for credit; cumulative maximum 6 hours. Readings in themes and literature of a global approach to history.

**572 The Middle East Since World War I** 3 Developments in the Middle East since World War I including nationalism, fundamentalism, and revolution. (Crosslisted course offered as HISTORY 472, ASIA 472).

**573 Field Course in African History** 3 May be repeated for credit; cumulative maximum 6 hours. Readings and interpretive problems in African history.

**575 Field Course in Women's History** 3 May be repeated for credit; cumulative maximum 6 hours. Readings and interpretive problems in women's history.

**577 Modern Japanese History** 3 Examination of political, socioeconomic and cultural changes and the international crises in modern Japan since the 19th century. (Crosslisted course offered as HISTORY 477, ASIA 477). Credit not granted for both HISTORY 477 and HISTORY 577.

**578 Field Course in Asian History** 3 May be repeated for credit; cumulative maximum 9 hours. Readings and interpretive problems in Asian history. 580 Historiography 3

**595 The Teaching of History in College** 3 Theory, problems, and methods of teaching history at the college level.

**596 Topics in American Studies** 3 May be repeated for credit; cumulative maximum 9 hours. American Studies Summer Institute. (Crosslisted course offered as AMER ST 596, HISTORY 596).

**597 Seminar in History** V 2-3 May be repeated for credit.

**598 History Internship** V 1-12 May be repeated for credit; cumulative maximum 12 hours. Participation as intern in public or private sectors. Credit not granted for both HISTORY 498 and HISTORY 598.

**599 History Colloquium** 1 May be repeated for credit; cumulative maximum 4 hours. Weekly discussions and presentations on historical topics or current faculty and graduate student research.

**600 Special Projects or Independent Study** V 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination** V 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination** V 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major

advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: Admitted to the History PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Horticulture  
HORT

**503 Advanced Topics in Horticulture V** 1-4 May be repeated for credit; cumulative maximum 8 hours. Current topics and research techniques in horticulture.

**509 Seminar** 1 May be repeated for credit; cumulative maximum 12 hours. Continuous enrollment required for regularly enrolled graduate students in horticulture. Recent developments in horticulture.

**510 Graduate Seminar** 1 May be repeated for credit; cumulative maximum 4 hours. Literature reviews and research progress reports.

**513 Advanced Viticulture** 3 Wine and juice grape production in eastern Washington; wine and fruit physiology, climate and soils, and fruit quality. (Crosslisted course offered as HORT 413, VIT ENOL 413).

**516 Advanced Horticultural Crop Physiology** 3 Physiological processes related to growth, development, and productivity of horticultural crops; advances in recombinant DNA technology; the impact on horticultural practices. Credit not granted for both HORT 416 and HORT 516. Recommended preparation: BIOLOGY 420.

**518 Post-harvest Biology and Technology** 3 (2-3) Physical and physiological basis for handling and storage practices; perishable organ ontogeny and physiological disorders; post-harvest environment requirements. Field trip required. Credit not granted for both HORT 418 and HORT 518. Recommended preparation: HORT 202.

**521 Fruit Crops Management** 3 Current research and management strategies for production and quality of temperate-zone fruit crops. Credit not granted for both HORT 421 and HORT 521. Recommended preparation: HORT 310 or HORT 313.

**535 Chemistry and Biochemistry of Fruit and Wine** 3 Study of the chemistry

and biochemistry of fruits; biochemistry and physiology of individual fruit compounds, aspects of processing including winemaking. (Crosslisted course offered as HORT 435, VIT ENOL 435). Recommended preparation: Analytical chemistry.

**550 Bioinformatics for Research** 4 (3-3) Foundational knowledge about advanced bioinformatics analyses of next-generation sequencing data. Recommended preparation: Molecular Biology and/or Genetics.

**600 Special Projects or Independent Study V** 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V** 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**800 Doctoral Research, Dissertation, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Horticulture PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Health Policy And Administration  
HPA

**500 Introduction to the Health Care System** 3 Orientation to history and organization of the health care system.

**501 Health Care Policy and Politics** 3 History, methods, results and evaluation of health-care-related policy and politics.

**502 Law and Ethics of Health Management** 3 Private health law and ethics, including professional liability, relationship of physician and patient, malpractice reform, health institutions, and health access.

**503 Government Regulation of Health Services** 3 Public law regulation; health care quality, personhood and individual autonomy, life/death decisions, antitrust, health care financing and cost control.

**509 Health Care Economics** 3 The economics of allocating, financing and delivering health care services.

**510 Health Care Cost Accounting** 3 Basic cost-accounting concepts, principles, and applications in the health care setting.

**511 Health Care Finance** 3 Aspects of health care financial management fundamentals and managerial accounting for strategic financial management.

**515 Health Care Management** 3 Introduction to the knowledge, skills, and values associated with the practice of health management.

**517 Health Care and Human Resources Management** 3 Managing human resources and health professionals in diverse health care environments such as hospitals, clinics, home health care agencies and pharmaceutical firms.

**519 Biostatistics and Epidemiology for the Health Sciences** 3 Application of quantitative methods to problems in the health sciences; statistical analysis software.

**520 Research and Evaluation Methods** 3 Basic research and evaluation methods for health care professionals.

**530 Health Care Information Systems** 3 Key attributes of health care information systems and their evolution in health care environment.

**550 Operations Management I: Project Management** 3 Course Prerequisite: Admission to the MHPA program. Comprehensive overview of management theory through the use of an educational experience in project management.

**570 Marketing for Health Care Organizations** 3 Basic marketing concepts, principles, and issues related to marketing public and private health care.

**590 Strategic Management and Marketing** 3 Key components and processes in strategic planning.

**597 Internship V** 1-5 May be repeated for credit; cumulative maximum 5 hours. Student experience in professional work settings.

**599 Special Topics in Health Policy and Administration V** 1-3 May be repeated for credit; cumulative maximum 9 hours.

**600 Special Projects or Independent Study V** 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V** 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study and/or Examination V** 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program.

Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

International Business  
I BUS

**580 International Business Management 3** Course Prerequisite: Admission to the MBA program. Decision making in the international environment; political, cultural, and economic risk management.

**582 International Marketing Management 3** Course Prerequisite: Admission to the MBA program. Principles of international marketing, marketing decision making in international environments, problems of adapting marketing programs to international markets.

**600 Special Projects or Independent Study V** 1-18 May be repeated for credit. Course Prerequisite: Admission to the MBA program. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

Interior Design  
I D

**520 Historical Perspectives of Interior Space 3** Historical perspectives of interior environments, spatial distributions, furnishings, and related design elements from ancient Egypt to the 18th century.

**525 Interior Design Graduate Studio I** 5 (0-10) Graduate studio: application of advanced design theories, philosophies and research methodologies to enhance undergraduate design foundations through interdisciplinary studio experiences.

**526 Interior Design Graduate Studio II** 5 (0-10) Graduate studio: individual thesis topics and the application of advanced

design theories, philosophies, and research methodologies to student's focus topic.

**530 Philosophies and Theories of the Built Environment 3** Course Prerequisite: Graduate standing in Architecture, Interior Design, or Landscape Architecture. Focus on systematic thought which may describe behavior of the built environment. (Crosslisted course offered as ARCH 530, I D 530, LND ARCH 530).

**540 Research Methods 3** Research methods, from quantitative to technical to philosophical, directed toward qualitative research. (Crosslisted course offered as ARCH 540, I D 540, LND ARCH 540).

**560 Interdisciplinary Seminar 3** Explores approaches to design thinking in the topic areas of people and place, history, theory and criticism, and physical design. (Crosslisted course offered as ARCH 560, I D 560, LND ARCH 560).

**594 Readings in Interior Design 3** Exploration of current topics through readings in interior design.

**598 Topics in Interior Design V** 1-3 May be repeated for credit; cumulative maximum 6 hours.

**600 Special Projects or Independent Study V** 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V** 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study and/or Examination V** 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

Integrated Pest Management  
IPM

**552 Pesticides and the Environment 3** Immediate and prolonged effects of pesticides on human and other animals; legal and moral repercussions of pesticide use. Credit not granted for both IPM 452 and

552. Recommended for graduate-level course: 12 credit hours of biology or ecology courses.

International Student Exchange  
ISE

**602 G INTL EXCHG V** 1-18 May be repeated for credit; cumulative maximum 36 hours.

Kinesiology  
KINES

**513 Advanced Psychology of Physical Activity 3** Advanced exploration of foundational topics in sport and exercise physiology.

**514 Motivation Theories 3** Antecedents, consequences, and processes of motivated behavior examined from theoretical, empirical, and applied perspectives. (Crosslisted course offered as ED PSYCH 573, KINES 514.)

**515 Etiology of Obesity 3** In-depth analysis and study of the latest research on causes and contributors to obesity.

**525 Aging Across the Lifespan 3** Examination of aspects of aging as a process across the lifespan including physical, mental, and emotional changes that occur throughout the process.

**536 Methods of Health and Physical Education 2** Physical activity and health promotion for school programs, and educational/legal issues on physical and sexual abuse, K-8. (Formerly KINES 586).

**545 Leadership Philosophy, Programming, and Marketing Physical Activity 3** Planning, development, and assessment of recreation, physical activity, and sport based programming; implementation of health and physical activity marketing techniques with emphasis in leadership and practical application.

**550 Physical Activity Epidemiology 3** Epidemiological basis for research in physical activity; review of scientific findings concerning the effects of physical activity on chronic disease and various health indices.

**560 Neuromuscular Physiology 3** Understand and solve problems related to the design and function of the human system that produces voluntary movement.

**561 Motor Control Theory 3** The mechanisms and principles governing motor control and learning, as well as the research methods commonly used in motor behavior.

**562 Biomechanical Measurement Techniques 3** The daily operational use and maintenance of biomechanics lab equipment; the processing and analysis of biomechanics lab data.

**563 Balance, Gait and Running 3** Course Prerequisite: KINES 562. The

biomechanical analysis and literature of balance, gait and running.

**580 Applied Experiences in Exercise Physiology** 3 Systematic review of human physiological responses to exercise; review of current evaluative methods for cardiorespiratory function, body composition, energy expenditure, and human athletic performance.

**584 Exercise Prescription** 3 Designed to provide principles of testing and prescription based on current practices in movement education for healthy individuals and special populations.

**590 Kinesiology Seminar** 1 May be repeated for credit; cumulative maximum 4 hours. Course Prerequisite: By instructor permission. Experience in presentation and discussion of scientific data broadly within kinesiology.

**600 Special Projects or Independent Study** V 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination** V 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination** V 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

Landscape Architecture

L A

**520 The Northern Rocky Mountain Regional Landscape** 4 (2-4) Biophysical characteristics of the Northern Rocky Mountain regional landscape.

**521 Cultural Interpretation of the Regional Landscape** 4 (2-4) Cultural characteristics of the Northern Rocky Mountain regional landscape.

**525 Landscape Modeling** 3 (1-6) Visual and cartographic landscape modeling through application of GIS and visualization technologies to landscape changes.

**530 Philosophies and Theories of the Built Environment** 3 Course Prerequisite: Graduate standing in Architecture, Interior Design, or Landscape Architecture. Focus on systematic thought which may describe behavior of the built environment.

(Crosslisted course offered as ARCH 530, I D 530, LND ARCH 530).

**540 Research Methods** 3 Research methods, from quantitative to technical to philosophical, directed toward qualitative research. (Crosslisted course offered as ARCH 540, I D 540, LND ARCH 540).

**560 Interdisciplinary Seminar** 3 Explores approaches to design thinking in the topic areas of people and place, history, theory and criticism, and physical design. (Crosslisted course offered as ARCH 560, I D 560, LND ARCH 560).

**600 Special Projects or Independent Study** V 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination** V 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

Language, Literacy, And Technology LLT

**586 (TCH LRN) Seminar in Language, Literacy, and Technology** 1 May be repeated for credit; cumulative maximum 3 hours. Tools for professional development in the areas of research, teaching, and service. Seminar compliments required courses in the LLT doctoral student program.

**800 Doctoral Research, Dissertation, and/or Examination** V 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Language, Literacy, and Technology PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Mechanical Engineering  
M E

**501 Continuum Mechanics** 3 Unified presentation of principles common to all branches of solid and fluid mechanics; viscous fluids, elasticity, viscoelasticity, and plasticity.

**502 Sustainability Assessment for Engineering Design** 3 Sustainability assessment, including environmental, societal, and economic assessment, in design and planning for entire product life cycle.

**503 Systems Design Approaches for Sustainability** 3 Sustainability in systems design methodologies; systems modeling and decision-making for sustainability; multidisciplinary design optimization; research topics.

**507 Additive Manufacturing** 3 Additive manufacturing processes and their applications in ceramic, metallic, polymeric, and composite materials. Recommended preparation: Basic knowledge in materials science and manufacturing. (Crosslisted course offered as MSE 507, ME 507). Cooperative: Open to UI degree-seeking students.

**509 MEMS Engineering** 3 (2-3) Introduction to the design, fabrication and application of microelectromechanical systems. (Crosslisted course offered as ME 509, MSE 509).

**513 Crystal Plasticity** 3 Dislocation theory; slip; climb; mechanical properties of polycrystalline materials and application to important deformation processes. (Crosslisted course offered as MSE 513, ME 513, MATSE 513).

**514 Thermodynamics of Solids** 3 Thermodynamic properties of solid solutions; models for substitutional and interstitial solutions; configurational and non-configurational contributions; calculation of phase diagrams. (Crosslisted course offered as MSE 514, ME 514).

**515 Advanced Heat Transfer** 3 Derivation of the energy conservation equation; laminar and turbulent forced convection heat transfer with internal and external flow; free convection.

**516 Conduction and Radiation Heat Transfer** 3 Principles of conduction and radiation heat transfer with focus on solving conduction and radiation problems of engineering interest.

**517 Thin Films** 3 Materials science aspect of thin films, including growth, characterization, and properties for electrical, mechanical, corrosion, and optical behavior. (Crosslisted course offered as MSE 517, ME 517).

**520 Multiscale Modeling in Thermomechanics of Materials** 3 Multiscale problems in thermomechanics of

materials; practical and computational aspects of homogenization, granular materials, dislocation plasticity and atomistic methods. (Crosslisted course offered as ME 520, MSE 520).

**521 Fundamentals of Fluids I 3** Governing equations of fluid mechanics accompanied by applications of Navier-Stokes equation to simple flow situations, boundary layer analysis.

**525 Biomechanics 3** Methods for analysis of rigid body and deformable mechanics; application to biological tissue, especially bone, cartilage, ligaments, tendon and muscle. (Crosslisted course offered as BIO ENG 425/525, ME 525). Credit not granted for more than one of BIO ENG 425, BIO ENG 525, or ME 525.

**526 Statistical Thermodynamics 3** Microscopic development of equilibrium; classical and quantum particle statistics; statistical **Description:** of real and ideal gases, solids, and liquids.

**527 Macroscopic Thermodynamics 3** Advanced thermodynamics from macroscopic viewpoint; basic postulates, equilibrium, stability, property relations; application to thermal-fluid and solid mechanics; irreversible thermodynamics.

**530 Elasticity 3** Theory of kinematics of solid deformable bodies; conservation laws applied to an elastic continuum; generalized linear stress-strain behavior with applications. (Crosslisted course offered as ME 530, MSE 530).

**531 Theory of Plasticity 3** The fundamentals of the theory of plasticity; the classical theory of plasticity; the classical theory and modern continuum theories of large elasto-plastic deformations. (Crosslisted course offered as ME 531, MSE 531).

**532 Finite Elements 3** Theory of finite elements; applications to general engineering systems considered as assemblages of discrete elements. (Crosslisted course offered as CE 532, ME 532).

**534 Mechanics of Composite Materials 3** Analysis of micromechanical and macromechanical behavior of composite materials with emphasis on fiber-reinforced composite; prediction of properties; stiffness and strength theories; laminated beams and plates; dynamic behavior; environmental effects. (Crosslisted course offered as ME 534, MSE 534).

**537 Fracture Mechanics and Mechanisms 3** Fracture mechanics and mechanisms and the microstructural origins of toughness in metals, polymers and

composites. (Crosslisted course offered as MSE 537, ME 537).

**540 Advanced Dynamics of Physical Systems 3** Newtonian dynamics, rotating coordinate systems; Lagrangian and Hamiltonian mechanics; gyroscopic mechanics, other applications.

**556 Numerical Modeling in Fluid Mechanics 3** Fundamental concepts in development of numerical models for fluid flow with applications to steady and unsteady flows.

**565 Nuclear Reactor Engineering 3** Reactor power distribution; thermal and exposure limits; critical heat flux and pressure design; neutronic/thermal hydraulic relationships; transient/accident analysis.

**574 Foundations of CAD 3** Topics fundamental to the creation of CAD, engineering visualization, and virtual reality based engineering software.

**575 Geometric Modeling 3** Study of the mathematics behind the creation of complex shapes for CAD using curves, surfaces, and solids.

579 Advanced Topics in Mechanical Engineering V 1-3 May be repeated for credit.

**581 Control Systems 3** Analysis and design of feedback control systems.

**598 Seminar 1** May be repeated for credit. Current research interests.

**600 Special Projects or Independent Study V 1-18** May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V 1-18** May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V 1-18** May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination V 1-18** May be

repeated for credit. Course Prerequisite: Admitted to the Mechanical Engineering or Engineering Science PhD program.

Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Materials Science

MAT S

**503 Current Topics in Materials Science V 1-3** May be repeated for credit. Recent advances and current research at the forefront of materials science.

**505 Advanced Materials Science 3** Broad baseline in materials science including relationships between structure and properties. (Crosslisted course offered as MSE 505, MATSE 505).

**506 Biomaterials 3** Overview of the different types of materials used in biomedical applications such as implants and medical devices. Credit not granted for both MSE 406 and MSE 506. (Crosslisted course offered as MSE 506 and MATSE 506.)

**513 Crystal Plasticity 3** Dislocation theory; slip; climb; mechanical properties of polycrystalline materials and application to important deformation processes. (Crosslisted course offered as MSE 513, ME 513, MATSE 513).

**516 Phase Transformations 3** Thermodynamics, nucleation, interface motion, mechanisms and kinetics of chemical reactions between solid metals and their environment. (Crosslisted course offered as MSE 516, MATSE 516).

**521 Statistics of Microstructures 3** Stereology, orientation and spatial distributions, percolation, measurement techniques and application to modeling of microstructures. (Crosslisted course offered as MSE 521, MATSE 521). Recommended preparation: MATH 540.

**538 Special Topics V 1-3** May be repeated for credit. Selected topics of current interest in advanced materials science.

**571 Microscopic Analysis of Solid Surfaces 3** Modern spectroscopic methods for microscopic analysis of solid surfaces; emphasizes electron, ion, laser, and x-ray techniques.

**593 Seminar in Materials Science 1** May be repeated for credit; cumulative maximum 6 hours. Presentation and discussion of topics in materials science taken from research in progress or current literature.



**600 Special Projects or Independent Study V** 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**800 Doctoral Research, Dissertation, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Materials Science or the Materials Science and Engineering PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Mathematics  
MATH

**500 Proseminar** 1 May be repeated for credit; cumulative maximum 2 hours.

**501 Real Analysis** 3 Metric spaces, convergence, continuous functions, infinite series, differentiation and integration of functions of one and several variables. Required preparation must include advanced calculus or real analysis.

**502 Introduction to Functional Analysis** 3 Course Prerequisite: MATH 501. Normed linear spaces, Banach spaces, introduction to Hilbert space, linear operators. Required preparation: Advanced linear algebra.

**503 Complex Analysis** 3 Course Prerequisite: MATH 501. Analytic functions, complex integration, Taylor and Laurent series, conformal mapping, Riemann surfaces and analytic continuation.

**504 Measure and Integration** 3 Course Prerequisite: MATH 501. Lebesgue measure, Lebesgue integration, differentiation, L spaces, general measure and integration, Radon-Nikodym Theorem, outer measure and product measures.

**505 Abstract Algebra** 3 Groups, rings, fields, and homological algebra. Required preparation must include abstract algebra.

**507 Advanced Theory of Numbers** 3 May be repeated for credit; cumulative maximum 6 hours. Analytic and algebraic number theory.

**508 Topics in Applied Analysis** 3 Advanced treatment of applications using techniques from fundamental analysis, convexity, analytic function theory, asymptotics, and differential equations.

**511 Advanced Linear Algebra** 3 Vector spaces, inner products, unitary equivalence, similarity, Jordan forms, normality, spectral theory, singular value decomposition, norms and inequalities. Required preparation must include advanced linear algebra.

**512 Ordinary Differential Equations** 3 Existence of solutions; linear systems; qualitative behavior, especially stability; periodic solutions. Required preparation must include a year-long sequence in advanced calculus or real analysis.

**516 Simulation Methods** 3 Model formulation and simulation in business, industry, and government; simulation languages; analysis of simulation output; applications. Credit not granted for both MATH 416 and MATH 516. Required preparation must include probability and statistics and programming experience.

**525 General Topology** 3 Sets, metric spaces, topological spaces; continuous mappings, compactness, connectedness, local properties, function spaces, and fundamental groups. Required preparation must include a year-long sequence in advanced calculus or real analysis.

**531 Intersections of Culture and Mathematics** 3 Gender/race/ethnicity differences; social consequences; cultural influences on development and learning of mathematics; role of women, people of color in mathematics. Credit not granted for both MATH 431 and 531.

**532 Advanced Mathematical Thinking** 3 Course Prerequisite: Graduate standing in mathematics. Current theories about how humans learn to think mathematically at the advanced level.

**533 Teaching College Mathematics** 1 May be repeated for credit; cumulative maximum 3 hours. Course Prerequisite: Graduate standing in Mathematics. Theory and practice of mathematics instruction at the collegiate level.

**534 Theories of Learning in Mathematics** 3 Math learning theories, including behaviorism, information processing, constructivism, situated cognition, communities of practice; influence on teaching and learning mathematics.

**535 Research Paradigms in Mathematics Education** 3 Course Prerequisite: MATH 534. Current research paradigms in math education research; critique research designs used in current mathematics education research article; design and carry out a research project.

**536 Statistical Computing** 3 (2-3) Generation of random variables, Monte

Carlo simulation, bootstrap and jackknife methods, EM algorithm, Markov chain Monte Carlo methods. (Crosslisted course offered as STAT 536, MATH 536). Recommended preparation: One 3-hour 400-level probability or STAT course.

**540 Applied Mathematics I** 3 Partial differential equations; Fourier series and integrals; Bessel functions; calculus of variations; vector calculus; applications. Credit not granted for both MATH 440 and MATH 540. Required preparation must include differential equations.

**541 Applied Mathematics II** 3 Complex variable theory including analytic functions, infinite series, residues, and conformal mapping; Laplace transforms; applications. Credit not granted for both MATH 441 and MATH 541. Required preparation must include differential equations.

**543 Approximation Theory** 3 Univariate polynomial and rational approximation techniques; approximation using splines and wavelets; selected topics in multivariate approximation; algorithms for approximation. Required preparation must include numerical analysis.

**544 Advanced Matrix Computations** 3 Advanced topics in the solution of linear systems and eigenvalue problems, including parallel matrix computations. (Crosslisted course offered as MATH 544, CPT S 531). Required preparation must include numerical analysis.

**545 Numerical Analysis of Evolution Equations** 3 Discretization and numerical solution of partial differential equations of evolution; stability, consistency, and convergence; shocks; conservation of forms. Required preparation must include numerical analysis.

**546 Numerical Analysis of Elliptic PDEs** 3 Methods of discretizing elliptic partial differential equations and solving the resulting systems of equations; error analysis. Required preparation must include numerical analysis.

**548 Numerical Analysis** 3 Fundamentals of numerical computation; finding zeroes of functions, approximation and interpolation; numerical integration (quadrature); numerical solution of ordinary differential equations. (Crosslisted course offered as MATH 448, MATH 548, CPT S 430, CPT S 530). Required preparation must include differential equations and a programming course.

**553 Graph Theory** 3 Graphs and their applications, directed graphs, trees, networks, Eulerian and Hamiltonian paths, matrix representations, construction of

algorithms. (Crosslisted course offered as MATH 453, MATH 553, CPT S 453, CPT S 553). Required preparation must include linear algebra. Required preparation must include linear algebra.

**555 Topics in Combinatorics** 3 May be repeated for credit; cumulative maximum 6 hours. Combinatorics, generating functions, recurrence relations, inclusion-exclusion, coding theory; experimental design, graph theory.

**560 Partial Differential Equations I** 3 Partial differential equations and other functional equations: general theory, methods of solution, applications. Required preparation must include a year-long sequence in advanced calculus or real analysis.

**561 Partial Differential Equations II** 3 Course Prerequisite: MATH 560. Continuation of MATH 560.

**563 Mathematical Genetics** 3 Mathematical approaches to population genetics and genome analysis; theories and statistical analyses of genetic parameters. (Crosslisted course offered as MATH 563, BIOLOGY 566). Required preparation must include multivariate calculus, genetics, and statistics.

**564 Nonlinear Optimization I** 3 Theory and algorithms for unconstrained nonlinear optimization problems, including line search, trust region, conjugate gradient, Newton and quasi-Newton methods. Required preparation must include advanced multivariate calculus, and a programming language. Recommended preparation: MATH 464, 544.

**565 Nonlinear Optimization II** 3 Course Prerequisite: MATH 564. Theory and algorithms for constrained linear and nonlinear optimization including interior point, quadratic programming, penalty, barrier and augmented Lagrangian methods.

**566 Optimization in Networks** 3 Formulation and solution of network optimization problems including shortest path, maximal flow, minimum cost flow, assignment, covering, postman, and salesman. Credit not granted for both MATH 466 and MATH 566. Required preparation must include linear programming.

**567 Integer and Combinatorial Optimization** 3 Theory and applications of integer and combinatorial optimization including enumerative, cutting plane, basis reduction, relaxation and matching methods. Required preparation must include linear optimization.

**568 Statistical Theory I** 3 Probability spaces, combinatorics, multidimensional

random variables, characteristic function, special distributions, limit theorems, stochastic processes, order statistics. (Crosslisted course offered as STAT 548, MATH 568). Recommended preparation: Calculus III and one 3-hour 400-level probability course.

**569 Statistical Theory II** 3 Continuation of STAT 548. Statistical inferences; estimation and testing hypotheses; regression analysis; sequential analysis and nonparametric methods. (Crosslisted course offered as STAT 549, MATH 569). Recommended preparation: STAT 548.

**570 Mathematical Foundations of Continuum Mechanics I** 3 The basic mathematical theory of continuum mechanics and its relation to perturbation techniques and stability methods. Required preparation must include differential equations and advanced calculus or real analysis.

**571 Mathematical Foundations of Continuum Mechanics II** 3 Course Prerequisite: MATH 570. Continuation of MATH 570.

**574 Topics in Optimization** 3 May be repeated for credit; cumulative maximum 12 hours. Advanced topics in the theory and computing methodology in optimization with emphasis on real-life algorithmic implementations. Required preparation must include advanced multivariable calculus and a programming language.

**575 Asset Pricing in Financial Engineering** 3 Mathematical methods for various models on valuation of stocks and options, with rigorous mathematical analysis on pricing and hedging techniques. Recommended preparation: Advanced calculus and some knowledge on differential equations.

**576 Quantitative Risk Management** 3 Fundamental concepts in modern risk theory and mathematical methods in quantitative risk management; coherent risk measures, volatility modeling, multivariate dependence analysis using copulas, risk aggregation and allocation, and extreme value theory.

**579 Mathematical Modeling in the Biological and Health Sciences** 3 Techniques, theory, and current literature in mathematical modeling in the biological and health sciences, including computational simulation. (Course offered as BIOLOGY 579, MATH 579).

**581 Topics in Mathematics** V 1-3 May be repeated for credit. Topics in mathematics.

**583 Topics in Applied Mathematics** V 1-3 May be repeated for credit. Topics in applied mathematics.

**586 Mathematical Modeling in the Natural Science** 3 Development of mathematical models for solutions of problems in the physical and life sciences. Credit not granted for both MATH 486 and MATH 586. Required preparation must include differential equations.

**590 Topics in Mathematics Education** V 1-3 May be repeated for credit; cumulative maximum 6 hours. Topics in mathematics education.

**591 Seminar in Mathematical Biology** 1 May be repeated for credit; cumulative maximum 10 hours. Current research in mathematical biology.

**592 Seminar in Analysis** 1 May be repeated for credit; cumulative maximum 10 hours. Current research in analysis.

**593 Seminar in Combinatorics, Linear Algebra, and Number Theory** 1 May be repeated for credit; cumulative maximum 10 hours. Current research in combinatorics, linear algebra, and number theory.

**594 Mathematics Education Seminar** 1 May be repeated for credit; cumulative maximum 10 hours. Current research in mathematics education.

**597 Mathematics Instruction Seminar** 1 May be repeated for credit; cumulative maximum 5 hours. Introduction to the teaching of university mathematics.

**600 Special Projects or Independent Study** V 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**702 Master's Special Problems, Directed Study, and/or Examination** V 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination** V 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Mathematics PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate

degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Molecular Biosciences

MBIOS

**501 Cell Biology 3** Cellular structure and function; membrane biochemistry and transport; cell-cell communication; regulation of cell cycle and apoptosis; cell signaling; cancer biology. Credit not granted for both MBIOS 401 and MBIOS 501.

Recommended preparation for graduate students: Introductory genetics and biochemistry coursework.

**503 Advanced Molecular Biology I 3** DNA replication, gene expression and regulation, including chromatin structure, DNA repair, recombination, genomic editing, and epigenetic regulation.

**505 Cell Biology of Disease 3** Discussion of human diseases characterized by cell biological defects, using popular press and research articles as a source of information. Credit not granted for both MBIOS 405 and 505.

**513 General Biochemistry 3** Structure and function of proteins, nucleic acids and biological membranes; principles of enzymology; biochemical methodology. Credit not granted for both MBIOS 413 and MBIOS 513. Recommended preparation: Introductory biochemistry coursework.

**514 General Biochemistry 3** Course Prerequisite: MBIOS 513. Metabolism of carbohydrates, proteins, fats, bioenergetics; photosynthesis; control of metabolic processes. Credit not granted for both MBIOS 414 and MBIOS 514.

**525 Advanced Topics in Genetics V 1-3** May be repeated for credit; cumulative maximum 4 hours. Recent genetics research in selected areas. Recommended preparation: MBIOS 503 or an equivalent course providing a basic understanding of molecular biology or molecular genetics.

**528 Molecular and Cellular Reproduction 3 (2-2)** State of the art concepts of the molecular, cellular, and physiological aspects of mammalian reproduction. (Crosslisted course offered as MBIOS 528, ANIM SCI 558).

**529 Selected Topics in Cell Biology V 1-3** May be repeated for credit; cumulative maximum 3 hours. Selected topics in cell biology using current literature. Recommended preparation: MBIOS 401 or an equivalent course providing a basic understanding of a typical eukaryotic cell.

**540 Immunology 3** Principles of basic immunology. Credit not granted for both MBIOS 440 and MBIOS 540.

Recommended preparation: Introductory microbiology coursework; concurrent enrollment with MBIOS 548 highly recommended.

**541 Research Seminar 1** May be repeated for credit; cumulative maximum 2 hours. Literature reviews and research reports.

**542 General Virology 3** The biology of bacterial, animal, and plant viruses. Credit not granted for both MBIOS 442 and MBIOS 542. Recommended preparation: Introductory genetics and biochemistry coursework; concurrent enrollment with MBIOS 548 highly recommended.

**548 Selected Topics in Immunology & Virology 1** May be repeated for credit; cumulative maximum 2 hours. Selected topics in immunology and virology using the current literature. Recommended preparation: Concurrent enrollment with MBIOS 540 or 542.

**549 Seminar in Immunology 1** May be repeated for credit; cumulative maximum 2 hours. Seminar series on advances in immunology. May be repeated for credit; cumulative maximum 2 hours.

Recommended preparation: MBIOS 540 or concurrent enrollment.

**550 Microbial Physiology 3** Basic microbial physiology and its relevance to the processes of applied microbiology. Credit not granted for both MBIOS 450 and 550. Recommended preparation: Introductory genetics, biochemistry or microbiology coursework.

**561 Biochemical Signaling in Plants, Animals and Microorganisms 3** Course Prerequisite: MBIOS 513. New research on intra and extra cellular biochemical signaling, including communication in plants and hormone action in animals. (Crosslisted course offered as MBIOS 561, MPS 561).

**563 Deconstruction of Research 3** Course Prerequisite: Graduate standing in a WSU biomedical based graduate program. Nature and development of scientific investigation through oral and written avenues, and methods of critical analyses applied to questions of biomedical interest. (Crosslisted course offered as NEUROSCI 563, GLANHLTH 563, MBIOS 563, VET MICR 563, VET PATH 563, VET PH 563).

**564 Topics in Biomedical Experimentation V 1-3** May be repeated for credit; cumulative maximum 6 hours. Examination of the philosophy of experimental design and practical application and analysis of various experimental approaches in biomedical research. Recommended preparation:

graduate standing in a WSU biomedical-based program, and an advanced undergraduate or graduate statistics course. (Crosslisted course offered as NEUROSCI 564, GLANHLTH 564, MBIOS 564, VET MICR 564, VET PATH 564, VET PH 564).

**568 Advanced Topics in Molecular Biosciences V 1-3** May be repeated for credit. Recent research in selected areas of molecular biosciences.

**574 Protein Biotechnology 3** Biotechnology related to the isolation, modification and large scale commercial production, patenting and marketing of useful recombinant proteins and products. (Crosslisted course offered as MPS 574, CHE 574, MBIOS 574). Recommended preparation: MBIOS 513.

**578 Bioinformatics 3 (2-3)** Computer analysis of protein and nucleic acid sequences, functional genomics and proteomics data; modeling biological networks and pathways. Credit not granted for both MBIOS 478 and MBIOS 578. Recommended preparation: Introductory genetics or biochemistry coursework.

**579 Molecular Biosciences Seminar 1** May be repeated for credit; cumulative maximum 10 hours. Required of all graduate students in molecular biosciences.

**580 Science Information Literacy 2** Efficient methods to locate and effectively use a wide variety of information resources that will be useful in the work world.

**583 Professional Skills Seminar 1** Covers many aspects of professionalism, including professional behavior, professional dress, and professional sensitivity in social settings.

**584 Medical Genetics 3** The mechanisms of human heredity and how these mechanisms can influence human health.

**585 Molecular Biotechniques 2** Background and application of classical and current techniques involved in cloning, characterization, modification, and expression of genes.

**586 Molecular Biotechniques Laboratory 1 (0-3)** Laboratory exploration of classical and current techniques involved in cloning, characterization, modification, and expression of genes. Recommended preparation: MBIOS 585 or concurrent enrollment.

**593 Research Proposal 2** May be repeated for credit; cumulative maximum 4 hours. Written proposal and oral defense of research project in the area of molecular biosciences.

**600 Special Projects or Independent Study V 1-18** May be repeated for credit.

Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V** 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**701 Master's Independent Capstone Project and/or Examination V** 1-6 May be repeated for credit. Capstone project or final examination for professional master's degree under the Graduate School. The credits will include a balloted evaluation of the student's completion of the program's capstone/examination requirements by the program's graduate faculty. Students must have graduate degree-seeking status and obtain approval from their major advisor/committee chair before enrolling for 701 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V** 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Molecular Biosciences PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit. Mechanical Engineering - Vancouver MECH

**501 Digital Design and Manufacturing** 3 Fundamentals of digital design and manufacturing; exposure to current research topics in the area.

**509 MEMS Engineering** 3 (2-3) Introduction to the design, fabrication and application of microelectromechanical systems.

**515 Advanced Heat Transfer** 3 Energy conservation equations; forced

convection with internal and external flow, free convection, boiling and condensation, mass transfer, numerical methods.

**516 Micro/Nanoscale Thermal Engineering** 3 Fundamentals and applications of micro/nanoscale thermal science and engineering.

**521 Fundamentals of Fluids I** 3 Mass and momentum conservation equations, Navier-Stokes equations, compressible flows, inviscid-potential flows, advanced viscous flows including boundary layer numerical methods.

**523 Computational Fluid Dynamics and Heat Transfer** 3 Partial differential equation systems, finite difference method, stability analysis, methods for wave equation, heat equation, Laplace equation, finite volume method.

**529 Experimental Methods for Mechanical Engineering Research** 3 Research methods for mechanical engineers, including experimental design, techniques, analysis, and presentation.

**532 Finite Elements** 3 Theory of finite elements; applications to general engineering systems considered as assemblages of discrete elements.

**538 Microfabrication Technology** 3 Microelectronic fabrication technology, semiconductor material, diffusion, thermal oxidation, ion implantation, lithography, etching, thin film deposition, CMOS integration and MEMS. Credit not granted for both MECH 438 and MECH 538.

**540 Advanced Dynamics** 3 Newtonian dynamics, rotating coordinate systems; Lagrangian and Hamiltonian mechanics, gyroscopic mechanics, other applications.

**542 Advanced Thermal Systems** 3 Analysis and design of advanced thermal systems at macro, mini and micro scales; applied design software packages; design projects. Credit not granted for both MECH 442 and MECH 542.

**550 Advanced Topics in Micro and Nano Technology** 3 (2-3) Microfabrication technology, bulk and surface micromachining, sensors and actuators, microelectromechanical systems (MEMS), nanofabrication technology, micro/nano scale material and device measurements. Credit not granted for both MECH 450 and MECH 550.

**567 Automation** 3 (2-3) Design of automation systems, motion control, programmable logic. Credit not granted for both MECH 467 and MECH 567.

**568 Robotics** 3 Industrial robots, kinematics, control, robot programming, interfacing, sensors, actuators, vision

systems and mobile robots. Credit not granted for both MECH 468 and MECH 568.

**576 Advanced Manufacturing Engineering** 3 Advanced topics in manufacturing processes, including interrelationships between the properties of the material, the manufacturing process and design of components. Credit not granted for both MECH 476 and MECH 576.

**579 Advanced Topics in Design and Manufacturing V** 1-3 May be repeated for credit.

**585 Computer-aided Engineering** 3 Introduction to the use of finite element techniques in engineering product design and analysis; basic concepts and applications in CAE.

**589 Material Failure in Mechanical Design** 3 Analysis, design and prevention from failure of materials in mechanical design; mechanical behavior of materials such as fatigue, fracture and wear. Credit not granted for both MECH 489 and MECH 589.

**598 Seminar** 1 May be repeated for credit. Current research interests.

**700 Master's Research, Thesis, and/or Examination V** 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

Medical Clinical Training  
MEDCL

**521 Longitudinal Integrated Clerkship I** 8 Course Prerequisite: MED FMS 513. Covers the seven core disciplines in medicine: family medicine, internal medicine, general surgery, pediatrics, psychiatry, obstetrics and gynecology, and neurology; clinical experiences will be interleaved throughout the entire sequence of LIC courses and will focus on working with a small number of preceptors in each discipline for a continuity experience between teacher and learner.

**522 Longitudinal Integrated Clerkship II** 14 Course Prerequisite: MED CLIN 521. Covers the seven core disciplines in medicine: family medicine, internal medicine, general surgery, pediatrics, psychiatry, obstetrics and gynecology, and neurology; clinical experiences will be interleaved throughout the entire sequence of LIC courses and will focus on working with a small number of preceptors in each discipline for a continuity experience between teacher and learner.

**523 Longitudinal Integrated Clerkship III** 14 Course Prerequisite: MED CLIN 522. Covers the seven core disciplines in medicine: family medicine, internal medicine, general surgery, pediatrics, psychiatry, obstetrics and gynecology, and neurology; clinical experiences will be interleaved throughout the entire sequence of LIC courses and will focus on working with a small number of preceptors in each discipline for a continuity experience between teacher and learner.

**524 Longitudinal Integrated Clerkship IV** 10 Course Prerequisite: MED CLIN 523. Covers the seven core disciplines in medicine: family medicine, internal medicine, general surgery, pediatrics, psychiatry, obstetrics and gynecology, and neurology; clinical experiences will be interleaved throughout the entire sequence of LIC courses and will focus on working with a small number of preceptors in each discipline for a continuity experience between teacher and learner.

**531 Sub Internship in Family Medicine** 4 Course Prerequisite: MED CLIN 524. Extension of knowledge and skills in the evaluation and management of acute and chronic medical conditions treated by family physicians. May include attendance at medical conferences.

**532 Sub Internship in Inpatient Internal Medicine** 4 Course Prerequisite: MED CLIN 524. Extension of knowledge, skills, and range of medical problems evaluated and managed in a hospital setting.

**533 Sub Internship in General Surgery** 4 Course Prerequisite: MED CLIN 524. Knowledge, skills, and range of medical problems related to common surgical issues in various surgical specialties.

**534 Sub Internship in Pediatrics** 4 Course Prerequisite: MED CLIN 524. Knowledge and skills in caring for pediatric patients admitted to the hospital; exposure to the wide range of medical diagnoses that lead to the admission of pediatric patients.

**535 Sub Internship in Psychiatry** 4 Course Prerequisite: MED CLIN 524. Knowledge, skills, and attitudes necessary to diagnose and treat a wide range of routine psychiatric, medical, and behavioral problems; exposure to the breadth of undifferentiated patient complaints presenting in both acute and chronic treatment settings.

**536 Sub Internship in Obstetrics and Gynecology** 4 Course Prerequisite: MED CLIN 524. Knowledge, skills, and range of women's health issues with concentration on common obstetrical and

gynecological conditions; introduction to serious, less common conditions.

**537 Clinical Rotation in Emergency Medicine** 4 Course Prerequisite: MED CLIN 524. Knowledge, skills, and range of medical problems treated by emergency physicians; breadth of undifferentiated patient complaints presenting in an acute setting.

**538 Clinical Rotation in Rural Medicine** 4 Course Prerequisite: MED CLIN 524. Caring for patients in communities with limited medical facilities; issues related to referrals and transfers to tertiary care centers for more complex medical problems and care coordination with local resources.

**539 Clinical Rotation in Underserved Medicine** 4 Course Prerequisite: MED CLIN 524. The health care issues of underserved populations and the complexities of providing for their medical needs in challenging social situations; disparities in the American health care system and challenges under-resourced patients face in meeting their medical needs.

**541 Clinical Rotation in Imaging/Radiology** 4 Course Prerequisite: MED CLIN 524. Medical imaging modalities and imaging-guided treatments, including patient preparation, risks, costs, and accuracies.

**542 Clinical Rotation in Dermatology** 4 Course Prerequisite: MED CLIN 524. Disorders of the skin, mucous membranes, hair, and nails, including common skin problems such as acne, atopic dermatitis, contact dermatitis, psoriasis, cutaneous infections, benign skin lesions, and malignant lesions.

**543 Clinical Rotation in Physical Medicine and Rehabilitation** 4 Course Prerequisite: MED CLIN 524. Diagnosis and treatment of patients with acute or chronic pathology of the neuromusculoskeletal systems.

**544 Clinical Rotation in Nephrology** 4 Course Prerequisite: MED CLIN 524. Breadth of nephrologic disorders as related to acute kidney injury, chronic kidney disease, hematuria, proteinuria, hyperparathyroidism, hypertension, electrolyte disorders, metabolic/acid-base disorders, and poisoning.

**545 Clinical Rotation in Critical Care Medicine** 4 Course Prerequisite: MED CLIN 524. Breadth of complex patient conditions presenting acutely and throughout an intensive care stay.

**546 Clinical Rotation in Vascular Surgery** 4 Course Prerequisite: MED CLIN 524. Etiologies, pathophysiology,

evaluation, treatment, and follow-up care of commonly encountered vascular diseases; participation in supervised patient care and learning activities in various environments.

**547 Clinical Rotation in Cardiology** 4 Course Prerequisite: MED CLIN 524. Cardiac problems and pathology, including, but not limited to, angina and other forms of chest pain, ischemic heart disease, chronic heart failure, other myocardial diseases and arrhythmias.

**548 Clinical Rotation in Orthopedic Surgery** 4 Course Prerequisite: MED CLIN 524. Introduction to the conservative and operative diagnostic and treatment approaches in managing common orthopedic problems including acute and chronic spine and extremity presentations.

**549 Clinical Rotation in Hematology and Oncology** 4 Course Prerequisite: MED CLIN 524. Acute inpatient and chronic outpatient medical conditions treated by hematology-oncology physicians; treatment options including chemotherapy, immunotherapy, surgery, and radiation therapy.

**551 Clinical Rotation in Pathology** 4 Course Prerequisite: MED CLIN 524. Anatomic and clinical pathology including surgical pathology, cytopathology, hematopathology, and laboratory medicine.

**552 Clinical Rotation in Gastroenterology** 4 Course Prerequisite: MED CLIN 524. Breadth of digestive system problems and pathology; utility of various diagnostic methods available, including physical diagnosis, laboratory testing, imaging, and endoscopy.

**553 Clinical Rotation in a Pediatric Sub-Specialty** 4 May be repeated for credit; cumulative maximum 12 hours. Course Prerequisite: MED CLIN 524. Identifying and caring for pediatric patients in need of sub-specialty care, with emphasis on medications and interventions.

**598 Research Experience in Medicine** 4 May be repeated for credit; cumulative maximum 12 hours. Course Prerequisite: MED CLIN 524; departmental permission. In-depth research experience including data-gathering, statistical analyses, and writing research results in preparation for publication.

**599 Special Projects** 4 May be repeated for credit; cumulative maximum 12 hours. Course Prerequisite: MED CLIN 524; departmental permission. Laboratory research, clinical research, or comprehensive review of selected subjects. Foundations Of Medical Science MEDFS

**501 Foundations of Medical Science I** 14 (5-18) Course Prerequisite: Admission to the MD Degree Program. Foundational anatomy, histology, and introductory pathology; physical exam, population health, clinical skills and ethics.

**502 Foundations of Medical Science II** 13 (7-12) Course Prerequisite: MED FMS 501. Foundational cell and molecular sciences, hematology and oncology; clinical skills.

**503 Foundations of Medical Science III** 12 (7-10) Course Prerequisite: MED FMS 502. Foundational microbiology, infectious disease, and cardiovascular systems; clinical skills.

**511 Foundations of Medical Science IV** 13 (7-12) Course Prerequisite: MED FMS 503. Foundational cardiovascular, respiratory, gastrointestinal, and renal systems; nutritional sciences; clinical skills.

**512 Foundations of Medical Science V** 13 (7-12) Course Prerequisite: MED FMS 511. Foundational nervous system, psychiatry, and behavioral sciences; endocrine system; human reproduction; clinical skills.

**513 Foundations of Medical Science VI** 11 (5-12) Course Prerequisite: MED FMS 512. Foundational rheumatology; skin system; musculoskeletal system; clinical immunology; clinical skills.

Leadership In Medicine And Healthcare MEDMH

**501 Understanding Yourself as a Physician Leader** 1 Course Prerequisite: Admission to the MD Degree Program. Physicians as professionals with a leadership role; basic leadership principles and styles.

**502 Leadership of Teams** 1 Course Prerequisite: MED LMH 501. Leadership in teams in the context of inter-professional practice.

**503 Physicians as Leaders, Scientists, and Advocates** 1 Course Prerequisite: MED LMH 502. Leadership in the context of physicians as leaders and advocates in a complex system of healthcare delivery; discovery (research) driven by a different set of stakeholders and political agendas that affect our current payment and delivery systems.

**511 Leadership and Management in Healthcare: Microsystem to Macrosystem** 1 Course Prerequisite: MED LMH 503. Management and leadership skills in healthcare; progression from basic theoretical models to case examples; understanding of current US health economics and how US insurance systems work; how systems are managed and led in both public and private sectors.

**512 Improving Healthcare through Leadership, Advocacy, and Innovation: Person to Profession** 1 Course Prerequisite: MED LMH 511. Identification and analysis of physician participation in leadership, advocacy, and innovation from the patient level to the national level in both public and private sectors.

**513 Information Management in Healthcare: Clinical Information Systems** 1 Course Prerequisite: MED LMH 512. Leadership skills as related to healthcare information management, including clinical information systems.

**521 Quality and Safety in Healthcare: Medical Errors** 1 Course Prerequisite: MED LMH 513. Quality in healthcare, including safety and quality metrics, measurement and reporting of quality, analysis of patient safety and medical errors, including root cause analysis; physician disclosure and the difference between errors and malpractice.

**522 Continuous Quality Improvement in Healthcare** 1 Course Prerequisite: MED LMH 521. Waste analysis in healthcare and continuous quality improvement (CQI) strategies; application of CQI and 'LEAN management' models in healthcare settings.

**523 Value-based Care** 1 Course Prerequisite: MED LMH 522. Introduction to principles and practice of value-based care.

**531 Personal Leadership Development I** 1 Course Prerequisite: MED LMH 523. Development of capstone project proposal and plan; exploration of personal leadership development plan; includes application of knowledge and experience from coursework, clerkships and/or healthcare-related volunteer activities.

**532 Personal Leadership Development II** 1 Course Prerequisite: MED LMH 531. Literature review for capstone project; identification of leadership opportunities for personal leadership development plan; includes application of knowledge and experience from coursework, clerkships and/or healthcare-related volunteer activities.

**533 Personal Leadership Development III** 1 Course Prerequisite: MED LMH 532. Completion and presentation of capstone project; creation of coalitions and synthesis as part of personal leadership development plan; includes application of knowledge and experience from coursework, clerkships and/or healthcare-related volunteer activities. Management MGMT

**582 Personnel and Human Resource Management** 3 Course Prerequisite: Admission to the MBA program. Human resources and personnel administration; selection, training, compensation, performance appraisal, labor relations, health and safety, EEO legislation.

**584 Seminar in Entrepreneurship** 3 Course Prerequisite: Admission to the Ph.D. in Business Administration. Advanced, doctoral-level topics in entrepreneurship.

**585 Advanced Negotiation Skills** 3 Course Prerequisite: Admission to the Master of Accounting program, MBA program, Master of Public Affairs (MPA) program, or Business Ph.D. programs. Bargaining skills in multi-stakeholder settings; experiential work.

**587 Professional Ethics and Practice in Business** 3 Course Prerequisite: Admission to the MBA program. Ethical issues faced by businesses in the current environment; traditional sources for discerning professional and ethical practices.

**588 Management of Innovation** 3 Course Prerequisite: Admission to the MBA program. Technological transitions and technology strategy; knowledge and creativity in organizations; managing innovation processes, technical employees, and cross-functional cooperation. (Crosslisted course offered as MGMT 588, ENTRP 588).

**589 Seminar in Management** 3 May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Admission to the MBA program. Special topics in management, organization behavior, organization theory, human resource management and strategic management.

**590 Strategy Formulation and Organizational Design** 3 Course Prerequisite: Admission to the MBA program. Relationship between the formulation of strategy and the selection of effective organizational structures and systems.

**593 Managerial Leadership and Productivity** 3 Course Prerequisite: Admission to the MBA program. Organizational behavior and human motivation in the workplace; organization and leadership theories, studies, projects and models leading to improved productivity.

**594 Seminar in Organizational Theory** 3 Course Prerequisite: Admission to the Ph.D. in Business Administration. Advanced, doctoral-level topics in organizational theory.

**595 Seminar in Strategic Management** 3 Course Prerequisite: Admission to the Ph.D. in Business

Administration. Advanced, doctoral-level topics in Strategic Management.

**597 Seminar in International Management** 3 Course Prerequisite:

Admission to the Ph.D. in Business Administration. Advanced, doctoral-level topics in International Management.

**599 Seminar in Management (Organizational Behavior)** 3 Course

Prerequisite: Admission to PhD programs in business. Advanced doctoral-level topics in organizational behavior.

**600 Special Projects or Independent Study** V 1-18 May be repeated for credit.

Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**702 Master's Special Problems, Directed Study, and/or Examination** V 1-

18 May be repeated for credit. Course Prerequisite: Admission to the MBA program. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination** V 1-18 May be

repeated for credit. Course Prerequisite: Admitted to the Business Administration - Management PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination.

Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Management And Operations  
MGTOP

**516 Time Series** 3 ARIMA models; identification, estimation, diagnostics, and forecasting; seasonal adjustments, outlier detection, intervention analysis and transfer function modeling. (Crosslisted course offered as MGTOP 516, STAT 516).

Recommended preparation: STAT 443.

**519 Applied Multivariate Analysis** 3

Multivariate normal distribution, principal components, factor analysis, discriminant function, cluster analysis, Hotteling's T2 and MANOVA. (Crosslisted course offered as MGTOP 519, STAT 519). Recommended preparation: STAT 443.

**540 Deterministic Business Models** 3

Decision analysis, linear optimization models, nonlinear models, network analysis including PERT, and dynamic programming as applied to business.

**556 Advanced Business Modeling** 3

Course Prerequisite: Admission to the MBA program. Spreadsheet modeling and solution of business problems using mathematical programming; Monte Carlo simulation, queuing theory, and decision analysis.

**581 Operations Management** 3

Course Prerequisite: Admission to the MBA program. Analytical approach to solving problems in production and operations management.

**591 Statistical Analysis for Business**

**Decisions** 3 Course Prerequisite: Admission to the MBA program. Analytical skills for decision-making; data collection and analysis, sampling, inferential, regression methodologies, experimental design, time series, forecasting analysis.

**596 Doctoral Topics** V 1-4 May be repeated for credit; cumulative maximum 15 hours. Course Prerequisite: Admission to PhD programs in business. Advanced topics in management and operations.

**597 Doctoral Topics** 3 May be repeated for credit; cumulative maximum 9 hours. Course Prerequisite: Admission to PhD programs in business. Advanced topics in management and operations.

**598 Research and Professional Development** 1 May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Admission to PhD programs in business. Ph.D.-level professional development colloquium designed to improve research, teaching, and presentation skills and to provide professional socialization.

**600 Special Projects or Independent Study** V 1-18 May be repeated for credit.

Course Prerequisite: Admission to the MBA, Master of Accounting, or Business PhD programs. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**702 Master's Special Problems, Directed Study, and/or Examination** V 1-

18 May be repeated for credit. Course Prerequisite: Admission to the MBA program. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status

and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination** V 1-18 May be

repeated for credit. Course Prerequisite: Admitted to the Business Administration - Operations and Management Science PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit. Management Information Systems  
MIS

**557 Designing Business Intelligence Systems** 3 Course Prerequisite: Admission to the MBA program. Design and use of business intelligence systems, and business performance analytics.

**572 Database Management Systems** 3 Course Prerequisite: Admission to the MBA, Master of Accounting, or Business PhD programs. Database management, data modeling, system design and implementation; the application of DBMS technologies to organizational and business problems.

**574 Telecommunications and Networking in Business** 3 Course Prerequisite: Admission to the MBA, Master of Accounting, or Business PhD programs. Business applications of data communications, infrastructure, protocols, topologies and management, the design of wired and wireless solutions, and related research issues.

**575 Electronic Commerce and the Internet** 3 Course Prerequisite: Admission to the MBA, Master of Accounting, or Business PhD programs. Technologies underlying electronic commerce and the internet; strategies and implementation plans for managing the implementation of electronic commerce systems.

**576 Emerging Technologies** 3 Course Prerequisite: Admission to the MBA, Master of Accounting, or Business PhD programs. Special and advanced topics in MIS.

**580 Information Systems Management** 3 Course Prerequisite:

Admission to the MBA program. Data processing organization; operations, application development, computer selection, management of computer personnel and systems.

**582 Systems Analysis and Design** 3 Course Prerequisite: Admission to the MBA, Master of Accounting, or Business PhD programs. Research on and application of

systems analysis, design, development and management of information systems; systems development life cycle.

**595 MIS Research Foundations 3**

Course Prerequisite: Admission to PhD programs in business. Seminal works in MIS, philosophy of science and theory development.

**596 Doctoral Topics 3** May be repeated for credit; cumulative maximum 9 hours. Course Prerequisite: Admission to PhD programs in business. Advanced topics in management information systems.

**597 MIS Research Methods 3** Course Prerequisite: Admission to PhD programs in business. Study and application of research methods used in MIS research.

**598 MIS Research Topics 3** Course Prerequisite: Admission to PhD programs in business. Major streams of research in MIS.

**599 MIS Research Proposal**

**Development 3** Course Prerequisite: Admission to PhD programs in business. Seminar on the process of creating a MIS research proposal.

**600 Special Projects or Independent Study V 1-18** May be repeated for credit.

Course Prerequisite: Admission to the MBA, Master of Accounting, or Business PhD programs. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**800 Doctoral Research, Dissertation, and/or Examination V 1-18** May be repeated for credit.

Course Prerequisite: Admitted to the Business Administration - Information Systems PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Master In Teaching  
MIT

**501 Learning and Development in School and Community Contexts 3**

Prerequisite: Admission to MIT Program. Theories of learning and student development within school and community contexts.

**504 Social Foundations of Education for Teachers V 2-3**

Course Prerequisite: Admission to MIT Program. The social context of American education including historical and contemporary influences;

education in the context of history, politics, and society.

**505 (TCH LRN 525) Classroom Management Seminar 3**

Course Prerequisite: Admission to MIT Program. Contemporary issues in management of elementary, middle school, and secondary classrooms; issues of abuse.

**506 Integrating Technology into Classroom Teaching V 2-3**

Course Prerequisite: Admission to MIT Program. Exploration of technology use in schools, production techniques, instructional methods, and integration of technology into grade-level curriculum based on current technology standards. (Formerly TCH LRN 517.)

**507 Teacher Inquiry and Praxis V 2-3**

Course Prerequisite: Admission to MIT Program. Exploration and development of teacher research strategies; concepts for producing knowledge and empowerment enabling teachers to challenge social norms that perpetuate inequality and marginalization.

**508 Curriculum and Instruction Methods 3**

Course Prerequisite: Admission to MIT Program. Development of curriculum and instructional methods for teaching in diverse K-12 classrooms.

**509 Instruction and Assessment for Elementary Teachers 3**

Course Prerequisite: Admission to MIT Program. Knowledge, skills, and dispositions that support continuous improvement in teaching and learning.

**510 Instruction for Secondary Teachers 3**

Course Prerequisite: Admission to MIT Program. Methods of improvement in education, with emphasis on teacher collaboration, classroom instruction, and school reform.

**511 Methods for Teaching English Language Learners, K-12 2**

Course Prerequisite: Admission to MIT Program. Research-based ESL strategies, methods, and practical knowledge that pre-service teachers can apply in a variety of instructional contexts to insure the success of minority students from diverse linguistic and cultural backgrounds.

**513 ESL Methods and Materials for Secondary Teachers 2**

Course Prerequisite: Admission to MIT Program. Research-based ESL strategies and methods for pre-service and secondary content area teachers. (Formerly TCH LRN 503.)

**533 (TCH LRN 564) Elementary School Mathematics Methods 3**

Course Prerequisite: Admission to MIT Program. Introduction to research, theory, and

methods of teaching K-8 mathematics; emphasis on integrating theory and practice.

**534 Elementary School Science Methods Elementary School Science Methods 3**

Course Prerequisite: Admission to MIT Program. Theoretical base to design and implement appropriate standards-based elementary science instruction. (Formerly TCH LRN 572.)

**537 Problem Solving in Elementary Mathematics 1 (0-2)**

Course Prerequisite: Admission to MIT Program. Supplemental practicum course for MIT 533 that affords pre-service elementary teachers opportunity to discuss mathematical problem solving in great detail: theoretically, by looking at samples of children's mathematical solutions, and engaging in mathematical problem solving.

**550 Seminar in Middle Level Education 3**

Course Prerequisite: Admission to MIT Program. Research on organizational structures, curriculum, instructional approaches, and materials for contemporary middle grade schools. (Formerly TCH LRN 513.)

**551 Literacy within the Disciplines 3**

Explores literacy research and practices that enhance the learning of various disciplines taught in K-12 settings. (Crosslisted course offered as TCH LRN 528, MIT 551). Credit not allowed for students who have earned credit for TCH LRN 428.

**552 Multicultural Education in a Global Society 3**

Multicultural and multilingual education from a global perspective; development of multicultural curriculum. (Crosslisted course offered as TCH LRN 580, CSSTE 535, MIT 552). Credit not granted for both TCH LRN 480 and TCH LRN 580.

**571 Pre-internship and Seminar 2 (1-3)**

May be repeated for credit; cumulative maximum 4 hours. Course Prerequisite: Admission to MIT Program. Instructional practice in diverse classroom settings and reflection on that practice. (Formerly TCH LRN 593).

**575 Internship and Seminar 10 (1-27)**

Course Prerequisite: MIT 571; admission to MIT Program. Instructional practice in classroom settings, reflection on practice; completion of Washington state licensure requirements for teacher certification. (Formerly TCH LRN 595).

**702 Master's Special Problems, Directed Study, and/or Examination V 1-18**

May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking



status and should check with their major advisor/committee chair before enrolling for 702 credit.

Marketing  
MKTG

**505 Survey of Marketing** 3 Course  
Prerequisite: Admission to the MBA, Master of Accounting, or Business PhD programs. Marketing management; relevance of marketing to company profitability and consumer satisfaction; decision regarding price, product, promotion, and distribution.

**506 Marketing Strategy** 3 Course  
Prerequisite: Admission to the MBA program. Marketing analyses needed to recommend and implement a marketing strategy. Includes coverage of industry, competitor, and customer analysis as well as decision factors related to segmentation, positioning, and the marketing mix.

**507 Consumer Behavior** 3 Course  
Prerequisite: Admission to the MBA program. Marketing structure and behavior from economic and behavioral perspectives; social evaluation and behavioral implications of marketing strategy.

**555 Marketing Analytics** 3 Course  
Prerequisite: Admission to the MBA program. Development of marketing analytics skills utilizing large data sets to identify marketing and consumer trends in online and offline markets.

**561 New Product Marketing** 3  
Course Prerequisite: Admission to the MBA program. Introduction of new products that are based on new technology; exploration of actual products in the market.

**565 Seminar in Marketing** 3 May be repeated for credit; cumulative maximum 9 hours. Course Prerequisite: Admission to the MBA program. Marketing structure and behavior from economic and behavioral perspectives; social evaluation and behavioral implications of marketing strategy.

**577 Promotional Management** 3  
Course Prerequisite: Admission to the MBA program. Integrated promotion into the marketing plan; methods, organization, communications, media selection, and campaigns.

**590 Seminar in Consumer Behavior** 3 Course  
Prerequisite: Admission to PhD programs in business. Advanced, doctoral-level topics in consumer behavior.

**591 Seminar in Marketing Management** 3 Course  
Prerequisite: Admission to PhD programs in business. Advanced, doctoral-level topics in marketing management.

**592 Seminar in Marketing Theory** 3  
Course Prerequisite: Admission to PhD

programs in business. Advanced, doctoral-level topics in marketing theory.

**593 Seminar in Research Design** 3  
Course Prerequisite: Admission to PhD programs in business. Advanced, doctoral-level topics in research design.

**600 Special Projects or Independent Study** V 1-18 May be repeated for credit.  
Course Prerequisite: Admission to the MBA, Master of Accounting, or Business PhD programs. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**702 Master's Special Problems, Directed Study, and/or Examination** V 1-18 May be repeated for credit. Course Prerequisite: Admission to the MBA program. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination** V 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Business Administration - Marketing PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Molecular Plant Sciences  
MPS

**515 Seminar in Molecular Plant Sciences** 1 May be repeated for credit; cumulative maximum 4 hours. A cross-discipline seminar, including botany, crop and soils sciences, horticulture, plant pathology, and molecular plant sciences.

**525 Plant Molecular Genetics** 3  
Introduction to plant genome organization and gene expression while acquiring knowledge of modern molecular techniques and experimental approaches.

**561 Biochemical Signaling in Plants, Animals and Microorganisms** 3 Course  
Prerequisite: MBIOS 513. New research on intra and extra cellular biochemical signaling, including communication in plants and hormone action in animals. (Crosslisted course offered as MBIOS 561, MPS 561).

**570 Advanced Topics in Molecular Plant Sciences** 1 May be repeated for credit; cumulative maximum 3 hours. Oral presentation of a current research paper.

**574 Protein Biotechnology** 3  
Biotechnology related to the isolation, modification and large scale commercial production, patenting and marketing of useful recombinant proteins and products. (Crosslisted course offered as MPS 574, CHE 574, MBIOS 574). Recommended preparation: MBIOS 513.

**587 Advanced Topics in Plant Biochemistry** 3 Course  
Prerequisite: MBIOS 514.

**600 Special Projects or Independent Study** V 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Dissertation and/or Examination** V 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**800 Doctoral Research, Dissertation and/or Examination** V 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Molecular Plant Science PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.  
Materials Science And Engineering  
MSE

**503 Advanced Topics in Materials Engineering** V 1-3 May be repeated for credit; cumulative maximum 6 hours.

**505 Advanced Materials Science** 3  
Broad baseline in materials science including relationships between structure and properties. (Crosslisted course offered as MSE 505, MATSE 505).

**506 Biomaterials** 3 Overview of the different types of materials used in biomedical applications such as implants and medical devices. Credit not granted for both MSE 406 and MSE 506. (Crosslisted course offered as MSE 506 and MATSE 506.)

**507 Additive Manufacturing 3**  
Additive manufacturing processes and their applications in ceramic, metallic, polymeric, and composite materials. Recommended preparation: Basic knowledge in materials science and manufacturing. (Crosslisted course offered as MSE 507, ME 507).  
Cooperative: Open to UI degree-seeking students.

**508 Polymer Nanocomposites and Functionalities 3** Structures, properties, fabrication and applications of nano-scale material and their polymer nanocomposites; functionalities including flame retardant, electrically, thermal and damping properties.

**509 MEMS Engineering 3 (2-3)**  
Introduction to the design, fabrication and application of microelectromechanical systems. (Crosslisted course offered as ME 509, MSE 509).

**513 Crystal Plasticity 3** Dislocation theory; slip; climb; mechanical properties of polycrystalline materials and application to important deformation processes. (Crosslisted course offered as MSE 513, ME 513, MATSE 513).

**514 Thermodynamics of Solids 3**  
Thermodynamic properties of solid solutions; models for substitutional and interstitial solutions; configurational and non-configurational contributions; calculation of phase diagrams. (Crosslisted course offered as MSE 514, ME 514).

**515 Electronic Properties of Materials 3** Electron energy bands in solids, electrical conduction in metals and semiconductors, applications to semiconductor devices based on silicon and III-V compounds.

**516 Phase Transformations 3**  
Thermodynamics, nucleation, interface motion, mechanisms and kinetics of chemical reactions between solid metals and their environment. (Crosslisted course offered as MSE 516, MATSE 516).

**517 Thin Films 3** Materials science aspect of thin films, including growth, characterization, and properties for electrical, mechanical, corrosion, and optical behavior. (Crosslisted course offered as MSE 517, ME 517).

**520 Multiscale Modeling in Thermomechanics of Materials 3**  
Multiscale problems in thermomechanics of materials; practical and computational aspects of homogenization, granular materials, dislocation plasticity and atomistic methods. (Crosslisted course offered as ME 520, MSE 520).

**521 Statistics of Microstructures 3**  
Stereology, orientation and spatial distributions, percolation, measurement

techniques and application to modeling of microstructures. (Crosslisted course offered as MSE 521, MATSE 521). Recommended preparation: MATH 540.

**523 Ceramics Processing 3**  
Fundamentals of ceramic processing science for thin films and bulk ceramics.

**530 Elasticity 3** Theory of kinematics of solid deformable bodies; conservation laws applied to an elastic continuum; generalized linear stress-strain behavior with applications. (Crosslisted course offered as ME 530, MSE 530).

**531 Theory of Plasticity 3** The fundamentals of the theory of plasticity; the classical theory of plasticity; the classical theory and modern continuum theories of large elasto-plastic deformations. (Crosslisted course offered as ME 531, MSE 531).

**534 Mechanics of Composite Materials 3** Analysis of micromechanical and macromechanical behavior of composite materials with emphasis on fiber-reinforced composite; prediction of properties; stiffness and strength theories; laminated beams and plates; dynamic behavior; environmental effects. (Crosslisted course offered as ME 534, MSE 534).

**537 Fracture Mechanics and Mechanisms 3** Fracture mechanics and mechanisms and the microstructural origins of toughness in metals, polymers and composites. (Crosslisted course offered as MSE 537, ME 537).

**543 Polymer Materials and Engineering 3** Preparation and structure-property relationship of polymer materials with emphasis on fracture mechanics and toughening. (Crosslisted course offered as MSE 543, CE 593). Required preparation must include MSE 402.

**544 Natural Fibers 3** Structural aspects and properties of natural fibers including anatomy, ultrastructure, and chemistry. (Crosslisted course offered as CE 594, MSE 544).

**545 Polymer and Composite Processing 3** Polymer and composite processing from fundamental principles to practical applications. (Crosslisted course offered as MSE 545, CE 595).

**546 Engineered Wood Composites 3**  
Theory and practice of wood composite materials, manufacture and development. (Crosslisted course offered as CE 596, MSE 546).

**547 Polymers and Surfaces for Adhesion 3** Physical chemistry of polymers and surfaces needed to understand interface morphology, adhesion mechanisms and bond performance. (Crosslisted course

offered as CE 597, MSE 547). Required preparation must include MSE 402 or 404.

**548 Natural Fiber Polymer Composites 3** Fundamentals, development and application of composite materials produced from polymers reinforced with natural fibers and wood as major components. (Crosslisted course offered as CE 598, MSE 548).

**592 Transmission Electron Microscopy 3** Development of the principles and applications of electron optics in microscopy.

**600 Special Projects or Independent Study V 1-18** May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V 1-18** May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V 1-18** May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

Mathematics / Science Education  
MTHSC

**598 (TCH LRN) Research Seminar in Mathematics and Science Education 1**  
May be repeated for credit; cumulative maximum 6 hours. Through targeted readings and discussion, students will develop knowledge base proficiencies related to areas of mathematics/science education.

**800 Doctoral Research, Dissertation, and/or Examination V 1-18** May be repeated for credit. Course Prerequisite: Admitted to the Mathematics/Science Education PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major

advisor/committee chair before enrolling for 800 credit.

Music  
MUS

**501 Organ** V 2 (0-6) to 4 (0-12) May be repeated for credit.

**502 Piano** V 2 (0-6) to 4 (0-12) May be repeated for credit.

**503 Voice** V 2 (0-6) to 4 (0-12) May be repeated for credit. Recommended preparation: Concurrent enrollment in MUS 431 or 432.

**504 Horn** V 2 (0-6) to 4 (0-12) May be repeated for credit.

**505 Trumpet** V 2 (0-6) to 4 (0-12) May be repeated for credit.

**506 Trombone** V 2 (0-6) to 4 (0-12) May be repeated for credit.

**507 Euphonium** V 2 (0-6) to 4 (0-12) May be repeated for credit.

**508 Tuba** V 2 (0-6) to 4 (0-12) May be repeated for credit.

**509 Percussion** V 2 (0-6) to 4 (0-12) May be repeated for credit.

**510 Violin** V 2 (0-6) to 4 (0-12) May be repeated for credit.

**511 Viola** V 2 (0-6) to 4 (0-12) May be repeated for credit.

**512 Violoncello** V 2 (0-6) to 4 (0-12) May be repeated for credit.

**513 Contrabass** V 2 (0-6) to 4 (0-12) May be repeated for credit.

**514 Flute** V 2 (0-6) to 4 (0-12) May be repeated for credit.

**515 Oboe** V 2 (0-6) to 4 (0-12) May be repeated for credit.

**516 Clarinet** V 2 (0-6) to 4 (0-12) May be repeated for credit.

**517 Bassoon** V 2 (0-6) to 4 (0-12) May be repeated for credit.

**518 Saxophone** V 2 (0-6) to 4 (0-12) May be repeated for credit.

**519 Secondary Performance Study** V 1-2 May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: By permission only. Instruction on instruments or voice other than major performing medium.

**520 Guitar** V 2 (0-6) to 4 (0-12) May be repeated for credit. Guitar.

**522 Graduate Recital** 2 Private screening and public performance as required within each performance emphasis.

**528 Opera Workshop** 1 (0-4) May be repeated for credit. Course Prerequisite: By audition only; see <http://libarts.wsu.edu/music/audition/index.htm> for details. Public performance may be required. Credit not granted for both MUS 428 and MUS 528.

**531 Concert Choir** 1 (0-4) May be repeated for credit. Course Prerequisite: By

audition only; see

<http://libarts.wsu.edu/music/audition/index.htm> for details. Auditioned choral ensemble studying and performing global music of varying cultures, language, period, style, and tradition. Credit not granted for both MUS 431 and MUS 531.

**533 Madrigal/Chamber Singers** 1 (0-4) May be repeated for credit. Course Prerequisite: By audition only; see <http://libarts.wsu.edu/music/audition/index.htm> for details. Study, rehearse, perform, and review original works and transcriptions for symphony orchestra; public performance each semester. Credit not granted for both MUS 433 and MUS 533.

**534 Symphony Orchestra** 1 (0-4) May be repeated for credit. Study, rehearse, perform and review original works and transcriptions for symphony orchestra; public performance each semester.

**535 Chamber Ensembles** 1 May be repeated for credit. Course Prerequisite: By audition only; see <http://libarts.wsu.edu/music/audition/index.htm> for details. Public performance may be required. Credit not granted for both MUS 435 and MUS 535.

**537 Wind Symphony** 1 (0-4) May be repeated for credit. Large ensemble; public performances each semester. Credit not granted for both MUS 437 and MUS 537.

**538 Jazz-Lab Band** 1 (0-4) May be repeated for credit; cumulative maximum 8 hours. Course Prerequisite: By audition only; see

<http://libarts.wsu.edu/music/audition/index.htm> for details. Jazz big band. Public performances each semester. Credit not granted for both MUS 438 and MUS 538.

**539 Vocal Jazz Ensemble** 1 (0-4) May be repeated for credit; cumulative maximum 8 hours. Course Prerequisite: By audition only; see

<http://libarts.wsu.edu/music/audition/index.htm> for details. The majority of this group is made up of non-music majors. Public performances each semester. Credit not granted for both MUS 439 and MUS 539.

**540 Jazz Combos** 1 (0-4) May be repeated for credit; cumulative maximum 8 hours. Course Prerequisite: By audition only; see

<http://libarts.wsu.edu/music/audition/index.htm> for details. Public performances each semester. Credit not granted for both MUS 440 and MUS 540.

**541 Accompanying** 1 (0-4) May be repeated for credit.

**550 Seminar in Analysis** 2 May be repeated for credit; cumulative maximum 4 hours. Applications of analytical techniques

to develop a basis for musical understanding and interpretation.

**553 Seminar in Music Theory** 2 May be repeated for credit; cumulative maximum 4 hours.

**556 Graduate Seminar in Advanced Composition** V 2 (1-2) to 3 (1-4) May be repeated for credit; cumulative maximum 10 hours. The creation of works for either traditional acoustic ensembles or electro-acoustic media.

**559 Seminar in Advanced Jazz Composition** V 1 (0-2) to 3 (0-6) May be repeated for credit; cumulative maximum 12 hours. Creation of works for Jazz Ensembles. Credit not granted for both MUS 459 and MUS 559.

**560 Introduction to Graduate Studies in Music** 2 Required of all graduate students in music. Basic bibliographic and research techniques; written presentations related to area of emphasis.

**561 Seminar in Literature of 20th Century Music** 2 Impressionism, expressionism, neoclassicism, neoromanticism, jazz and recent electronic music.

**562 Seminar in Major Ensemble Literature** 2 May be repeated for credit; cumulative maximum 6 hours. Ensemble literature for symphony orchestra, band, choral, or jazz ensembles.

**566 Seminar in Music History** 2 May be repeated for credit; cumulative maximum 6 hours. Various historic periods and composers.

**575 Advanced Conducting** V 2-3 May be repeated for credit. Rehearsing orchestras, bands, and choruses. Public performance may be required.

**580 Instrumental Music Education** 3 Philosophies, administration, organization, materials and methods for instrumental music education K-12. Credit not granted for both MUS 480 and MUS 580.

**586 Seminar in Piano Pedagogy** 2 Course Prerequisite: MUS 502. Materials and methods of teaching experiences.

**588 Choral Methods and Materials I** 2 (0-6) Preparation in the administration of choral programs from auditions to the selection and rehearsal of choral literature. Credit not granted for both MUS 488 and MUS 588.

**589 Choral Methods and Materials II** 2 Course Prerequisite: MUS 588. Development of skills in choral arranging, curriculum construction, research, and job placement. Credit not granted for both MUS 489 and MUS 589.

**590 General Music Material/Methods** 3 Materials and methods

for general music education majors; multiculturalism, collaboration, developmental curriculum and research issues; addressing national standards; observations. Credit not granted for both MUS 490 and MUS 590.

**591 Voice Pedagogy 2** (1-3) Anatomy of the singing process; methodology of teaching voices in various learning and teaching styles. Credit not granted for both MUS 491 and MUS 591.

**596 Topics in Music V** 1-3 May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: By permission only.

**600 Special Projects or Independent Study V** 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V** 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V** 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

Natural Resource Sciences  
NATRS

**519 Advanced Topics V** 1-3 May be repeated for credit; cumulative maximum 6 hours.

**535 Wildlife Ecology 4** (3-3) The ecology of wildlife species and the contributing biological processes. Overnight field trip required.

**550 Conservation Biology 3** Patterns of biological diversity, factors producing changes in diversity, values of diversity, management principles applied to small populations, protected areas, landscape linkages, biotic integrity, restoration, legal issues and funding sources. Credit not granted for both NATRS 450 and NATRS 550.

**556 Foraging Ecology of Herbivores 2** Synthesis of foraging behavior concepts including nutritive quality of forages, digestive and metabolic constraints, and diet and habitat selection.

**560 Watershed Management 3** Principles and practices of management of forest and rangelands for protection, maintenance, and improvement of water resource values. Field trip required. Recommended preparation: NATRS 204 or sufficient background in spreadsheets.

**594 Environmental and Natural Resources Issues and Ethics 3** Ethical systems applied to natural resources; issues of professionalism and ethics in natural resource management.

**595 Seminar in Natural Resource Sciences 1** May be repeated for credit. Literature review; preparation and presentation of reports in natural resource sciences.

**700 Master's Research, Thesis, and/or Examination V** 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**800 Doctoral Research, Dissertation, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Environmental and Natural Resource Sciences PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.  
Nutrition And Exercise Physiology  
NEP

**501 Community Supervised Practice 5** (1-12) Review of literature in dietetic education and health promotion including supervised practice in community facilities.

**505 Graduate Seminar 1** May be repeated for credit; cumulative maximum 2 hours. Course Prerequisite: Admission to NEP Graduate Program. Weekly presentations by experts centered around a theme that addresses current issues and controversies in the broad fields of nutrition and exercise physiology.

**520 Research Methods in Nutrition and Exercise Physiology 3** Current research designs and methods in nutrition and exercise physiology including behavioral

and basic sciences emphasizing chronic disease prevention.

**525 Advanced Human Nutrition 3** Course Prerequisite: Admission to NEP Graduate Program. Topics in applied human nutrition with an in-depth study of contemporary nutrition research and applications in public health.

**526 Nutritional Epidemiology 3** The relationship between nutritional status, diet, and disease at the community and population level.

**537 Medical Nutrition Therapy I 4** Theory and practical application of medical nutrition therapy for a variety of disease states. Required preparation: previous college-level courses in pathophysiology and nutrition assessment.

**540 Clinical Supervised Practice 11** Course Prerequisite: NEP 537. Clinical supervised practical experience for graduate students in coordinated program in dietetics.

**542 Medical Nutrition Therapy II 3** Course Prerequisite: NEP 537. Theoretical and practical application of advanced medical nutrition therapy principles to complex disease states.

**551 Management Practices in Food Service 5** (1-12) Course Prerequisite: Admission to the Coordinated Program in Dietetics. Advanced principles and supervised experience in food systems, institutional food service management, school food service and community feeding programs.

**573 Nutrition in the Community 2** Public health from a nutrition perspective including current issues in nutrition healthcare, overview of existing programs and assessment of program planning.

**580 Advanced Topics in Exercise Physiology and Nutrition 3** May be repeated for credit; cumulative maximum 6 hours. In-depth evaluation of current research in the fields of exercise physiology and nutrition; exploration of different topics by different instructors on a rotating basis.

**582 Advanced Exercise Physiology 3** (2-3) Systematic study of energy metabolism and acute and chronic adaptations of physical activity at the whole systems level. Recommended preparation: Undergraduate coursework in anatomy and physiology, biochemistry, and exercise physiology.

**585 Clinical Exercise Physiology 4** Exercise and nutrition assessment/prescription and program management in rehabilitation for populations in various disease states.

**586 Physical Activity Epidemiology and Public Health 3** Course Prerequisite:

Admission to NEP Graduate Program. An in-depth evaluation of topics relevant to the study of physical activity and public health globally.

**600 Special Projects or Independent Study V** 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V** 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**701 Master's Independent Capstone Project and/or Examination V** 1-6 May be repeated for credit. Capstone project or final examination for professional master's degree under the Graduate School. The credits will include a balloted evaluation of the student's completion of the program's capstone/examination requirements by the program's graduate faculty. Students must have graduate degree-seeking status and obtain approval from their major advisor/committee chair before enrolling for 701 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V** 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Nutrition and Exercise Physiology PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.  
Neuroscience  
NEURO

**509 Affective Neuroscience** 3 Brain mechanisms of human and animal emotions.

Credit not granted for both NEUROSCI 409 and NEUROSCI 509.

**520 Fundamentals of Neuroscience** 4 (3-3) Functional aspects of the brain from cell membrane to higher integrative processes.

**529 Integrative Neuroscience** 3 Basic biochemical processes in the nervous system and their significance for normal and abnormal function.

**531 Neuroscience Laboratory Rotation** 1 (0-3) May be repeated for credit; cumulative maximum 2 hours. Fourteen-week rotation through each of two research laboratories; learning procedures and techniques in neuroscience.

**540 Special Topics in Integrative Neuroscience V** 1-3 May be repeated for credit; cumulative maximum 6 hours. Concepts and controversies in neuroscience involving integrative properties of cell systems.

**541 Special Topics in Cellular and Molecular Neuroscience V** 1-3 May be repeated for credit; cumulative maximum 6 hours. Concepts and controversies in neuroscience that involve nerve cell function and regulation.

**542 Special Topics in Interdisciplinary Neuroscience V** 1-3 May be repeated for credit; cumulative maximum 6 hours. Concepts and controversies in neuroscience that revolve around traditional approaches to nervous system study.

**543 Special Topics in Behavioral/Clinical Neuroscience V** 1-3 May be repeated for credit; cumulative maximum 6 hours. Concepts and controversies in neuroscience that involve normal and pathological aspects of behavior.

**563 Deconstruction of Research** 3 Course Prerequisite: Graduate standing in a WSU biomedical based graduate program. Nature and development of scientific investigation through oral and written avenues, and methods of critical analyses applied to questions of biomedical interest. (Crosslisted course offered as NEUROSCI 563, GLANHLTH 563, MBIOS 563, VET MICR 563, VET PATH 563, VET PH 563).

**564 Topics in Biomedical Experimentation V** 1-3 May be repeated for credit; cumulative maximum 6 hours. Examination of the philosophy of experimental design and practical application and analysis of various experimental approaches in biomedical research. Recommended preparation: graduate standing in a WSU biomedical-based program, and an advanced undergraduate or graduate statistics course. (Crosslisted course offered as NEUROSCI

564, GLANHLTH 564, MBIOS 564, VET MICR 564, VET PATH 564, VET PH 564).

**590 Seminar** 1 May be repeated for credit; cumulative maximum 7 hours. Presented by advanced graduate students and faculty (both in INP and around WSU) on their research areas.

**592 Research Writing and Seminar** 3 May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Graduate student in Neuroscience program. Essentials of oral and written scientific communication.

**600 Special Projects or Independent Study V** 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V** 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**800 Doctoral Research, Dissertation, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Neuroscience PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.  
Nursing - Yakima  
NUR-Y

**503 Scientific Inquiry in Nursing** 2 Scientific inquiry applied to theoretical and philosophical foundations in nursing.

**504 Methods of Nursing Research** 4 Research process as foundational to both conduct of scientific inquiry and utilization of findings.

**507 Health Care Policy Analysis V** 2-3 Analysis of health care system policy; exploration of issues of clinical management and community resource utilization including advocacy techniques.

**519 Teaching in the Information Age** 3 Focus on educational paradigms consistent with distance education; development of a variety of multimedia materials for nursing education.

**520 Nursing Education in a Multicultural Society** V 3-5 Application of learning theories and strategies useful in teaching diverse populations; taught in a distance degree format.

**521 Teaching, Learning and Evaluation in Nursing** 3 Exploration of concepts related to teaching-learning, assessment of diverse learning needs, instructional strategies and design, evaluation of performance outcomes.

**523 Educational Issues and Curriculum Analysis** V 3-5 Exploration of curriculum history, development, future predictions; program evaluation, instructional resources, leadership, and policy development in academic and service settings.

**527 Association, Group Difference and Regression Techniques for Health Services** 3 Application of quantitative techniques to explore relationships and group differences among variables supporting questions in health science research.

**528 Multivariate Statistical Techniques for Health Sciences** 3 Application of quantitative techniques to explore multivariate relationships among variables supporting questions in health science research.

532 RESOUR STEWR 3

**541 Psychiatric/Mental Health Nursing: Individuals** 4 (3-3) Theories of psychopathology and appropriate nursing interventions with individuals across the age continuum.

**543 Psychiatric Mental Health Nursing** 4 (3-3) Introduction to theory and practice of group psychotherapy; Milieu and other selected theories studied and applied to nursing practice.

**546 Practicum in Psychiatric/Mental Health Nursing** V 4 (1-9) to 5 (1-12) Individualized clinical experience/seminar designed to provide advanced competency, accountability, leadership in psychiatric/mental health nursing.

**548 Psychiatric Nurse Practitioner Internship** V 1-9 May be repeated for credit; cumulative maximum 9 hours. Application and integration of theory, research findings, and interventions in the primary care of clients with psychiatric disorders.

**549 Addiction Perspectives** 2 Overview of the theories, physiology, course and epidemiology of addictions; assessment, evaluation, prevention and treatment.

**550 International, Interdisciplinary, and Transcultural Health Care** 3 Diverse health beliefs and practices or clients and

members of the interdisciplinary health care team.

**551 Risk and Resilience in Child and Adolescent Health** 4 Risk and resilience models in the development of strengths-based health interventions for child and adolescent populations.

**552 Family Nursing in the Community** V 2-4 Theoretical approaches to the analysis of normal and at-risk families; application of family assessment and intervention models when planning care.

**554 Epidemiological Approaches to Community Health** 3 Epidemiologic application to health; implications for health promotion, disease prevention; focus: knowledge and skills required to obtain and use databases.

**556 Community-Based/Population-Focused Role Practicum** V 3-6 Culminating analysis, development, and enactment of advanced practice roles in teaching, practice, or administration of community-based/population-focused nursing.

**561 Advanced Assessment and Diagnosis for the Psychiatric Mental Health Practitioner** 3 Assessment and diagnosis of psychiatric illnesses; focus on physical and psychiatric history, mental status exam and strategies of psychometric evaluation.

**562 Advanced Health Assessment and Differential Diagnoses** 4 (3-3) Advanced holistic health assessment/differential diagnosis; analysis of data from biological, sociological, psychological, cultural, and spiritual dimensions.

**563 Advanced Pharmacological Concepts and Practice** 4 (3-3) Pharmacology for clinical practice including decision making, prescribing, drug monitoring, and patient education associated with prescriptive authority.

**564 Health Promotion in Nursing Practice** V 2-3 Theoretical bases including cultural variations for selected health promotion strategies for neonates through elderly clients.

**565 Information Management for Clinical Practice** 3 (2-3) Application/evaluation of nursing informatics; information systems to support clinical research, practice, administration, and education.

**566 Community Analysis and Program Planning** V 2-3 Application of core public health functions in community analysis, program development and program evaluation.

**567 Primary Care: Adults and Elders** 4 (1-9) Assessment, differential diagnosis, therapeutic intervention with adults; developmental changes; opportunities to provide diagnostic, maintenance, and follow-up care.

**568 Primary Care: Infants, Children and Adolescents** 4 (1-9) Assessment, differential diagnosis, and therapeutic intervention with infants, children, and adolescents in rural and urban settings.

**569 Primary Care: Family** 4 (1-9) Assessment, differential diagnosis, therapeutic intervention with individuals in childbearing, childrearing, and multigenerational families.

**570 Clinical Decision Making 1** Provides a framework for systematic collection, organization, interpretation, and communication of data for the development of differential diagnosis.

**575 Diagnostic Testing and Interpretation** 3 (2-3) Analysis of diagnostic findings across the age continuum for clinical decision making; selected diagnostic and treatment skills for advanced practice.

576 ORG LEADER 3

**577 Health Care Ethics** V 2-3 Ethical theories including deontology, teleology, virtue ethics and applicability to ethical dilemmas in nursing. Credit not granted for both NUR-Y 477 and NUR-Y 577.

**578 Plateau Tribes: Culture and Health** 3 (2-3) History, culture, and health care needs of the Plateau Indian tribes; both classroom and practicum experience. Credit not granted for both NUR-Y 478 and NUR-Y 578.

**581 Advanced Pathophysiology** 4 Advanced cellular and system pathophysiology of individuals with neurological, endocrine, immune, hematology, cardiopulmonary, renal, gastrointestinal, bone and skin disorders.

**595 Internship** V 1-5 May be repeated for credit; cumulative maximum 6 hours. Application and integration of theoretical content, research findings, and assessment and intervention strategies into primary care practice.

**597 Advanced Topics in Nursing** V 1-3 May be repeated for credit; cumulative maximum 6 hours. May be repeated for credit; cumulative maximum 6 hours.

**598 Advanced Topics in Nursing** V 1-3 May be repeated for credit; cumulative maximum 6 hours. May be repeated for credit; cumulative maximum 6 hours.

**599 Independent Study** V 1-18 May be repeated for credit.

**700 Master's Research, Thesis, and/or Examination V** 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V** 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program.

Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

Nursing  
NURS

**501 Psychiatric Assessment, Diagnosis, and Management of Children and Adolescents** 3 Course Prerequisite: NURS 530; NURS 562; admission to PMHNP program. Introduction to assessment, diagnosis, and management of psychiatric illnesses common in children and adolescents.

**502 Psychiatric Assessment, Diagnosis, and Management of Adults and Geriatrics** 3 Course Prerequisite: NURS 530; NURS 562; admission to PMHNP program. Introduction to assessment, diagnosis, and management of psychiatric illnesses common in adults and geriatrics.

**503 Scientific Inquiry in Nursing** 2 Course prerequisite: Admission to Nursing graduate program. Scientific inquiry applied to theoretical and philosophical foundations in nursing.

**504 Evidence-Based Practice** 3 Course prerequisite: Admission to Nursing graduate program. Exploration of evidence-based practice through the conduct of scientific inquiry and application of credible evidence.

**505 Analytical Foundations for Practice Inquiry** 3 Course prerequisite: NURS 503, NURS 504, and admission to Nursing graduate program; or post-master's DNP program. Application of quantitative methods and statistics in current health care to review, describe, and interpret the language of research.

**508 Diagnostics and Procedures for Primary Care Practice** 2 (1-4) Course Prerequisite: NURS 562 or concurrent enrollment; NURS 563; NURS 581; admission to FNP program. Introduction to the selection and interpretation of diagnostic

tests, and performance of minor procedures for primary care practice.

**509 Clinical Decision Making: Essential Concepts and Diagnostic Reasoning** 3 Course Prerequisite: NURS 562 or concurrent enrollment; NURS 563; NURS 581; admission to the FNP program. Provides a framework for conducting systematic clinical encounters, developing differential diagnoses, and planning patient-centered care.

**513 Primary Care I: Health Promotion, Disease Prevention, and Disease Detection** 3 Course Prerequisite: NURS 508; NURS 509; concurrent enrollment in NURS 514. Primary care approaches to health promotion, disease prevention, risk reduction, and disease detection for individuals and families across the life span.

**514 Primary Care Practicum 1** 2 (0-8) Course Prerequisite: NURS 508; NURS 509; concurrent enrollment in NURS 513. Primary care practicum experience focused on health promotion, disease prevention, and disease detection across the lifespan in primary health care.

**515 Primary Care II: Acute Health Conditions** 3 Course Prerequisite: NURS 513; NURS 514; concurrent enrollment in NURS 516. Primary care approaches to the assessment, diagnosis, and management of individuals and families across the lifespan with common acute conditions.

**516 Primary Care Practicum II** 2 (0-8) Course Prerequisite: NURS 513; NURS 514; concurrent enrollment in NURS 515. Primary care clinical practicum that focuses on caring for individuals and families across the lifespan with common, acute health conditions.

**518 Translating Evidence into Practice** 3 Course prerequisite: NURS 553; NURS 565; NURS 591; admission to Nursing graduate program. Health related evidence and development of skills to apply evidence in advanced practice.

**521 Teaching, Learning and Evaluation in Nursing** 3 Course prerequisite: Admission to Nursing graduate program. Exploration of concepts related to teaching-learning, assessment of diverse learning needs, instructional strategies and design, evaluation of performance outcomes.

**523 Educational Issues and Curriculum Analysis** 3 Course prerequisite: Admission to Nursing graduate program. Exploration of curriculum history, development, future predictions; program evaluation, instructional resources, leadership, and policy development in academic and service settings.

**524 Foundations of Methodological Applications for Health Sciences** 2 Qualitative and quantitative methods in health care; research, statistics, and interpretation language.

**526 Analytical Foundations for Health Sciences** 3 Quantitative methods, research and statistics in current health care literature. Required preparation must include college-level statistics course.

**527 Association, Group Difference and Regression Techniques for Health Services** 3 Course Prerequisite: NURS 526. Application of quantitative techniques to explore relationships and group differences among variables supporting questions in health science research. Required preparation: Graduate-level statistics course.

**528 Multivariate Statistical Techniques for Health Sciences** 3 Course Prerequisite: NURS 527. Application of quantitative techniques to explore multivariate relationships among variables supporting questions in health science research.

**529 Analytical Seminar for Health Science** 3 In-depth research methods used for health science research.

**530 Theory of Psychopharmacology and Safe Prescribing Practices** 3 Course Prerequisite: NURS 563; NURS 581. Theoretical perspectives of psychopharmacology as they pertain to safe prescribing and monitoring patient outcomes in psychiatry.

**531 Culture, Populations, and Family Health Care** 3 Course prerequisite: Admission to Nursing graduate program. Diverse health beliefs and practices of clients, families, and members of the interdisciplinary health care team.

**533 Trends and Issues in Healthcare Education: Workforce Diversity and Delivery Methods** 3 Course prerequisite: Admission to Nursing graduate program. Synthesis and application of advanced adult education theory, competencies, instructional delivery technologies, and best practices in interprofessional healthcare education.

**534 Research Seminar: Grant Development and Critique** 3 Seminar focusing on writing a fellowship and/ or grant application and skills for critically reviewing a funded fellowship or grant.

**535 Philosophy of Nursing Science** 3 Course prerequisite: Graduate standing in Nursing; NURS 534 or concurrent enrollment. Structure and organization of fields of knowledge in science including historical and philosophical tenets of inquiry.

**536 Nursing Theory: Foundations for Knowledge Development** 3 Course

prerequisite: Admission to Nursing graduate program. Theory development analysis; theory critique; nursing knowledge examination; impact of theory on nursing science, applied to student's phenomenon of interest.

**537 Primary Care III: Chronic and Complex Health Conditions** 3 Course

Prerequisite: NURS 515; NURS 516; concurrent enrollment in NURS 538.

Synthesis of clinical management approaches for care of individuals with chronic and complex conditions across the lifespan and their families.

**538 Primary Care Practicum III** 2

(0-8) Course Prerequisite: NURS 515; NURS 516; concurrent enrollment in NURS 537. Primary care practicum focused on caring for individuals and families with complex and chronic health conditions across the lifespan.

**540 Internship: Practicum in Advancing the FNP Primary Care Role V**

1-10 May be repeated for credit; cumulative maximum 10 hours. Course Prerequisite: NURS 514. Primary Care Practicum experience requiring the supervised provision of increasingly complex direct patient care.

**542 Population Focused Clinical Foundations for Healthcare Educators** 3

Course prerequisite: Admission to Nursing graduate program. Synthesis and application of population health perspectives and educational and instructional best practices in teaching courses foundational to clinical practice.

**544 Therapeutic Modalities I: Introduction to Therapies** 3 Course

Prerequisite: NURS 530; admission to PMHNP program. Initial theoretical training in individual and group therapy applicable across lifespan and cross-culturally.

**545 Therapeutic Modalities II: Specialization in Therapy** 3 Course

Prerequisite: NURS 544. Focused training in theory of individual and group therapies applicable across lifespan and cross-culturally.

**547 Introduction to Practice: Therapeutic Modalities** 3 Course

Prerequisite: NURS 545. PMHNP practicum experience emphasizes the development of the advanced practitioner role in developing therapeutic relationships with clients across the lifespan.

**553 Practicum in Organizational Systems and Leadership** 3 (1-6) Course

Prerequisite: NURS 576 or concurrent enrollment. Integration of principal

dimensions of healthcare quality improvement and measurement of nurse leaders in a constantly changing health care environment.

**554 Epidemiology and Biostatistics for Health Professions** 3

Introduction to epidemiology: principles and methods of epidemiologic investigation including analysis of key elements of investigation of high risk populations. Required preparation must include college-level statistics course.

**555 PMHNP Practicum I** 3 (1-8)

Course Prerequisite: NURS 501; NURS 530; admission to PMHNP program.

Psychiatric mental health practicum experience focused on developing initial competence in assessment, interview, diagnosis, and development of evidence-based approaches to treatment.

**556 Advanced Population Health V** 2-6 Course

Prerequisite: Graduate student in Nursing; instructor permission. Culminating analysis, development, and enactment of advanced practice roles in teaching, practice, or administration of community-based/population-focused nursing.

**557 Concepts of Practice Transformation** 3 (2-3) Course

Prerequisite: NURS 518; NURS 553; NURS 554. Application of knowledge of current nursing science to the development of a proposal for the final DNP project.

**558 Practice Transformation Project I: Program Design and Data Collection** 3

(1-6) Course Prerequisite: NURS 557 with a grade B or better. Development of program design plan and collection of data for the DNP Practice Transformation Project.

**559 Practice Transformation Project II: Implementation, Evaluation, and Dissemination** 3 (1-6) Course

Prerequisite: NURS 557 with a grade B or better; NURS 558 with a grade B or better. Implementation and evaluation of the DNP Practice Transformation Project.

**560 PMHNP Practicum II** 3 (0-12)

Course Prerequisite: NURS 501; NURS 502; NURS 555; admission to PMHNP program. Psychiatric mental health practicum experience focused on developing increased competence in assessment, diagnosis, and evidence-based treatment planning across the lifespan.

**562 Advanced Health Assessment and Differential Diagnoses** 3 (2-3) Course

prerequisite: NURS 581 or concurrent enrollment. Applying health assessment and differential diagnostic skills to individuals, families, and populations in rural, urban, and medically under-served areas.

**563 Advanced Pharmacological Concepts and Practice** 3 Course

prerequisite: Admission to Nursing graduate program. Pharmacology for clinical practice including decision making, prescribing, drug monitoring, and patient education associated with prescriptive authority.

**564 Health Promotion in Nursing Practice** 2

Interprofessional course analyzing the theoretical bases for developing and evaluating health promotion strategies tailored to variations in health behaviors.

**565 Information Management for Clinical Practice** 3 Course

Prerequisite: NURS 505; NURS 576; admission to Nursing graduate program. Application/evaluation of nursing informatics; information systems to support clinical research, practice, administration, and education. Required preparation must include competency in word processing/spreadsheets.

**566 Community Analysis and Grant Development** 2 Course

prerequisite: Admission to Nursing graduate program. Application of core public health functions in community analysis, program development and program evaluation.

**573 Rational Prescribing** 3 Course

Prerequisite: NURS 563; admission to FNP program. Pharmacology for clinical practice including decision-making, prescribing, drug monitoring, and patient education associated with prescriptive authority.

**576 Organizational Systems and Leadership Roles in Nursing Practice** 3

Course prerequisite: NURS 503 and NURS 504; or admission as a post-master's DNP or PhD student. Analysis of advanced nursing roles and required skill sets to develop competencies in organizational systems analysis and leadership.

**577 Health Care Ethics** V 2-3 Ethical

theories including deontology, teleology, virtue ethics and applicability to ethical dilemmas in nursing. Credit not granted for both NURS 477 and NURS 577.

**578 Plateau Tribes: Culture and Health** 3 (2-3) Course

Prerequisite: Admission to Nursing, Nutrition and Exercise Physiology, or Pharmacy graduate programs. History, culture, and health care needs of the Plateau Indian tribes; both classroom and practicum experience. Credit not granted for both NURS 478 and NURS 578.

**581 Advanced Pathophysiology** 3

Course prerequisite: Admission to Nursing graduate program. Etiology, pathogenesis, manifestations, and outcomes of disruption and dysfunction of human physiology.

**582 PMHNP Internship** 3 Course

Prerequisite: NURS 555 or admission to



PMHNP program. A culminating internship focusing on the provision of comprehensive psychiatric mental health care to individuals and families across the lifespan.

**583 Population Health Nursing**

**Internship V** 1-5 May be repeated for credit; cumulative maximum 10 hours.

Course Prerequisite: Admission to Master of Nursing or DNP Population Health programs. Application and integration of theoretical content, research, assessment, and intervention strategies into practice.

**584 Health Care Law, Policy, and Analysis**

**3** Course prerequisite: Admission to Nursing graduate program. Analysis of health care policy and delivery systems including access, disparity, barriers to care, social justice, vulnerability, and health outcomes.

**585 Faculty Role Seminar** **3** Analysis of current issues related to the faculty role in nursing education.

**587 Research Inquiry: Qualitative Methods I**

**3** Qualitative methodologies, issues and techniques of data collection, analysis and interpretation; issues of ethics and bias.

**588 Research Inquiry: Quantitative Methods I**

**3** Quantitative methodologies, issues and techniques of data collection, analysis and interpretation.

**589 Psychometrics in Health Care Research**

**2** Course prerequisite: NURS 526; NURS 527; 588. Application of psychometric theory and techniques for constructing, analyzing and testing instruments to measure nursing and educational interventions and outcomes.

**590 Research Inquiry: Quantitative Methods II**

**2** Course prerequisite: NURS 588; NURS 589. Advanced theoretical and practical application of selected quantitative and methodological strategies.

**591 Mixed Methods for Program Development, Implementation, and Evaluation**

**3** Course Prerequisite: NURS 503, NURS 504, and NURS 554; or admission to post-master's DNP program and NURS 554. A mixed-methods approach to program development, implementation, and outcomes evaluation in healthcare.

**592 Research Inquiry: Qualitative Methods II**

**2** Course prerequisite: NURS 587. Application of qualitative methodologies, techniques of qualitative data analysis, presentation of qualitative findings, rigor, data management and research dissemination.

**593 Preliminary Examination Seminar**

**1** Course prerequisite: PhD in Nursing; completion of 30 core credits; by permission only. Methods to synthesize

material from coursework to present and analyze scholarly nursing science knowledge.

**596 Nursing Science: Theory and Science of Nursing II**

**3** Course Prerequisite: NURS 536. Analysis and application of concepts, models, and theories for nursing science research with a focus on vulnerable populations.

**597 Advanced Topics in Nursing V**

**1-3** May be repeated for credit; cumulative maximum 6 hours. Course prerequisite: Admission to Nursing graduate program. Specialized topics within the discipline; content will vary each term.

**598 Advanced Topics in Nursing V**

**1-3** May be repeated for credit; cumulative maximum 6 hours. Course prerequisite: Admission to Nursing graduate program. Specialized topics within the discipline; content will vary each term.

**599 Independent Study V**

**1-18** May be repeated for credit. Course prerequisite: Admission to Nursing graduate program.

**700 Master's Research, Thesis, and/or Examination V**

**1-18** May be repeated for credit. Course prerequisite: Admission to Nursing graduate program. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V**

**1-18** May be repeated for credit. Course prerequisite: Admission to Nursing graduate program. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**799 Dissertation Seminar**

**1** May be repeated for credit. Course prerequisite: Admission to Nursing graduate program. Best practices for doctoral research and presentation.

**800 Doctoral Research, Dissertation, and/or Examination V**

**1-18** May be repeated for credit. Course Prerequisite: Admitted to the Nursing PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with

their major advisor/committee chair before enrolling for 800 credit.

Pharmacy

PHARD

**501 Applied Patient Care I: Patient Assessment**

**1** (0-3) Course Prerequisite: Admission to Pharmacy program. Laboratory course teaching hands-on physical assessment techniques from a pharmacy perspective, to provide patient-specific care.

**507 Introduction to Therapeutic Agents: Top 200 Drugs**

**1** (0-2) Course Prerequisite: Admission to Pharmacy program. Drugs most frequently prescribed in the US as a basis for pharmacy practice.

**509 Professional Communications Lab**

**1** (0-3) Course Prerequisite: Admission to Pharmacy program. Professional communication skills as an essential foundation for career development.

**513 Introductory Pharmacy Practice Experience I**

**1** Course Prerequisite: PHARDSCI 504. Prepares student pharmacists for community practice experience and service learning activities.

**514 Pharmacotherapy I**

**4** Course Prerequisite: PHARDSCI 502; PHARMACY 507. First in a sequence of courses that focuses on the clinical use of medications in the prevention, mitigation, or cure of disease.

**516 Health Care Systems**

**2** Course Prerequisite: Admission to Pharmacy program. US healthcare system, financing of health care delivery and the role of the pharmacist.

**530 Point of Care and Clinical Services**

**2** Course Prerequisite: PHARDSCI 504; PHARMACY 501; PHARMACY 513. Providing point of care and clinical services in a pharmacy setting.

**531 Applied Patient Care II: Clinical Assessment and Documentation**

**1** (0-3) Course Prerequisite: PHARDSCI 504; PHARMACY 501. Clinical assessment and documentation skills necessary for effective pharmaceutical care.

**533 Introductory Pharmacy Practice Experience II**

**3** (0-9) Course Prerequisite: PHARDSCI 504; PHARMACY 513. Authentic practice situations and service learning with opportunities for discussion and reflection.

**534 Pharmacotherapy II**

**4** Course Prerequisite: PHARDSCI 512; PHARMACY 514. Second in a sequence of courses that focuses on the clinical use of medications in the prevention, mitigation, or cure of disease.

**541 Applied Patient Care III: Medication Therapy Management**

**1** (0-3)

Course Prerequisite: PHARMACY 531.

Identification of pertinent patient findings, assessment of drug-related problems and clinical problem solving.

**543 Introductory Pharmacy Practice**

**Experience III** 1 Course Prerequisite:

PHARMACY 533. Authentic practice situations and service learning with opportunities for discussion and reflection.

**544 Pharmacotherapy III** 4 Course

Prerequisite: PHARMACY 534. Third in a sequence of courses that focuses on the clinical use of medications in the prevention, mitigation, or cure of disease.

**545 Pharmacy Management** 3

Course Prerequisite: Admission to Pharmacy program. Management principles essential for common practice settings in the profession of pharmacy.

**546 Selected Topics in Pharmacy**

**Practice** 2 Course Prerequisite:

PHARMACY 516. Interactive course addressing economic, ethical and professional aspects of health care delivery.

**551 Applied Patient Care IV:**

**Advanced Medication Therapy**

**Management** 2 (1-3) Course Prerequisite:

PHARMACY 541. Medication therapy management for complex patients; case-based discussions and human patient simulation.

**553 Introductory Pharmacy Practice**

**Experience IV** 3 (0-9) Course Prerequisite:

PHARMACY 543. Authentic practice situations and service learning with opportunities for discussion and reflection.

**554 Pharmacotherapy IV** 4 Course

Prerequisite: PHARMACY 544. Fourth in a sequence of courses that focuses on the clinical use of medications in the prevention, mitigation, or cure of disease.

**555 Drug Information and**

**Literature Evaluation** 4 Course

Prerequisite: PHARMACY 544. Evaluation of drug information in pharmaceutical and biomedical literature to provide better patient care.

**557 Pharmacotherapy V** 4 Course

Prerequisite: PHARMACY 554. Fifth in a sequence of courses that focuses on the clinical use of medications in the prevention, mitigation, or cure of disease.

**558 Applied Clinical**

**Pharmacokinetics** 2 Course Prerequisite:

PHARDSCI 528. Clinical applications of pharmacokinetics including theoretical background and application to patient care.

**559 Quality Assurance and Patient**

**Safety** 2 Course Prerequisite: PHARMACY

531; PHARMACY 534. Patient safety issues including quality assurance, medication

error avoidance and risk management in healthcare systems.

**561 Applied Patient Care V:**

**Integrated Patient Care** 2 (1-3) Course

Prerequisite: PHARMACY 551. Integration of pharmaceutical care with an interdisciplinary emphasis using patient cases and human patient simulation.

**563 Introductory Pharmacy Practice**

**Experience V** 2 Course Prerequisite:

PHARMACY 553. Authentic practice situations and service learning with opportunities for discussion and reflection.

**564 Pharmacy Law and Regulatory**

**Affairs** 3 Course Prerequisite:

PHARMACY 551; PHARMACY 553. Legal and ethical pharmacy practice including licensing, patient privacy protection, order fulfillment and contracts.

**566 Therapeutics of Special**

**Populations** 3 Course Prerequisite:

PHARMACY 544. Special therapeutic needs of unique populations including pediatrics, chronic neurologic disorders, hospice care and immuno-compromised patients.

**567 Public Health and Emergency**

**Preparedness and Response** 2 Course

Prerequisite: PHARMACY 541; PHARMACY 544. Interdisciplinary students (pharmacy, nursing, medicine) working and learning together using patient cases.

**574 Veterinary Pharmacy** 2 Course

Prerequisite: PHARMACY 534. Basic pathophysiology of diseases in small and large animals and current treatments likely to be dispensed by community pharmacists.

**575 HIV Prevention and Advocacy** 2

Course Prerequisite: Admission to Pharmacy program. Knowledge, skills, and attitudes that improve health outcomes related to HIV and AIDS. Recommended preparation: Completion of one year in the Pharmacy program.

**576 Survey of Organ Transplant**

**and Immunosuppressive Drugs** 1 Course

Prerequisite: Admission to Pharmacy program. An overview of human transplantation by systems and the immunosuppressive regimes employed to prevent organ rejection.

**577 Diseases, Complications, and**

**Drug Therapy in Obstetrics** 2 Course

Prerequisite: PHARDSCI 532; admission to Pharmacy program. Medical and pharmacological issues common in obstetrics.

**578 Leadership and Professional**

**Development** 2 Skills, traits, and values

required by leaders seeking to influence

change in the pharmacy profession and health care.

**579 Diabetes Prevention** 2 Course

Prerequisite: PHARMACY 544. Preparation for educating patients in diabetes prevention and promoting health and wellness in the community.

**580 Practical Politics and Pharmacy**

1 Course Prerequisite: Admission to Pharmacy program. Study of government and legislation to better assist patients in navigating the political process.

**581 Acute Care Advanced Practice**

**Experience** 5 (0-15) Course Prerequisite:

Admission to Pharmacy program. Advanced practice experience in acute care settings.

**582 Ambulatory Care Advanced**

**Practice Experience** 5 (0-15) Course

Prerequisite: Admission to Pharmacy program. Advanced practice experience in ambulatory care settings.

**583 Community Advanced Practice**

**Experience** 5 (0-15) Course Prerequisite:

Admission to Pharmacy program. Advanced practice experience in a community pharmacy setting.

**584 Institutional Advanced Practice**

**Experience** 5 (0-15) May be repeated for

credit; cumulative maximum 5 hours.

Course Prerequisite: Admission to Pharmacy program. Advanced practice experience in an institutional pharmacy setting.

**585 Elective I Advanced Practice**

**Experience** 5 (0-15) Course Prerequisite:

Admission to Pharmacy program. Advanced practice experience in acute or ambulatory patient care settings.

**586 Elective II Advanced Practice**

**Experience** 5 (0-15) Course Prerequisite:

Admission to Pharmacy program. Advanced practice experience in acute, ambulatory, or non-traditional patient care.

**587 Elective III Advanced Practice**

**Experience** 5 (0-15) Course Prerequisite:

Admission to Pharmacy program. Advanced practice experience in various health care settings.

**588 Special Topics V** 1-4 May be

repeated for credit; cumulative maximum 10 hours. Contemporary issues in pharmacy.

Recommended preparation: Completion of one year in the Pharmacy program.

**589 Repeat Advanced Practice**

**Experience** 5 (0-15) Course Prerequisite:

Admission to Pharmacy program. Advanced pharmacy practice experience that provides an opportunity for pharmacy students to repeat a required advanced practice experience.

**590 Advanced Topics in Infectious**

**Disease** 1 Course Prerequisite:

PHARMACY 544. Advanced knowledge of

infectious disease topics covered in therapeutic pharmacy coursework.

**591 Advanced Elective in Critical Care 2** Course Prerequisite: PHARMACY 554. Elective course: Explores in greater depth the pharmacology and pharmacotherapy encountered in the critical care setting.

**592 Mental Health First Aid 2** Skills, education, and awareness in topics related to mental health and the ability to provide assistance and education in mental health crises.

**593 Residency Preparation 2** Course Prerequisite: Admission to Pharmacy program. An introduction to the residency experience and methods to succeed in attaining a pharmacy residency.

**594 Comprehensive Diabetes Management 3** Course Prerequisite: Admission to Pharmacy program. Multidisciplinary foundation for future health professionals in the principles of diabetes management, using self-paced, modular and internet-based alternative format for delivery.

**596 Entrepreneurship in Pharmacy 1** Course Prerequisite: Admission to Pharmacy program. Entrepreneurship and innovative pharmacy business plan development.

**598 Elementary Science Education Practicum 1 (0-2)** Course Prerequisite: Admission to Pharmacy program. Communication with children in classroom environment to stimulate future practicing pharmacists to participate in outreach activities as part of science education.

**599 Special Projects 2** May be repeated for credit; cumulative maximum 10 hours. Laboratory research, clinical research, or comprehensive review of selected subjects.

Philosophy  
PHIL

**501 Advanced Formal Logic 3** First-order predicate logic plus some metatheory, applications and/or extensions. Credit not granted for both PHIL 401 and PHIL 501. Recommended preparation: PHIL 201.

**504 Special Topics in Philosophy 3** May be repeated for credit; cumulative maximum 6 hours. Intensive study of a special topic not otherwise covered in depth in the curriculum.

**507 Seminar in Philosophy of Religion 3** May be repeated for credit; cumulative maximum 6 hours. Advanced topic-driven seminar. Critical analysis of traditional and contemporary religions and religious phenomena. Credit not granted for both PHIL 407 and PHIL 507.

**510 Seminar in the History of Philosophy 3** May be repeated for credit; cumulative maximum 6 hours. Systematic exploration of the central works of an individual philosopher or philosophical movement.

**520 Seminar in Ethical Theory 3** The major issues, views, and figures of ethical theory from ancient Greece to the present.

**522 Seminar in Metaphysics 3** The nature of reality, through study of key concepts such as God, personhood, free will, causation, space, time, and identity.

**524 Seminar in Epistemology 3** Classical problems, questions, and theories involving the concept of knowledge.

**530 Bioethics 2** Professional ethics for scientists; ethical implications of new technologies; obligations to human and non-human research subjects.

**532 Seminar in Business Ethics 3** The major issues in business ethics, both domestic and international, from general principles to specific cases.

**535 Advanced Biomedical Ethics 3** Current ethical issues in medical practice, medical research and public policy relating to health issues.

**540 Ethics and Social Science Research 3** Professional ethics for social science research, ethical conduct of research, obligations to human subjects and ethical implications of methods and technologies.

**543 Philosophy of Language 3** Investigation of philosophical issues concerning meaning, reference, truth, the nature of language, and the relation between language and thought. Credit not granted for both PHIL 443 and PHIL 543.

**570 Philosophy of Law 3** Selected topics pertaining to moral and philosophical evaluation of law. Credit not granted for both PHIL 470 and PHIL 570.

**600 Special Projects or Independent Study V 1-18** May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V 1-18** May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

Pharmaceutical Sciences Graduate Program  
PHRDS

**502 Faculty Research in Pharmacology/Toxicology 1** Introduction to faculty research for incoming graduate students.

**505 Principles and Methods of Toxicology 3** Course Prerequisite: MBIOS 513. Basic concepts in mammalian toxicology and the methodology currently employed for toxicological investigations. Required preparation: 300-level organ/mammalian physiology course.

**507 Principles of Therapeutics 3** Course Prerequisite: PHARMSCI 506. Organ systems pharmacology, including drug actions, effects, side effects, and interaction of medications used in therapeutics. Required preparation: 300-level organ/mammalian physiology course.

**510 Advanced Pharmacokinetics/Toxicokinetics 3** Course Prerequisite: PHARMSCI 506. Kinetics of drug absorption, distribution, elimination, and pharmacologic response.

**512 Topics in Pharmacology V 1-4** May be repeated for credit; cumulative maximum 12 hours. Topics of current interest in pharmacology and closely related disciplines.

**520 Foundations of Molecular Regulation 3** Principles of molecular biology, genetics, and biochemistry used to develop therapeutic approaches to the treatment and prevention of human disease.

**530 Foundations of Cellular Regulation 3** Fundamentals of pharmacology and toxicology; signal transduction; cellular effects of diet and exercise; action and regulation of dietary supplements.

**540 Fundamentals of Chronopharmacology 3** Role of the circadian clock in pharmacology as it relates to therapeutic efficacy; special emphasis on anti-cancer drug treatment.

**555 General and Cellular Physiology 4 (3-3)** Physiochemical mechanisms of cellular function. (Crosslisted course offered as VET PH 555, PHARMSCI 555). Recommended preparation: Concurrent enrollment in MBIOS 513.

**560 Molecular and Cellular Methods in Biomedical Sciences 3** Basic experimental methods and approaches in cell and molecular biology, with an emphasis on practical skills and their appropriate application.

**565 Drug Delivery 3** Comprehensive overview of drug delivery at the molecular, cellular, and organ levels; concepts and approaches as applied to multiple diseases.

**571 Computer-Aided Drug Design 3** (2-2) Course Prerequisite: Graduate standing in the Pharmaceutical Sciences graduate program and permission from the instructor. Principles and applications of ligand-based and structure-based computational methods used in lead optimization in drug discovery and development processes.

**572 Fundamentals of Oncology 3** Course Prerequisite: By permission only. Thorough overview of cancer biology encompassing basic cellular and molecular mechanisms of carcinogenesis and tumor progression, treatment and prevention.

**573 Principles of Pharmacokinetics and Toxicokinetics 3** Pharmacokinetic, pharmacodynamic, and toxicokinetic systems; mathematical model development utilizing common kinetic systems.

**575 Receptor-Ligand Interactions 3** Interactions of drugs with biological macromolecules constituting the physicochemical basis of drug action.

**576 Biophysical Methods 3** Biophysical methods separating or detecting analytes based on their physical interactions with a support matrix or energy.

**577 Responsible Conduct in Biomedical Research 3** Training in biomedical research ethics consistent with NIH requirements; introduction to literature searching and analysis, scientific writing, and oral presentations.

**578 Applied Biostatistics 3** Research process; techniques for conducting health sciences research and evaluation; critique published health sciences research and collect, utilize, and evaluate primary and secondary data.

**579 Advances in Pharmaceutical Sciences 3** Introduces entering graduate students to diverse concepts regarding advances in pharmaceutical sciences in the areas of drug discovery, targeted drug actions and reactions, molecular mechanisms of drug actions and nutraceuticals.

**580 Gene and Stem Cell Therapies 3** Stem cell therapeutics, gene transfer vectors and methods for isolating and generating stem cells; stem cell therapeutics, presentation skills and evaluation of primary literature.

**581 Stem Cell Biology, Therapeutics and Regenerative Medicine 3** Provides information on the latest cutting edge research in the areas of stem cell biology and tissue regeneration; covers stem cell therapeutics, gene transfer vectors and methods for isolating, characterizing, and generating stem cells. (Course offered as PHARMSCI 581, ANIM SCI 581).

**597 College of Pharmacy Graduate Seminar 1** May be repeated for credit; cumulative maximum 12 hours. (Crosslisted course offered as PHARMSCI 597, NEP 597.)

**600 Special Projects or Independent Study V 1-18** May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V 1-18** May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**800 Doctoral Research, Dissertation, and/or Examination V 1-18** May be repeated for credit. Course Prerequisite: Admitted to the Pharmaceutical Sciences PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit. Pharmacy Sciences PHRSC

**502 Integrated Pharmacology I 4** Course Prerequisite: Admission to Pharmacy program. Integrated autonomic and central nervous system pharmacology.

**504 Pharmacy Calculations 1 (0-2)** Course Prerequisite: Admission to Pharmacy program. The mathematics of prescription preparation and dispensing.

**508 Pharmaceutics I 3** Course Prerequisite: Admission to Pharmacy program. Principles of dosage from design and drug delivery, with an emphasis on physicochemical principles.

**510 Basic and Clinical Pharmacogenomics 2** Course Prerequisite: Admission to Pharmacy program. Introduction to the science involving pharmacogenomics and how this knowledge is clinically applied to individualized patient therapy.

**512 Integrated Pharmacology II 4** Course Prerequisite: PHARDSCI 502. Integrated hepatic, gastrointestinal, and endocrine pharmacology.

**518 Pharmaceutics II 2** Course Prerequisite: PHARDSCI 508. Principles of

dosage from design and drug delivery, with an emphasis on pharmaceutical technology and biopharmaceutics.

**519 Pharmaceutics Laboratory 1 (0-3)** Course Prerequisite: PHARDSCI 504; PHARDSCI 508. Laboratory experience in the preparation of medicines.

**528 Pharmacokinetics 3** Course Prerequisite: Admission to Pharmacy program. Qualitative and quantitative understanding of the processes of drug absorption, distribution, and elimination.

**532 Integrated Pharmacology III 4** Course Prerequisite: PHARDSCI 512. Integrated cardiovascular, pulmonary, and renal pharmacology.

**542 Integrated Pharmacology IV 4** Course Prerequisite: PHARDSCI 532. Integrated immuno- and anticancer pharmacology.

**547 Drug Development 2** Course Prerequisite: PHARMACY 516. Principles of drug design from the most initial stage of conception to the final product as a drug.

**599 Special Projects 2** May be repeated for credit; cumulative maximum 4 hours. Laboratory research, clinical research, or comprehensive review of selected subjects.

Physics  
PHYS

**501 Graduate Seminar 1** Introduction to graduate and interdisciplinary research.

**514 Optoelectronics Lab I 1 (0-3)** May be repeated for credit; cumulative maximum 3 hours. Experiments with optical systems: Imaging, interference, coherence, information storage/processing, gas and solid state lasers, optical fibers, and communications systems.

**515 Optoelectronics Lab II V 1 (0-3) to 3 (0-9)** May be repeated for credit; cumulative maximum 3 hours. Experiments in optical physics, physical properties of light, laser physics, waveguides, quantum confined semiconductor structures and ultrafast dynamics and nonlinear optics.

**521 Classical Mechanics I 3** Laws of motion as developed by Newton, d'Alembert, Lagrange, and Hamilton; dynamics of particles and rigid bodies.

**522 Classical Mechanics II 3** Continuation of PHYSICS 521. Classical mechanics of liquids and deformable solids; stress, deformation and strain, flow, oscillations and waves.

**533 Thermal and Statistical Physics I 3** Thermodynamic laws and potentials, kinetic theory, hydrodynamics and transport coefficients; introduction to statistical mechanics, ensembles, partition functions.

**534 Thermal and Statistical Physics**

**II 3** Phase transitions and critical phenomena, Ginzburg-Landau theory, Bose-Einstein condensation, superfluids, Fermi systems, low-temperature expansions.

**541 Electromagnetic Theory 3**

Special relativity and the classical electromagnetic field; emission, propagation, and absorption of electromagnetic waves.

**542 Electrodynamics 3** Interaction of matter and electromagnetic radiation; classical and quantum electrodynamics.

**545 Nonlinear Optics 3** Nonlinear wave propagation theory applied to several nonlinear-optical phenomena; experimental techniques that probe a material's nonlinearity.

**546 Quantum Electronics 3** The physics of lasers and of coherent optical radiation generation and propagation.

**550 Quantum Theory I 3**

Introduction to quantum theory; physical and mathematical foundations; application to atomic systems.

**551 Quantum Theory II 3** Symmetry and invariance; angular momentum theory; approximation methods.

**552 Quantum Theory III 3** Scattering theory; relativistic wave mechanics; quantum field theory.

**561 Atomic and Molecular Physics 3** Physics of atoms and molecules using quantum theory.

**563 Physics of the Solid State 3**

Lattice vibrations and defects; ionic and electronic conductivities; band theory; magnetic properties; luminescence.

**566 Biological Physics 3** Fundamental physics and thermodynamics of the cell; mechanics of biomolecular machines. Credit not granted for both PHYSICS 466 and PHYSICS 566.

**571 Methods of Theoretical Physics**

**3** Mathematical methods for theoretical physics; linear algebra, tensor analysis, complex variables, differential equations, integral equations, variational calculus, and group theory.

**575 Advanced Solid State Physics 3**

Quantum theory of solids; Green's functions, correlation functions and other field-theoretic methods; magnetism, superconductivity and transport properties.

**581 Advanced Topics 3** May be repeated for credit; cumulative maximum 12 hours. Topics of current interest in advanced physics. (Crosslisted course offered as PHYSICS 581, ASTRONOM 581).

**590 Seminar 1** May be repeated for credit.

**592 Wave Propagation Seminar 2**

May be repeated for credit; cumulative maximum 4 hours. Waves in the continuum; elastic, plastic, and hydrodynamic waves; shock waves.

**598 Teaching Undergraduate**

**Physics Laboratories 1** May be repeated

for credit; cumulative maximum 4 hours.

Principles and practices of teaching, planning and management of undergraduate physics laboratories; choice and care of equipment.

**600 Special Projects or Independent**

**Study V 1-18** May be repeated for credit.

Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis,**

**and/or Examination V 1-18** May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study and/or Examination V 1-18**

May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination V 1-18**

May be repeated for credit. Course Prerequisite: Admitted to the Physics PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Plant Pathology  
PL P

**501 Biology and Control of Plant**

**Diseases 3 (2-3)** Course Prerequisite: Admission to the Master of Science in Agriculture graduate degree program. Introduction to the biology and control of plant diseases covering disorders caused by fungi, viruses, bacteria, and nematodes.

**503 Advanced Cropping Systems 3**

Understanding the management of

constraints to crop production and quality; biological, physical, and chemical approaches to crop health management. Field trips required. (Crosslisted course offered as CROP SCI 403, CROP SCI 503, PL P 403, PL P 503.) Credit not granted for both CROP SCI 403 and 503, or PL P 403 and 503. Recommended preparation: CROP SCI 305; PL P 429.

**511 Viruses and Virus Diseases of Plants 3** Course Prerequisite: MBIOS 503 or 504. Nature of plant viruses, vector-virus relationships and virus diseases of plants.

**512 Topics in Plant Pathology V 1-3** May be repeated for credit; cumulative maximum 6 hours. Concepts of plant pathogen interactions and disease management.

**513 Plant Nematology 3** Anatomy and morphology of plant-parasitic nematodes, molecular plant-nematode interactions, genomics, symptoms, identification, techniques and control.

**514 Phytobacteriology 3** Isolation and characterization of bacteria having a saprophytic, symbiotic or pathogenic association with plants, molecular structure, function, and genetics.

**515 Seminar 1** May be repeated for credit.

**521 General Mycology 3** The structure, life histories, classification, and economic importance of the fungi.

**525 Field Plant Pathology and Mycology 3** Diverse plant diseases, disease diagnosis and management in fields, orchards, nurseries; interact directly with diverse agricultural stakeholders. Field trip required. Recommended preparation: PL P 429 or PL P 521.

**526 Advanced Fungal Biology 4 (2-6)** Advanced topics in fungal biology, ecology, systematics, evolution and coevolution via discussions of literature and special laboratory projects. Recommended preparation: Introductory mycology and genetics coursework.

**535 Molecular Genetics of Plant and Pathogen Interactions 3** Genetic and molecular biological aspects of host-pathogen interactions.

**551 Epidemiology and Management of Plant Diseases 3** Principles of plant disease epidemiology, control and ecology of pathogens. Recommended preparation: PL P 429.

**570 Techniques in Plant Pathology 3 (1-6)** Laboratory techniques for isolating, cultivating, and identifying the major groups of plant pathogenic organisms.

**700 Master's Research, Thesis, and/or Examination V 1-18** May be

repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**800 Doctoral Research, Dissertation, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Plant Pathology PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Political Science

POL S

**501 The Scope of Political Science 3** Historical development and present status of the discipline; contemporary issues and future trends.

**502 Seminar in Normative Theory 3** Elements of normative theory developments; examination of bases of controversies and approaches in the modern literature using historical sources.

**503 Research Methods in Political Science 3** Social science research design topics, measurement, sampling, data sources, experimental and quasi-experimental designs, field and historical designs, content analytic designs.

**504 Quantitative Methods in Political Science 3** Applied statistical skills, enabling understanding of substantive political and social questions.

**505 Qualitative Methods in Political Science 3** Use of qualitative methods in political science and public affairs research.

**510 Seminar on American Institutions and Processes 3** Seminar required of all graduate students using this field as a major or a minor; it is a prerequisite of all other graduate seminars in the field.

**511 Seminar in American Political Thought 3** May be repeated for credit; cumulative maximum 6 hours. The genesis and development of political thought in the United States.

**512 Seminar in American Institutions 3** May be repeated for credit; cumulative maximum 6 hours. Origin, development, and contemporary issues in political organization and structure in the United States.

**513 Seminar in American Political Behavior 3** May be repeated for credit; cumulative maximum 6 hours. Theoretical

approaches to, and empirical analysis of, mass political behavior in the US.

**514 Seminar in Public Policy 3** Examination of central questions in public policy including the nature of public policy, policy analysis, and government intervention in society.

**516 Seminar on Law, Courts, and Judicial Politics 3** Seminar on law, courts, and judicial politics.

**530 American Foreign Policy: Theories and Applications 3** Theories of international politics applied to American foreign policy.

**531 Seminar in International Security 3** International security and arms control politics, negotiations, agreements.

**532 Seminar in International Political Economy 3** Institutions, politics, and decision-making processes in managing international economic relations.

**533 Topics in Political Psychology 3** May be repeated for credit; cumulative maximum 6 hours. Psychological influences on political decision making, bargaining, conflict and conflict resolution options.

**534 Seminar in Comparative Politics 3**

**536 Special Topics in Comparative Politics 3** May be repeated for credit; cumulative maximum 6 hours. Advanced issues seminar in international and comparative politics.

**537 Concepts and Methods in Comparative Politics 3** May be repeated for credit; cumulative maximum 6 hours. Selected concepts (state, political participation), and methods (cross-national analysis, case study approaches) in comparative politics.

**538 International Development and Human Resources 3** History of and recent changes in international development emphasizing anthropological perspectives. (Crosslisted course offered as ANTH 519, POL S 538, SOC 519).

**539 The Political Science Profession 1** Methods, problems, and purposes of teaching, research, and vocation in political science.

**540 Proseminar in Public Administration 3** Proseminar over viewing basic theories of administrative organization, relationships, and behavior.

**541 Seminar in Evaluation Research 3** Interrelationship of ideology, data, policy development, and policy implementation in public policy analysis. (Crosslisted course offered as CRM J 540, POL S 541).

**542 Proseminar in Administration, Justice, and Applied Policy Studies 3** May be repeated for credit; cumulative maximum

6 hours. Analytical perspectives and theoretical issues.

**543 Topics in Public Administration and Policy 3** May be repeated for credit; cumulative maximum 6 hours. Examination of the literature on the politics of the American public policy process.

**544 The Politics of Policy Process 3** American political process; policy making under the constraints of a democratic system; relationship to the (non) achievement of the public interest.

**590 Policy Studio Course I 2** Course Prerequisite: By instructor permission. Public policy training for graduate students in the science and engineering fields through the NSF-IGERT program.

**591 Policy Studio Course II 2** Course Prerequisite: By instructor permission. Public policy training for graduate students in the science and engineering fields through the NSF-IGERT program.

**592 Policy Studio Course III 2** Course Prerequisite: By instructor permission. Public policy training for graduate students in the science and engineering fields through the NSF-IGERT program.

**597 Graduate Internship V** 2-12 May be repeated for credit; cumulative maximum 12 hours. On/off campus internship in federal, state, or local government institutions; nonprofit or public organizations; written assignments and readings required.

**600 Special Projects or Independent Study V** 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V** 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V** 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major

advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Political Science PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit. Prevention Science  
PRVSC

**508 Longitudinal Structural Equation Modeling 3** Longitudinal structural equation modeling and the use of Mplus statistical software to perform and interpret a broad range of longitudinal structural equation models. Recommended preparation: ED PSYCH 576, PSYCH 514, PSYCH 516, or previous knowledge of multivariate analysis and factor analysis.

**510 Multilevel Modeling II: Advanced Multilevel Models for Longitudinal Data 3** Advanced applications of the general linear mixed model (aka multilevel model, hierarchical linear model, latent growth curve model, random coefficients model) used to analyze data from longitudinal, repeated measures designs; conduct cumulative steps in a longitudinal multilevel analysis, including setting up data file and coding variables, evaluating fixed and random effects and interpreting covariance structures, predicting between- and within-person variation using time-invariant and time-varying covariates, and interpreting empirical findings. Recommended preparation: ED PSYCH 575 or previous knowledge of multivariate analysis and multilevel modeling.

**511 Introduction to Prevention Science 3** Disciplinary roots; the epidemiological approach to risk and prevention; design, implementation, and dissemination of preventive interventions.

**512 Finite and Growth Mixture Modeling 3** Introduction to a specific type of latent variable statistical models, commonly referred to as finite mixture models, which include several distinct subtypes including latent class analysis, latent profile analysis, latent transition analysis, and latent class growth analysis; conceptual background for models and application of models in practice. Recommended preparation: ED PSYCH 514 and ED PSYCH 576, or knowledge of multivariate analysis and psychometrics.

**513 Research Methods in Prevention Science 3** Introduction to process of research and methods in prevention science; techniques of research, data collection, and data analysis procedures.

**535 Effective Prevention Strategies I 3** Community mobilization and problem analysis; program selection, implementation, and management; grant writing.

**540 Effective Prevention Strategies II 3** Evaluation of prevention science programs.

**700 Master's Research, Thesis, and/or Examination V** 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**800 Doctoral Research, Dissertation, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Prevention Sciences PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit. Psychology  
PSYCH

**502 Research Design V** 1-3 May be repeated for credit; cumulative maximum 16 hours. Course Prerequisite: Ph.D. student in Psychology. Research design, equipment, data collection, data analysis, and report writing.

**504 History of Psychology: Theoretical and Scientific Foundations 3** Course Prerequisite: Ph.D. student in Psychology. Roots of scientific explanation in psychology traced through various philosophical schools and psychological movements.

**505 Teaching Introductory Psychology V** 1-3 May be repeated for credit; cumulative maximum 5 hours. Course Prerequisite: Ph.D. student in Psychology. Problems and techniques related to teaching introductory psychology.

**506 Current Research in Psychology 1** May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Ph.D. student in Psychology. Current research being conducted by psychology faculty and members of associated departments.

**508 Special Topics in Psychology V** 1-3 May be repeated for credit.

**510 Introduction to Online Instruction 1** Course Prerequisite: Ph. D student in Psychology. Instruction in teaching online courses addressing issues faced by instructors and students; students are mentored while teaching online.

**511 Analysis of Variance and Experimental Design 3** Course Prerequisite: Ph.D. student in Psychology or Business Administration. Parametric, nonparametric, repeated-measures, and multivariate ANOVA; planned comparisons; confidence intervals and power analysis; experimental design and variants.

**512 Correlation, Regression, and Quasi-Experimental Design 3** Course Prerequisite: Ph.D. student in Psychology or Business Administration. Simple and multiple correlation and regression; time-series analysis; factor analysis; field research and quasi-experimental design.

**513 Seminar in Quantitative Methods and Research Design 3** May be repeated for credit. Course Prerequisite: PSYCH 512. Advanced topics in specialized quantitative procedures and in design of research in psychology.

**514 Psychometrics 3** Course Prerequisite: PSYCH 512. Scientific construction of behavioral assessment instruments, including validation and reliability; types of scales and responses; statistical scaling; test theory issues.

**515 Multilevel and Synthesized Data 3** Course Prerequisite: PSYCH 512. Structural equation modeling, hierarchical linear modeling and meta-analysis and the software used to conduct these analyses.

**516 Applied Structural Equation Modeling with Current Software 3** Course Prerequisite: PSYCH 512; PSYCH 514. Confirmatory factor analysis, path analysis, structural regression analysis, multilevel analysis and latent growth analysis with current software.

**519 Industrial/Organizational Psychology 3** Course Prerequisite: Ph.D. student in Psychology. Overview of research, theory, and application of psychological principles in the workplace.

**520 Adult Psychotherapy 3** Course Prerequisite: PSYCH 533. An overview of empirically-supported treatments for psychological disorders in adults and the science of psychotherapy research.

**523 Health Psychology 3** Course Prerequisite: Ph.D. student in Psychology. Overview of the field of health psychology from a social-cognitive perspective; includes a focus on health behavior models addressing how beliefs, expectations, affect,

and other social influences impact health decisions and behavior.

**529 Occupational Health Psychology**

3 Course Prerequisite: Ph.D. student in Psychology. Overview of major occupational health psychology content areas and foundational theories; causes and consequences of work-related stressors, injury, and illness; individual and organizational interventions.

**530 Professional, Ethical, and Legal Issues**

3 Course Prerequisite: Ph.D. student in Psychology. Application of professional, ethical, and legal issues in clinical psychology to such topics as confidentiality, dual-relationships, research, assessment, and intervention.

**533 Adult Psychopathology**

3 Course Prerequisite: Ph.D. student in Psychology. Theoretical and empirical approaches to diagnosis, etiology and treatment of mental disorders.

**534 Clinical Psychopharmacology**

3 Course Prerequisite: PSYCH 533 or COUN PSY 517; PSYCH 574 or 575; Ph.D. student in Clinical or Counseling Psychology. Classification, clinical application, and mechanisms of psychotherapeutic drugs used in the treatment of mental disorders.

**535 Personality Assessment and Diagnosis**

3 Course Prerequisite: Ph.D. student in Psychology. Diagnostic interviewing, conceptualization of clinical problems, case presentations, and treatment planning.

**536 Measurement Theory and Personality Assessment**

3 Course Prerequisite: By interview only. Psychometric theory, theories of personality, objective and projective methods of assessing personality, development of testing and interpretive skills.

**537 Psychology Clinic Assessment Practicum**

3 May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: PSYCH 539; Ph.D. student in Psychology. Supervised practice in psychological assessment, including neuropsychological assessment, in the WSU Psychology Clinic.

**538 Child Therapy Practicum**

3 May be repeated for credit; cumulative maximum 18 hours. Course Prerequisite: Ph.D. student in Psychology. Supervised practice in the clinical application of psychology with children and families.

**539 Cognitive and Neuropsychological Assessment**

3 Course Prerequisite: Ph.D. student in Psychology. Theory and application of psychological cognitive assessment across the lifespan,

including test administration and interpretation.

**542 Evidence-Based Therapy for Children and Adolescents**

3 Course Prerequisite: Ph.D. student in Psychology. Theoretical and evidence-based approaches to intervention with children and adolescents.

**543 Developmental Psychopathology and Evidence-Based Assessment for Children**

3 Course Prerequisite: Ph.D. student in Psychology. Research on developmental psychopathology and evidence-based assessment of children and adolescents.

**544 Clinical Health and Primary Care Psychology**

3 Course Prerequisite: Ph.D. student in Clinical or Counseling Psychology. Principles and practice of clinical health and primary care psychology.

**545 Psychology Clinic Assessment and Psychotherapy Practicum**

3 (0-9) May be repeated for credit; cumulative maximum 18 hours. Course Prerequisite: Ph.D. student in Psychology. Supervised practice in the clinical application of psychology with adults in the Psychology Clinic.

**546 Counseling Service Practicum V**

1-3 May be repeated for credit; cumulative maximum 12 hours. Course Prerequisite: Ph.D. student in Psychology. Supervised practice in the clinical application of psychology at the WSU Counseling Service.

**547 Clinical Health and Primary Care Psychology Practicum**

3 May be repeated for credit; cumulative maximum 18 hours. Course Prerequisite: PSYCH 544; Ph.D. student in Clinical Psychology. Supervised practice in the application of clinical health and primary care psychology in medical settings.

**548 Clinical Externship V**

1-3 May be repeated for credit; cumulative maximum 18 hours. Course Prerequisite: Ph.D. student in Psychology. Supervised practice in the clinical application of psychology at approved hospitals and medical practices.

**550 Social Psychology**

3 Course Prerequisite: Ph.D. student in Psychology. Attitude structure, function, and change; social cognition and motivation, and attributions.

**552 Diversity Issues in Psychology**

3 Course Prerequisite: Ph.D. student in Psychology. Research, theories, and controversies regarding the role of human diversity in psychotherapy, psychological assessment, and clinical research.

**574 Clinical and Experimental Biopsychology**

3 Course Prerequisite: Ph.D. student in Psychology. Neuroanatomical,

neurochemical, and other biological cases of human and animal behavior.

**575 Foundations of Neuropsychology**

3 Course Prerequisite: Ph.D. student in Psychology. Foundations in brain/behavior relationships and neuropathological syndromes; preparation for advanced training in neuropsychological assessment.

**577 Behavioral Pharmacology**

3 Survey of drugs which affect brain function with emphasis on animal models and clinical applications. Recommended preparation: PSYCH 574 or NEUROSCI 520.

**584 Sensory Bases of Behavior**

3 Sensory and physiological aspects of vision, audition, and other senses.

**591 Principles of Learning**

3 Principles of learning from a behavioral perspective using the experimental analysis of behavior. Credit not granted for both PSYCH 491 and 591. Recommended preparation: PSYCH 105.

**592 Cognition and Affective Basis of Behavior**

3 Course Prerequisite: Ph.D. student in Psychology. Experimental approaches to human information processing, memory, and cognition.

**595 Clinical Internship in Psychology V**

2-16 May be repeated for credit; cumulative maximum 16 hours. Course Prerequisite: Ph.D. student in Psychology. Clinical training in an internship approved by American Psychological Association or by WSU.

**600 Special Projects or Independent Study V**

1-18 May be repeated for credit. Course Prerequisite: Ph.D. student in Psychology. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V**

1-18 May be repeated for credit. Course Prerequisite: Ph.D. student in Psychology. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study and/or Examination V**

1-18 May be repeated for credit. Course Prerequisite: Ph.D. student in Psychology. Independent research in special problems, directed study, and/or examination credit for



students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Psychology PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

School Of Design And Construction  
SDC

**555 Global Engagement in Design and Construction 3** May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Graduate student in Architecture, Interior Design, or Landscape Architecture. Engagement with contemporary and historical issues relevant to the built environment, landscape, climate, industry, and/or culture of the city, region, or country under consideration. Speech And Hearing Sciences  
SHS

**501 Research Methods 3** Philosophy of research, types of literature; experimental and descriptive designs; application of statistics; analysis of statistical results.

**540 Special Topics in Speech and Hearing Sciences V** 1-3 May be repeated for credit; cumulative maximum 9 hours. Advanced study of specialized topics in speech and hearing sciences. SHS graduate student; all undergraduate prerequisite courses completed.

**542 Infant and Toddler Communication and Language 3** Typical development of communication and language in the birth to 5 year-old population; impairments affecting development; disorders; assessment; intervention. SHS graduate student; all undergraduate prerequisite courses completed.

**543 School Age and Adolescent Language 3** Language development in typically developing and language impaired school age and adolescent students; disorder types; implications for assessment and intervention. SHS graduate student; all undergraduate prerequisite courses completed.

**545 Autism Spectrum Disorder 2** Course Prerequisite: SHS 542. Overview and discussions of the characteristics,

causes, assessments, and interventions for autism spectrum disorder.

**550 Special Topics in Speech and Hearing Sciences V** 1-3 May be repeated for credit; cumulative maximum 9 hours. Study of specialized topics in speech and hearing sciences. SHS graduate student; all undergraduate prerequisite courses completed.

**552 Speech-Language Pathology and Audiology in Schools 2** Laws, policies, and ethical issues involved in providing speech-language and audiology services in public schools.

**555 Bilingual and Cultural Issues 2** Cultural and linguistic variables that may impact speech-language pathology services of culturally and linguistically diverse populations; assessment and treatment considerations.

**556 Problems in Stuttering 2** Historical and current literature; problem-solving strategies applied to theoretical and clinical problems in stuttering. SHS graduate student; all undergraduate prerequisite courses completed.

**557 Cleft Palate and Craniofacial Disorders 2** Speech and voice problems associated with clefts of the lip and palate. SHS graduate student; all undergraduate prerequisite courses completed.

**560 Special Topics in Speech and Hearing Sciences V** 1-3 May be repeated for credit; cumulative maximum 9 hours. Advanced study of specialized topics in speech and hearing sciences. SHS graduate student; all undergraduate prerequisite courses completed.

**562 Motor Speech Disorders 3** Underlying processes of neuromuscular control and feedback; results of damage and disease on neuromotor system. SHS graduate student; all undergraduate prerequisite courses completed.

**563 Dysphagia 3** Anatomy and physiology of swallowing; evaluation and treatment of swallowing disorders. SHS graduate student; all undergraduate prerequisite courses completed.

**565 Augmentative Communication 3** Augmentative communication theory; implementation, training strategies, ongoing adjustments, and evaluating effectiveness. SHS graduate student; all undergraduate prerequisite courses completed.

**566 Off-Campus Practicum Public School Setting V** 2 (0-6) to 6 (0-18) May be repeated for credit; cumulative maximum 15 hours. Course Prerequisite: SHS 575. Advanced clinical practice in a public school setting; evaluation and treatment of speech, language, and hearing disorders. SHS

graduate student; all undergraduate prerequisite courses completed.

**567 Issues in Public School Service Delivery 3** Clinical operations, policies, procedures, including legal, ethical, and professional considerations in the schools. SHS graduate student; all undergraduate prerequisite courses completed.

**568 Off-campus Practicum Clinical Setting V** 2 (0-6) to 6 (0-18) May be repeated for credit; cumulative maximum 15 hours. Course Prerequisite: SHS 575. Advanced clinical practice in an off-campus clinical/medical setting; evaluation and treatment of speech, language and hearing disorders.

**570 Advanced Internship in Speech-Language Pathology V** 1-18 May be repeated for credit. Course Prerequisite: SHS 566 or SHS 568. Advanced practicum in diagnosis of and therapy for communication disorders. SHS graduate student; all undergraduate prerequisite courses completed.

**574 Neuropathologies of Language 2** Advanced study of language disorders resulting from brain insult after birth; emphasis on aphasia and related disorders. SHS graduate student; all undergraduate prerequisite courses completed.

**575 Advanced Clinical Practice V** 2-6 May be repeated for credit; cumulative maximum 15 hours. Advanced clinical practice in evaluation and treatment of speech, language, and hearing disorders. SHS graduate student; all undergraduate prerequisite courses completed.

**576 Voice Disorders 2** Functional and organic voice disorders resulting from various etiologies. SHS graduate student; all undergraduate prerequisite courses completed.

**580 Special Topics in Speech and Hearing Sciences V** 1-3 May be repeated for credit; cumulative maximum 9 hours. Advanced study of specialized topics in speech and hearing sciences. SHS graduate student; all undergraduate prerequisite courses completed.

**587 Speech-Language Pathology in the Medical Setting 2** Report writing and charting, collaborating with the medical team, establishing prognosis and assessing efficacy of treatment, and third-party reimbursement. SHS graduate student; all undergraduate prerequisite courses completed.

**588 Advanced Speech Sound Disorders 2** Current literature in articulatory development and deviancy; diagnosis and therapy. Required preparation: SHS

graduate student; all undergraduate prerequisite courses completed.

**590 Special Topics in Speech and Hearing Sciences V 1-3** May be repeated for credit; cumulative maximum 9 hours. Advanced study of specialized topics in speech and hearing sciences. SHS graduate student; all undergraduate prerequisite courses completed.

**600 Special Projects or Independent Study V 1-18** May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V 1-18** May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V 1-18** May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

Sociology  
SOC

**510 Development of Social Theory 3** Examination of the foundations of social theory.

**511 Data Management 3** Core concepts and procedures regularly used in the quantitative analysis of sociological data.

**517 Seminar in Contemporary Sociological Theory 3** Recent developments in sociological theory, analysis, application and appraisal of specific theoretical systems.

**519 International Development and Human Resources 3** History of and recent changes in international development emphasizing anthropological perspectives. (Crosslisted course offered as ANTH 519, POL S 538, SOC 519).

**520 Research Methods in Sociology 3** Methodology of social research at the professional level.

**521 Regression Models 3** Simple and multiple regression, structural equation models, nonlinear applications, applications for discrete dependent variables.

**522 Advanced Sociological Methodology 3** May be repeated for credit; cumulative maximum 12 hours. Scaling theory, sampling theory, experimental design, measurement of association, multivariate analysis, current methods and techniques. Recommended preparation: SOC 521.

**523 Qualitative Methods Practicum 3** Introduction to qualitative research methods as used in social sciences; epistemological underpinnings and empirical techniques. Recommended preparation: SOC 520.

**525 Practicum in Survey Research 3** Practical experience in design and implementation of telephone and mail surveys; participation in all aspects of conducting a survey. Recommended preparation: SOC 520.

**526 Experimental Methods 3** Design and analysis, settings, manipulations, measures, and human participant considerations.

**530 Demography 3** Population studies; causes, effects, and measurement of changes in fertility, mortality, and migration; population estimation and projection.

**531 Human Ecology 3** Ecosystem context of human life; change viewed ecologically; sociological use and misuse of ecological concepts; issues in theory and research.

**532 Environmental Sociology 3** Societal-environmental interactions; impacts of human societies on the physical environment; environmental impacts on human behavior and social organization.

**535 Technology and Society 3** Analysis of sociotechnical systems; effects of technology on society; the social shaping of technologies and their environmental impacts.

**536 Special Topics in Environmental Sociology V 1 (0-3) to 3 (0-9)** May be repeated for credit; cumulative maximum 9 hours. Special topics in environmental sociology.

**542 Social Stratification: Class, Race and Gender Inequalities 3** Theoretical and empirical research in both classic stratification literature and recent scholarship on class, race/ethnicity and gender.

**545 Sociology of Community 3** Community stability and change: interaction processes; decision making; societal linkages; effects on well-being.

**552 Poverty and Family 3** Explores the experience of poverty and how it affects

family life, family structure, and family formation in both rural and urban America.

**553 Social Organization and the Family 3** The family as a social institution; principles of social organization applied to family relationships; macro-level analyses of family structure.

**554 Social Psychology of the Family 3** The family as an interacting group; social psychological theories and research applied to family relationships; effects of families on individuals.

**556 Sociology of Aging and the Life Course 3** Theory and research on the changes individuals undergo over the life course; influences of history, social structure, agency and social relations on lives.

**574 Labor Market Inequality 3** Overview of research on the causes and consequences of inequality in U.S. work organizations.

**580 Sociology of Race Relations 3** Analysis of race/ethnic relations; historical and current theoretical explanations of race/ethnic relations.

**582 Social Movements 3** Theories and methods in social movement studies.

**590 Special Topics in Sociology 3** May be repeated for credit; cumulative maximum 9 hours.

**591 The Sociology Profession 1** May be repeated for credit; cumulative maximum 2 hours. Requirements, operations, problems, and possibilities of the sociology profession.

**592 Special Topics in Sociology 3** May be repeated for credit; cumulative maximum 9 hours.

**593 Special Topics in Sociology V 1-3** May be repeated for credit; cumulative maximum 6 hours. Special topics in sociology.

**600 Special Projects or Independent Study V 1-18** May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V 1-18** May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V** 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Sociology PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Soil Science  
SOILS

**501 Seminar** 1 May be repeated for credit. Presentation of research information.

**502 Advanced Topics in Soils V** 1-3 May be repeated for credit; cumulative maximum 6 hours. Interpretation, presentation, and discussion of current research on soils, uses, and management.

**503 Advanced Soil Analysis V** 1-3 May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: By permission only. Soil research techniques; application of modern instrumentation to soil analysis.

**505 Teaching Practicum** 1 May be repeated for credit; cumulative maximum 4 hours. Supervised experience in classroom teaching; classroom preparation for lectures, discussions, laboratories; preparation and grading of exams.

**508 Environmental Spatial Statistics** 3 Theoretical introduction and practical training in spatial data analysis for graduate students in the environmental sciences. (Crosslisted course offered as SOIL SCI 508, STAT 508). Required preparation must include undergraduate statistics through applied multiple regression.

**511 Science Writing Workshop** 2 Instruction, tools, and peer review support to write graduate research proposal or journal article. (Crosslisted course offered as CROP SCI 511, ENTOM 511, SOIL SCI 511).

**513 Environmental Soil Physics** 3 Physical properties of soils and their relationships to moisture, aeration, and temperature; plant-soil-atmospheric relationships; solute transport and soil salinity. Recommended preparation: SOIL SCI 201 and general physics.

**514 Environmental Biophysics** 2 Physical environment of living organisms (temperature, humidity, radiation, wind); heat and mass exchange and balance in plant and animal systems. Recommended preparation: Introductory biology, physics, and calculus.

**515 Environmental Biophysics Laboratory** 1 (0-3) Course Prerequisite: SOIL SCI 514 or concurrent enrollment. Experimental methods and procedures in environmental measurements; temperature, wind, radiation, and humidity measurements in biological environments.

**516 Soil Processes in the Earth's Critical Zone** 3 Soil geochemistry and processes; theory and applications with a focus on reactions at the solid, liquid, and gaseous interface between the lithosphere, atmosphere, hydrosphere, and biosphere. (Crosslisted course offered as GEOLOGY 416/516, SOIL SCI 416/516). Credit not granted for both GEOLOGY/SOIL SCI 416 and GEOLOGY/SOIL SCI 516.

Recommended preparation: Basic knowledge of soils (e.g. SOIL SCI 201 or equivalent; CHEM 106; PHYSICS 102).

**521 Physical Chemistry of Soils** 3 Chemical equilibrium and kinetics of soil solution speciation, mineral precipitation and dissolution, adsorption and partitioning reactions, and ion exchange. Soil constituents; soil solutions: mineral equilibria; absorption reactions; acid/base reactions; oxidation-reduction; soil contaminants.

**531 Soil Microbiology** 3 (2-3) Biology and significance of organisms inhabiting soil and their role in nutrient cycling, ecosystem function, agriculture, and bioremediation.

**533 Advanced Vadose Processes** 2 Methods and models for water, heat, vapor and solute transport in the vadose zone; transfer functions to describe solute transport; non-linear parameter estimation; fate and transport of water, heat, and solutes in the vadose zone; hydrological and geochemical processes in unsaturated subsurface materials. Recommended preparation: upper division or graduate course in soil physics or chemistry.

**541 Soil-Plant-Microbial Interactions** 3 Soil-plant-microbial relationships to plant nutrition, plant health, and environmental cleanup; rhizosphere chemistry and microbial ecology. Required preparation must include two upper-division courses in biology, microbiology or soils.

**544 Nitrogen Cycling in the Earth's Systems** 3 Nitrogen dynamics in terrestrial, aquatic, and atmospheric systems; nitrogen

transformations in natural and managed systems and responses to human activities. (Crosslisted course offered as BIOLOGY 544, SOIL SCI 544).

**547 Soil Fertility Management** 3 Philosophy of fertilizer recommendations based on soil and plant tissue testing; principles of fertilizer manufacture, placement and use. Required preparation must include introductory soils and upper-division soil fertility courses.

**568 GIS Spatial Analysis** 4 (2-6) Geographic information systems applied to analysis of landscape data; maps, geographic coordinate systems and projections, geodatabases. (Crosslisted course offered as SOIL SCI 468, SOIL SCI 568, ENVR SCI 486, ENVR SCI 586.) Credit not granted for both SOIL SCI 468 and 568, or ENVR SCI 486 and 586.

**600 Special Projects or Independent Study V** 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V** 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V** 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Soil Science PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Special Education  
SP ED

**501 Teaching Students with Disabilities** 3 Intervention and instructional strategies for managing academic, social, and behavior problems in classroom settings. Credit not granted for both SPEC ED 401 and SPEC ED 501. Required preparation must include completion of an introductory special education course, or SPEC ED 520.

**502 Assessment and Curriculum for Students with Disabilities** 3 Methods of individual and group, formal and informal assessment for students with disabilities. Credit not granted for both SPEC ED 402 and SPEC ED 502. Graduate level required preparation must include completion of an introductory special education course, or SPEC ED 520; SPEC ED 504; concurrent enrollment SPEC ED 590 (2 credits).

**503 Secondary Education for Students with Disabilities** 3 Overview of instruction and intervention strategies for secondary students with disabilities; assessment, and curriculum/program development. Credit not granted for both SPEC ED 403 and SPEC ED 503. Required preparation must include completion of an introductory special education course, or SPEC ED 520; SPEC ED 504; or permission of instructor.

**504 Professional Skills in Special Education** 3 Legal aspects of special education, individualized education plans, roles and responsibilities of teachers, collaboration techniques, service delivery/design, and supervision of paraprofessionals. Credit not granted for both SPEC ED 404 and SPEC ED 504. Required preparation must include completion of an introductory special education course, SPEC ED 520.

**509 Early Childhood Special Education** 3 Assessment, curriculum, and instructional techniques for teaching young children with handicaps and their families in a variety of settings. Credit not granted for both SPEC ED 409 and SPEC ED 509. Required preparation must include completion of an introductory special education course, or SPEC ED 520.

**520 Teaching in Inclusive Classrooms** V 2-3 Designed for preservice/inservice general education (K-12) teachers to learn how to teach students with disabilities. Credit not granted for both SPEC ED 420 and SPEC ED 520.

**521 Inclusion Strategies for Special Education Teachers** 3 Roles and responsibilities of special education professionals in inclusion programs, including legal aspects and collaboration. Credit not granted for both SPEC ED 421

and SPEC ED 521. Required preparation must include completion of an introductory special education course, or SPEC ED 520; SPEC ED 504.

**522 Topics in Special Education** V 1-4 May be repeated for credit; cumulative maximum 8 hours. Recent research developments, issues and/or applications in selected areas of special education.

**540 Methods in Intensive Educational Supports** 3 Assessment, curriculum development and modification, and instructional methods for students with severe disabilities. Credit not granted for both SPEC ED 440 and SPEC ED 540. Required preparation must include completion of an introductory special education course, or SPEC ED 520.

**541 Foundations of Education of Children with Hearing Loss** 2 Historical and contemporary forces impacting education of children with hearing loss with emphasis on technology.

**542 Development of Language for Teachers of Children with Hearing Loss** 3 Language from birth through school-age with emphasis on development and relationship of pragmatics, semantics and syntax.

**543 Teaching Speech to Children with Hearing Loss** 3 Strategies for assessing, developing and remediating the speech of children with hearing loss.

**544 Developing Language in Children with Hearing Loss** 3 Strategies for assessing and developing language in children with hearing loss.

**545 Curriculum for Children with Hearing Loss** 3 Strategies for modifying and adapting instruction in academic areas to meet the needs to students with hearing loss.

**546 Working with Parents of Children with Hearing Loss** 3 Impact of hearing loss on parents and strategies for helping parents cope at various stages of their child's life.

**571 (470) Effective Assessment and Instruction in Reading for Diverse Learners** 3 Methods and approaches to reading assessment and designing, implementing evidence-based reading interventions. Credit not granted for both SPEC ED 471 and 571.

**589 Seminar in Disability Studies** 3 Current research, issues, trends in disabilities within the broader context of education, society, history.

**590 Practicum in Special Education** V 1-4 May be repeated for credit; cumulative maximum 8 hours. Supervised experiences in application of theories and

practices in special education. Required preparation must include completion of an introductory special education course, or SPEC ED 520; certified education major or completed certificate.

**591 Response to Intervention Across the Core Academic Curriculum** 3 New method of assessment for learning disability referred to as response to intervention. Recommended preparation: Admission to a doctoral program.

**592 Single Subject Research Design and Methods** 3 In-depth study of single subject research designs; critical analysis of strengths and weaknesses of each design. Recommended preparation: Admission to a doctoral program.

**593 Diversity Issues in Special Education: Theory, Research and Practice** 3 Diversity issues in special education examined and critically reflected upon for future use and practice. Recommended preparation: Admission to a doctoral program.

**594 Prevention and Intervention for Emotional and Behavioral Disorders (EBD)** 3 Cross-disciplinary perspectives on preventing mental, emotional, and behavioral disorders; analysis of evidence-based practices, research to practice gap, implementation and sustainability. Recommended preparation: Admission to a doctoral program.

**595 Universal Design** 3 Factors associated with developing, implementing and assessing curricular materials for individuals with disabilities. Recommended preparation: Admission to a doctoral program.

**596 Seminar in Quality Indicators for Research in Special Education** 1 May be repeated for credit; cumulative maximum 3 hours. Course Prerequisite: Admitted to the Teaching and Learning PhD programs. Examines quality indicators of research designs and approaches in special education.

**600 Special Projects or Independent Study** V 1-8 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**800 Doctoral Research, Dissertation, and/or Examination** V 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Special Education PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or

final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Spanish  
SPAN

**550 Medieval Literature 3** Selected works. Taught in Spanish.

**551 Seminar in Golden Age Literature 3** Reading and discussion of representative works of the Spanish Golden Age. Taught in Spanish.

**552 Topics in Nineteenth-Century Spanish Literature 3** May be repeated for credit; cumulative maximum 6 hours. Selected works and topics. Taught in Spanish.

**553 Topics in Twentieth-Century Spanish Literature 3** May be repeated for credit; cumulative maximum 6 hours. Selected works and topics. Taught in Spanish.

554 Seminar in Spanish Literature and/or Culture V 1-3 May be repeated for credit.

**555 Seminar in Colonial Spanish American Literature 3** May be repeated for credit; cumulative maximum 6 hours. Seminar on conquest and colonial literature in Hispanic America.

**556 Seminar in Nineteenth-Century Spanish American Literature 3** May be repeated for credit; cumulative maximum 6 hours. Study of nineteenth-century Spanish American Literature.

**557 Seminar in Twentieth-Century Spanish American Literature 3** May be repeated for credit; cumulative maximum 6 hours. Study of twentieth-century Spanish American literature and culture.

558 Seminar in Spanish American Literature and/or Culture V 1-3 May be repeated for credit.

**559 Special Topics in Hispanic Studies and/or Linguistics V 1-3** May be repeated for credit; cumulative maximum 6 hours. Special interdisciplinary topics in Hispanic studies and/or linguistics.

**560 Beginning Instructional Practicum 2** May be repeated for credit; cumulative maximum 4 hours. An introduction to foreign language instruction for beginning teaching assistants.

**561 Advanced Instructional Practicum 1** May be repeated for credit; cumulative maximum 4 hours. Supervised practical experience in foreign language teaching.

**597 Graduate Internship V 1 (0-3) to 6 (0-18)** May be repeated for credit; cumulative maximum 12 hours. Course Prerequisite: SPANISH 560; FOR LANG

540; minimum GPA of 3.50. Supervised internship experience relating to career objectives; portfolio assignment required.

**600 Special Projects or Independent Study V 1-18** May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V 1-18** May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V 1-18** May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

Sport Management  
SPMGT

**521 Special Topics in Sport Management V 1-3** May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Admission to the Sport Management Graduate program. Recent research, developments, issues, and /or applications in selected areas of Sport Management.

**540 Current Issues in Sport Management 3** Solutions-oriented investigation of current issues faced by sport managers/administrators; interpretation of research literature; procedures for issue resolution.

**564 Marketing of Sport Events and Programs 3** Principles of sport marketing including public relations, corporate sponsorship, and service quality for sport organizations.

**565 Ethical Perspectives of Sport and Physical Activity 3** Ontological, ethical, aesthetic views of physical activity. Required preparation must include SPMGT 365 or equivalent.

**567 Social and Cultural Issues of Physical Activity and Sport 3** Sport and physical activity as cultural forms, including the examination of subcultures,

stratification, socialization and power relations.

**568 Administrative Concepts in Sport Organizations 3** Effective management for sport programs. Analysis of dynamic management process necessary for improvement of productivity in sport organizations.

**569 Sport in Higher Education 3** Course Prerequisite: Admission to the Sport Management Graduate program. The course examines sport in higher education institutions from the historical, cultural, and administrative perspectives.

**577 Law and Risk Management in the Sport Industry 3** Use of risk management perspective to explore the law as it applies to the management concerns of sport organizations. Required preparation must include SPMGT 377 or equivalent.

**578 Sports in Society 3** The social significance of sports; sociology of sport research. Required preparation must include SPMGT 367 or equivalent.

**579 Sport Media and Communication 3** Explores and critically examines the role of media and communication in contemporary sports and society. Recommended preparation: SPMGT 379 or equivalent.

**600 Special Projects or Independent Study V 1-18** May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V 1-18** May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V 1-18** May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

Statistics  
STAT

**508 Environmental Spatial Statistics 3** Theoretical introduction and practical

training in spatial data analysis for graduate students in the environmental sciences. (Crosslisted course offered as SOIL SCI 508, STAT 508). Required preparation must include undergraduate statistics through applied multiple regression.

**510 Topics in Probability and Statistics** 3 May be repeated for credit; cumulative maximum 6 hours. Current topics in probability and statistics of mutual interest to faculty and students. Credit not granted for both STAT 410 and STAT 510. Recommended preparation: One 3-hour 300-level STAT course.

**511 Statistical Methods for Graduate Researchers** 4 (3-2) Fundamentals of experimental design and statistical methods for graduate students in the sciences. Covers t-test for one and two means, ANOVA through completely randomized designs with one and two factors, chi-square tests and regression analysis using R. Recommended preparation: One prior course in statistics. Cannot be used for credit in the Department of Mathematics and Statistics graduate programs. (Crosslisted course offered as STAT 511, AFS 511).

**512 Analysis of Variance of Designed Experiments** 3 (2-2) Principles of experimental design and analysis and interpretation of data. Recommended preparation: One 3-hour 300-level STAT course.

**516 Time Series** 3 ARIMA models; identification, estimation, diagnostics, and forecasting; seasonal adjustments, outlier detection, intervention analysis and transfer function modeling. (Crosslisted course offered as MGTOP 516, STAT 516). Recommended preparation: STAT 443.

**519 Applied Multivariate Analysis** 3 Multivariate normal distribution, principal components, factor analysis, discriminant function, cluster analysis, Hottelling's T<sub>2</sub> and MANOVA. (Crosslisted course offered as MGTOP 519, STAT 519). Recommended preparation: STAT 443.

**520 Statistical Analysis of Qualitative Data** 3 Binomial, Poisson, multinomial distribution; contingency tables, Fisher's tests, log-linear models; ordinal data; applications in biology, business, psychology, and sociology. Recommended preparation: Linear Algebra or Calculus I and one 3-hour 300-level STAT course.

**522 Biostatistics and Statistical Epidemiology** 3 Rigorous approach to biostatistical and epidemiological methods including relative risk, odds ratio, cross-over designs, survival analysis and generalized linear models. Recommended preparation:

Linear Algebra or Calculus I and one 3-hour 300-level STAT course.

**523 Statistical Methods for Engineers and Scientists** 3 Hypothesis testing; linear, multilinear, and nonlinear regression; analysis of variance for designed experiments; quality control; statistical computing. Credit not normally granted for both STAT 423 and 430. Recommended preparation: One 3-hour 300-level STAT course.

**530 Applied Linear Models** 3 (2-2) The design and analysis of experiments by linear models. Recommended preparation: One 3-hour 300-level STAT course.

**533 Theory of Linear Models** 3 Theoretical basis of linear regression and analysis of variance models; a unified approach based upon the generalized inverse. Recommended preparation: Linear Algebra and one 3-hour 400-level STAT theory course.

**535 Regression Analysis** 3 Conceptual development of regression; estimation, prediction, tests of hypotheses, variable selection, diagnostics, model validation, correlation, and nonlinear regression. Recommended preparation: One 3-hour 400-level STAT course.

**536 Statistical Computing** 3 (2-3) Generation of random variables, Monte Carlo simulation, bootstrap and jackknife methods, EM algorithm, Markov chain Monte Carlo methods. (Crosslisted course offered as STAT 536, MATH 536). Recommended preparation: One 3-hour 400-level probability or STAT course.

**544 Applied Stochastic Processes** 3 Poisson and Markov processes; queuing theory; auto-covariance; stationarity; power spectra; harmonic analysis; linear mean-square predictions. Recommended preparation: One 3-hour 400-level STAT or Applied Probability course.

**548 Statistical Theory I** 3 Probability spaces, combinatorics, multidimensional random variables, characteristic function, special distributions, limit theorems, stochastic processes, order statistics. (Crosslisted course offered as STAT 548, MATH 568). Recommended preparation: Calculus III and one 3-hour 400-level probability course.

**549 Statistical Theory II** 3 Continuation of STAT 548. Statistical inferences; estimation and testing hypotheses; regression analysis; sequential analysis and nonparametric methods. (Crosslisted course offered as STAT 549, MATH 569). Recommended preparation: STAT 548.

**556 Introduction to Statistical Theory** 3 Sampling distributions; hypothesis testing and estimation; maximum likelihood; likelihood ratio tests; theory of least squares; nonparametrics. (Crosslisted course offered as STAT 456, MATH 456). Recommended preparation: One 3-hour 400-level STAT or probability course.

**565 Analyzing Microarray and Other Genomic Data** 3 Statistical issues from pre-processing (transforming, normalizing) and analyzing genomic data (differential expression, pattern discovery and predictions). Recommended preparation: Linear Algebra and one 3-hour 300-level STAT course.

**572 Quality Control** 3 Simple quality assurance tools; process monitoring; Shewhart control charts; process characterization and capability; sampling inspection; factorial experiments. Recommended preparation: One 3-hour 300-level STAT or probability course.

**573 Reliability** 3 Probabilistic modeling and inference; product-limit estimator; probability plotting; maximum likelihood estimation with censored data; regression models for accelerated life testing. Recommended preparation: One 3-hour 300-level STAT or probability course.

**574 Linear and Nonlinear Mixed Models** 3 Course Prerequisite: STAT 530; STAT 533; STAT 556. The theoretical development and application of linear and nonlinear mixed models covering the theory of linear, generalized linear, and nonlinear mixed models.

**575 The Theory of Multivariate Analysis** 3 Course Prerequisite: STAT 519; STAT 536; STAT 556. The theoretical development and application of multivariate statistical methods; topics include multivariate distributions, MANOVA, principal components, factor analysis and classification.

**576 Bayesian Analysis** 3 Course Prerequisite: STAT 536; STAT 556. Statistical principle for combining new evidence with prior beliefs, inference and simulation procedures for accommodating complex data and producing interpretable output.

**577 Statistical Learning Theory** 3 Focus on learning and interpreting from data; both prediction and classification will be discussed for supervised and unsupervised learning. Recommended preparation: STAT 533; STAT 536; STAT 556.

**590 Statistical Consulting Practicum** V 1-2 May be repeated for credit; cumulative maximum 6 hours. Theory and

practice of statistical consulting, participation in consulting session. Recommended preparation: STAT 512 and STAT 530.

**600 Special Projects or Independent Study V** 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**702 Master's Special Problems, Directed Study, and/or Examination V** 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Statistics PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit. Teaching And Learning T & L

**501 Practicum in Bilingual/ESL Education 3** (1-6) May be repeated for credit; cumulative maximum 6 hours. Work with students from diverse linguistic and cultural backgrounds in educational settings. Credit not granted for both TCH LRN 401 and 501.

**502 Assessment for Teaching and Learning V** 2-3 Instruction in sound assessment practices for preservice and inservice graduate students.

**504 Advanced Study in Linguistics for Educators 3** Use of linguistics to better understand second language learning and teaching and the physical aspects of acquiring a language.

**505 ESL Methods for General Educators (K-8) 2** Course Prerequisite: For candidates admitted to MIT. Research-based ESL strategies and methods for pre-service and experienced teachers.

**506 Multicultural Classroom Instruction and Management 4** Instructional and management strategies for maximizing students' opportunities to learn in a multicultural setting.

**507 Seminar in Literacy in Multicultural Settings I 3** Multicultural perspective to curriculum development and classroom literacy practices.

**508 Seminar in Literacy in Multicultural Settings II 3** Course Prerequisite: TCH LRN 507. Multicultural perspective to curriculum development and classroom literacy practices.

**509 Research in Curriculum and Assessment for Bilingual/ESL Education 3** Research in curriculum development for and assessment of language minority students. Recommended preparation: TCH LRN 510; TCH LRN 549.

**510 Theoretical Foundations of Bilingual/ESL Education 3** Theoretical foundations related to research and instructional strategies for effective schooling of language minority students. Credit not granted for TCH LRN 410 and 510.

**511 Theoretical Foundations of Education Research 3** Identification and use of theoretical components to guide and explain education research.

**512 Language and Cultural Factors in Mathematics 3** Research and instructional strategies related to linguistic and cultural influences on learning math.

**514 Methods and Materials for Bilingual/ESL Education 3** Research and instructional methods related to English language acquisition across content areas. Credit not granted for both TCH LRN 414 and TCH LRN 514. Recommended preparation: Recommended: TCH LRN 410 or 510; TCH LRN 509; TCH LRN 549. 515 The Education of Cultural and Linguistic Minority Students 3 Issues in the education of language minority students.

**516 Advanced Study in Computer-Assisted Language Learning 3** Research, theory, and practice in computer-assisted language learning.

**518 Integrating Technology into the Curriculum 3** Examination and articulation of the potential for new technologies to expand learning opportunities.

**519 Instructional Media Production I 3** Instructional media development, emphasizing the theory and methods of instructional design, digital media production and evaluation.

**520 Topics in Special Student Populations V** 1-4 May be repeated for credit; cumulative maximum 6 hours. For K-12 teachers. Knowledge of special student populations and guidance in developing appropriate curricula.

**521 Topics in Education V** 1-4 May be repeated for credit; cumulative maximum

6 hours. Recent research, developments, issues, and/or applications in selected areas of education.

**522 Topics in Education V** 1-3 May be repeated for credit; cumulative maximum 6 hours. Recent research, development, issues, and/or applications in selected areas of education.

**523 Topics in Education V** 1-3 May be repeated for credit; cumulative maximum 6 hours. Recent research, development, issues, and/or applications in selected areas of education.

**524 Topics in Education V** 1-3 May be repeated for credit; cumulative maximum 6 hours. Recent research, development, issues, and/or applications in selected areas of education.

**526 Research in Multicultural Education 3** Course Prerequisite: TCH LRN 515. Research and instructional practices focusing on multicultural education.

**527 Seminar in Teacher Education Instruction 1** May be repeated for credit; cumulative maximum 4 hours. Teacher preparation program components and rationale, university teaching strategies, and evaluation methods.

**528 Literacy within the Disciplines 3** Explores literacy research and practices that enhance the learning of various disciplines taught in K-12 settings. (Crosslisted course offered as TCH LRN 528, MIT 551). Credit not allowed for students who have earned credit for TCH LRN 428.

530 Innovations in Reading V 2-3

**531 Frameworks for Research in Mathematics and Science Education 3** Exploration of research frameworks and methodologies specific to mathematics and science education.

**532 Children's Literature in the Curriculum 2** Theory and classroom applications for selecting and using literature and storytelling in content areas; reading, writing, language development, the arts.

**533 (426) Middle Level Mathematics Methods 3** Middle-school philosophy; understanding of effective standards and research-based methods. Credit not granted for both TCH LRN 433 and 533.

**534 (427) Conceptualization of Proportional Thinking 3** Investigation of the development of K-14 students' understanding of proportional reasoning. Credit not granted for both TCH LRN 434 and 534.

**537 Seminar in Language, Literacy, and Culture 3** Interrelationships between

schools, literacy, and student cultural background.

**538 Writing Across the Curriculum** 3 Writing for learning at grade levels K-12.

**539 Innovations in Language Arts** 3 The most recent developments in language arts instruction for pre-service and in-service teachers K-12.

**540 Elementary School Social Studies** 3 Course Prerequisite: For candidates admitted to MIT. For candidates admitted to graduate teacher preparation and experienced teachers. Elementary structures of various social sciences; research findings related to instruction; classroom applications and materials.

**541 Teacher Professional Certification: Pre-Assessment Seminar** V 1-3 May be repeated for credit; cumulative maximum 6 hours. Candidates evaluate current teaching against standards to determine steps for professional growth plans which measure positive impact on student learning.

**542 Teacher Professional Certification: Researching Exemplary Practices** V 1-3 May be repeated for credit; cumulative maximum 6 hours. Teachers will apply exemplary practices, continue to assess their performance and college evidence of positive impact on student learning.

**543 Teacher Professional Certification: Culminating Seminar** V 1-3 May be repeated for credit; cumulative maximum 6 hours. Candidates will complete ProCert requirements to document positive impact on students' learning; set new goals; learn about National Board options.

**544 Teaching Children's and Young Adult Literature** 3 Trends, issues, and research in children's and young adult literature.

**546 Teaching Writing** 3 Enrollment not allowed if credit already earned for TCH LRN 446. Theory and research relevant to instructional approaches and practices for teaching writing in K-12 schools. Credit not allowed for students who have earned credit for TCH LRN 446.

**547 Teaching Folk Literature to Children and Adolescents** 3 Folk literature as a genre in child and adolescent literature; curriculum applications; reading, language development, social studies, creative expression.

**548 Teaching Adolescent Literature** 3 Evaluating, selecting, and using literature for middle school and teenage students.

**549 Communicating in a Multilingual Society** 3 Study of language in social and educational context and its

relation to cultural and linguistic diversity. Recommended preparation: TCH LRN 510.

**550 Second Language Learning and Literacy** 3 Course Prerequisite: Admission to a graduate program. Research on second language teaching and learning in literacy education with a focus on English language learners in US schools.

**551 Psychology of Reading** 3 Enrollment not allowed if credit already earned for TCH LRN 441. Psychological, perceptual, motivational, developmental and physiological aspects of reading. Credit not allowed for students who have earned credit for TCH LRN 441.

**552 Literacy Development I** 3 Course Prerequisite: For candidates admitted to MIT. For candidates admitted to graduate teacher preparation. Review of current research and approaches to instruction in the development of literacy in elementary and middle grades.

**553 Assessment and Instruction for Reading** 4 (3-3) Enrollment not allowed if credit already earned for TCH LRN 443. Evaluation techniques and instructional practices for impacting the reading achievement of K-12 students. Credit not allowed for students who have earned credit for TCH LRN 443.

**554 Sociolinguistics** 3 Interaction between language use and sociopolitical and cultural contexts; cultural and linguistic delivery and educational opportunity. Recommended preparation: TCH LRN 504.

**555 Seminar in Literacy Development** 3 May be repeated for credit; cumulative maximum 6 hours. Current and historical research in reading/language arts, infancy through college and adult years; papers presented by faculty, invited speakers, and students.

**556 Literacy Development II** 3 Course Prerequisite: For candidates admitted to MIT. Review of current research and approaches to instruction in the development of literacy in elementary and middle grades.

**557 Research in Reading** 3 Exploration of qualitative and quantitative reading research covering topics of current and historical importance.

**558 Improving Reading Comprehension (K-12)** 3 Enrollment not allowed if credit already earned for TCH LRN 448. Key theoretical concepts and their implications for improved comprehension instruction, for K-12. Credit not allowed for students who have earned credit for TCH LRN 448.

**560 Research in Teaching** 3 May be repeated for credit; cumulative maximum 6 hours. Recent developments in research on

teaching; both quantitative and qualitative research methodologies emphasized.

**561 Elementary School Mathematics** 3 Research on curriculum and instruction issues in elementary school mathematics.

**562 Foundations of Literacy: Theory and Research** 3 Interdisciplinary inquiry into the various foundations of literacy.

**563 Teaching Concepts of Probability and Statistics** 3 Development of mathematical concepts and related teaching strategies for probability and statistics, with an emphasis on middle school topics. Credit not granted for both TCH LRN 463 and 563.

**565 Introduction to Scholarly Inquiry** 1 Introduction to the Ed.M program including the scholarship and research requirements and the role of students and action research.

**566 Democratic Education** 3 Rationale and skill to assist teachers in making classrooms more democratic.

**567 Social Foundations of Language and Literacy** 3 Social and cultural theories of language and literacy. Recommended preparation: Admission to a doctoral program.

**568 Psychological Foundations of Language and Literacy** 3 Psychological foundations of language and Literacy. Recommended preparation: Admission to a doctoral program.

**569 Critical Analysis of Children's and Young Adult Literature** 3 Course Prerequisite: Admission to a graduate program. Multicultural analysis of children's and adolescent literature and its pedagogical and sociopolitical implications and possibilities.

**570 Theory and Research in Electronic Literacies** 3 Ideas of literacy and effects of technology on literacy and policy, particularly those issues addressing diverse learners.

**571 Research in STEM Education** 3 Contemporary issues in STEM education research and practice.

**573 Theory and Research in Computer-Assisted Language Learning** 3 Information and tools needed to contribute to the CALL research literature.

**574 Science for All: An Individual and Multicultural Perspective** 3 Implications of cultural and individual diversity for understanding western scientific and mathematical thought; an activity-based, educational perspective.

**577 Curriculum Theory** 3 Curriculum theory as the interdisciplinary study of educational experience. (Crosslisted



course offered as TCH LRN 577, CSSTE 539).

**578 National Board for Professional Teaching Standards (NBPTS) I 3**

Development of evidence aligned with National Board standards and allowance for reflection on the impact of teaching and student learning. Required background must include: Bachelor's degree from accredited institution, valid state teaching/counseling certificate, completion of minimum 3 years successful full-time teaching in a U.S. P-12 school.

**579 National Board for Professional Teaching Standards (NBPTS) II 3**

Construct/submit portfolio of evidence meeting national standards in classrooms for National Board Certification assessment. Required background must include: Bachelor's degree from accredited institution, valid state teaching/counseling certificate, completion of minimum 3 years successful full-time teaching in a U.S. P-12 school.

**580 Multicultural Education in a Global Society 3**

Multicultural and multilingual education from a global perspective; development of multicultural curriculum. (Crosslisted course offered as TCH LRN 580, CSSTE 535, MIT 552). Credit not granted for both TCH LRN 480 and TCH LRN 580.

**581 Learning and Development in Mathematics and Science 3**

This course explores and illustrates what we know about various aspects of mathematical learning at various grade levels.

**582 Scholarly Writing 3**

Interdisciplinary; supports students to write publication-quality manuscripts.

**583 Problem Solving in Elementary and Middle Level Education 3**

Course Prerequisite: For candidates admitted to MIT. Integration of knowledge and skills to address complex cases in teaching and learning.

**584 Research in Teaching**

**Mathematics and Science 3** Development of an understanding for the research literature that is particularly related to mathematics and science teaching.

**585 Focused Reading and Conference in Math/Science Education V**

1-3 May be repeated for credit; cumulative maximum 9 hours. Designed to foster ongoing scholarship for individuals interested in mathematics and/or science educational research.

**588 Action Research: Teachers as**

**Research 3** Theoretical concepts, research, issues, models, and strategies for implementation of action research.

**590 Internship V 2-6** May be repeated for credit; cumulative maximum 12 hours.

Course Prerequisite: By interview only. Opportunities in professional positions.

**591 Research Internship in**

**Math/Science Education V 2-3** May be repeated for credit; cumulative maximum 6 hours. Provides opportunities for students to work closely with an accomplished researcher to observe, learn, and practice research methods.

**594 Integrating Fine Arts into K-8**

**Curriculum 2** Course Prerequisite: For candidates admitted to MIT. Integrating Fine Arts (art, music, dance, drama) into K-8 curriculum; designed for pre-service MIT.

**596 Topics in In-Service Education**

V 1-3 May be repeated for credit; cumulative maximum 12 hours. Advanced study of research, practice, and contemporary issues in education.

**597 Topics in In-Service Education**

V 1-3 May be repeated for credit; cumulative maximum 9 hours. New developments and applications on selected in-service and staff development topics.

**600 Special Projects or Independent**

**Study V 1-18** May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis,**

**and/or Examination V 1-18** May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems,**

**Directed Study, and/or Examination V 1-18** May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation,**

**and/or Examination V 1-18** May be repeated for credit. Course Prerequisite: Admitted to one of the following PhD programs: Cultural Studies and Social Thought in Education, Math and Science Education, or Language, Literacy, and Technology. Independent research and

advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Interdisciplinary

UNIV

**580 Leadership Development V 1-3**

Course Prerequisite: By permission only. Meetings and workshops designed to develop professional and leadership skills for doctoral students.

**590 Preparation for College**

**Teaching 2** Cross-discipline instructional development for graduate teaching assistants; course development teaching techniques, university policies and procedures.

**591 Interdisciplinary Studies 1**

Contemporary issues in interdisciplinary education and research. Open to all interested students.

**597 Preparing the Future**

**Professoriate 2** Course Prerequisite: By permission only. Understanding and contextual knowledge of the professoriate and issues facing higher education.

**598 Interdisciplinary Seminar 1**

Course Prerequisite: INTERDIS 591 or admission to the IIDP program. Assists IIDP students in the preparation of their program proposal, which serves as the qualifying examination for continuation in the IIDP. The IIDP Graduate Committee will review and evaluate the proposal.

**800 Doctoral Research, Dissertation,**

**and/or Examination V 1-18** May be repeated for credit. Course Prerequisite: Admitted to the IIDP PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Veterinary Medicine

V M

**500 Animals, Society, and the**

**Veterinarian 1** Active participation in activities designed to enhance personal growth, character development and leadership skills.

**501 International Veterinary**

**Medicine 1** Course Prerequisite: Veterinary Medicine student. Important issues and constraints facing the global community.

**502 Communication Skills V 1-3**

Course Prerequisite: Veterinary Medicine student. Exercises designed to enhance communication and relational skills.

- 504 Global Studies V 1** (0-3) to 6 (0-18) Course Prerequisite: VET MED 501. Preceptorship in the US or overseas, under direct supervision of veterinarian, agriculture or public health professional; related to international veterinary medicine.
- 505 Reverence for Life 1** (0-2) Course Prerequisite: Veterinary Medicine student. Connections between humans and animals; discussions related to use of animals in Western societies; social issues related to veterinary medicine.
- 508 Research Orientation and Resource 1** Course Prerequisite: Veterinary Medicine student. Resources and important issues for identifying and developing a focused area of scholarly activity in biomedical research.
- 509 Research Issues, Ethics, and Literacy 1** May be repeated for credit; cumulative maximum 3 hours. Course Prerequisite: Veterinary Medicine student. Philosophy and history of methodological, ethical and political issues relevant to biomedical research using selected monographs and essays. May be repeated for credit; cumulative maximum 3 hours.
- 510 Veterinary Microscopic Anatomy 4** (3-3) Course Prerequisite: Veterinary Medicine student. Microscopic functional morphology of the cell, tissues, and selected organ systems of domestic animals.
- 511 Veterinary Anatomy I 5** (0-15) Course Prerequisite: Veterinary Medicine student. Detailed macroscopic functional morphology of the dog with comparison to other domestic animals; developmental anatomy of selected organ systems.
- 512 Veterinary Anatomy II 4** (1-9) Course Prerequisite: VET MED 511. Detailed macroscopic functional morphology of domestic animals.
- 513 Veterinary Physiology I 4** Course Prerequisite: Veterinary Medicine student. Cell physiology focusing on endocrine, paracrine, and neurotransmission signaling processes, transcriptional and translational control, and methodologies relevant to medicine.
- 517 Small Animal Applied Anatomy and Surgical Techniques 2** (1-3) Course Prerequisite: VET MED 512. Applied anatomy of small animals including surgical anatomy.
- 518 Large Animal Applied Anatomy 2** (1-3) Course Prerequisite: VET MED 512. Applied anatomy of large animals including surgical anatomy.
- 520 Veterinary Physiology II 5** (4-3) Course Prerequisite: VET MED 510. Physiology of domestic animals.
- 521 Introduction to Veterinary Neurology 3** (2-3) Course Prerequisite: VET MED 510. Neuroanatomical and neurophysiological bases of veterinary neurology, emphasizing central and peripheral sensory and motor systems.
- 522 Fundamentals of Pharmacology 3** Course Prerequisite: Veterinary Medicine student. Fundamentals of pharmacology, including pharmacokinetics (absorption, distribution, metabolism, excretion), receptor theory and general mechanisms of drug action.
- 523 Veterinary Toxicology 3** Course Prerequisite: VET MED 522. Pharmacology and toxicology of the systems of domestic animals. Continuation of VET MED 522P.
- 524 Clinical Veterinary Pharmacology 3** Course Prerequisite: VET MED 523. Clinical pharmacology of domestic animal species.
- 525 Animal Behavior for the Practicing Veterinarian 1** (0-3) May be repeated for credit; cumulative maximum 2 hours. Course Prerequisite: Veterinary Medicine student. Study of the treatment of behavioral problems and training of domestic animals.
- 526 Domestic and Exotic Animal Behavior 2** (1-3) Course Prerequisite: Veterinary Medicine student. Focus on the medical relevance of behaviors that can cause diseases, and diseases that can lead to behavior problems in domestic and exotic animals.
- 534 Veterinary Immunology 3** (2-3) Course Prerequisite: Veterinary Medicine student. Immunology for the professional veterinary student.
- 535 Veterinary Virology 3** Course Prerequisite: Veterinary Medicine student. Virology for the professional veterinary student.
- 536 Veterinary Bacteriology 4** (3-3) Course Prerequisite: Veterinary Medicine student. Bacteria that produce disease in animals.
- 537 Veterinary Parasitology 4** (3-3) Course Prerequisite: Veterinary Medicine student. Arthropods, protozoa, and helminths of veterinary importance; their host-parasite relationship and control.
- 542 Diseases of Wildlife 2** Course Prerequisite: Veterinary Medicine student. Management principles, epidemiology, pathology, treatment, and control of diseases in wild birds, fish, and mammals.
- 543 Veterinary Medicine and Human Health 2** Course Prerequisite: Veterinary Medicine student. Preparation for veterinary students in public health and food hygiene.
- 545 General Pathology 3** (2-3) Structural and functional alterations in disease; elementary oncology.
- 546 Systemic Pathology 6** (5-3) Course Prerequisite: VET MED 545. Principles of system and organ response to injury, and the effects of injury/disease on the animal host.
- 551 Small Animal Medicine I 5** Course Prerequisite: Veterinary Medicine student. Diagnosis and treatment of small animal diseases.
- 552 Small Animal Medicine II 3** Course Prerequisite: VET MED 551. Diagnosis and treatment of small animal diseases. Continuation of VET MED 551P.
- 553 Small Animal Surgical Diseases and Traumatology 3** Course Prerequisite: Veterinary Medicine student. Diagnosis and medical management of small animal patients with surgical conditions, including determining if/when surgery is indicated.
- 554 Small Animal Anesthesia and Surgery 1** (0-3) Course Prerequisite: VET MED 586; VET MED 587; concurrent enrollment in VET MED 553. Work professionally as a team to anesthetize, spay, and provide peri-operative care for surgical patients.
- 555 Small Animal Clinical Problem Solving 2** Case-based investigation of small animal clinical presentations, diagnosis, and treatment plans.
- 556 Small Animal Soft Tissue Surgery Elective 1** (0-3) Course Prerequisite: VET MED 553. Instruction of advanced surgical techniques, primarily involving canine and feline soft tissue.
- 557 Small Animal Surgery Elective II 1** (0-3) Course Prerequisite: VET MED 553. Small animal orthopedic surgical exercises.
- 558 Diseases and Management of Pet and Wild Birds 2** (1-3) Course Prerequisite: Veterinary Medicine student. Management and handling, diagnosis and treatment of various disease conditions of pet and wild birds.
- 559 Special Animal Medicine V 1-3** Course Prerequisite: Veterinary Medicine student. Handling, restraint, care, normative features, procedures and diseases of unusual animals as pets or those used in food production or research.
- 561 Clinical Specialties V 1-4** Course Prerequisite: Veterinary Medicine student. This course includes clinical disciplines that are not considered core internal medicine, such as ophthalmology and dermatology.
- 562 Complementary and Alternative Veterinary Medicine 1** Presentation of

complementary and alternative veterinary medicine theories and techniques.

**566 Population Theriogenology - Food Animal** 3 Course Prerequisite: Veterinary Medicine student. Population theriogenology in food animal or mixed animal practice.

**567 Applied Comparative Reproductive Physiology** 1 Course Prerequisite: Veterinary Medicine student. Applied comparative reproduction physiology of domestic animals.

**568 Animal Handling and Orientation** 2 (1-3) Course Prerequisite: Veterinary Medicine student. Introduction to clinical restraint procedures, physical exam and treatment procedures, and clinical behavior and management.

**569 Agricultural Animal Medicine I** 4 (3-3) Course Prerequisite: Veterinary Medicine student. Infectious and non-infectious conditions of agricultural animals.

**570 Agricultural Animal Medicine II** 3 Course Prerequisite: VET MED 569. Infectious and non-infectious conditions of agricultural animals; introduction to performance medicine. Continuation of VET MED 569P.

**571 Theriogenology** 3 Course Prerequisite: Veterinary Medicine student. Diagnosis, symptomatology, and treatment of reproductive disorders.

**572 Large Animal Surgery** 2 Course Prerequisite: VET MED 553; veterinary medicine student. Large animal surgical techniques.

**573 Surgery Laboratory III** 1 Course Prerequisite: VET MED 512; concurrent enrollment in VET MED 572. Surgical exercises using large animals.

**574 Equine Lameness** 2 Principles of diagnosis and treatment of musculoskeletal disorders of the horse.

**575 Clinical Techniques in Theriogenology** 1 (0-3) Course Prerequisite: Concurrent enrollment in VET MED 571. Canine, bovine, equine, bull breeding, stallion breeding, and obstetrics.

**576 Emerging and Exotic Diseases of Animals** 1 Course Prerequisite: Veterinary Medicine student. To increase understanding of emerging and exotic diseases of animals among veterinary students.

**577 Herd Production Medicine** 2 Course Prerequisite: Veterinary Medicine student. Fundamentals of developing and providing business-to-business (B2B) professional services to commercial scale livestock operations.

**578 Veterinary Equine Medicine** 3 Course Prerequisite: Veterinary Medicine student. Discussion of clinical presentation,

diagnosis and treatment of common medical diseases of horses.

**579 Advanced Equine Medicine** 2 Course Prerequisite: VET MED 578. Advanced topics in pathophysiology, clinical signs, diagnosis, treatment and prognosis of common medical problems of the horse.

**580 Basic Nutrition** 1 Course Prerequisite: Veterinary Medicine student. Introduction to the concepts of basic nutrition designed for the first year veterinary student.

**581 Agricultural Animal Problems Seminar** 1 May be repeated for credit; cumulative maximum 6 hours. Investigation of current herd problems and evaluation of emerging animal agricultural issues.

**582 Agricultural Animal On-Farm Clinical Experience** 1 May be repeated for credit; cumulative maximum 3 hours. On-farm investigation of individual and herd problems and on-farm provision of professional service.

**585 Epidemiology** 2 Course Prerequisite: Veterinary Medicine student. Minimally quantitative survey in which health is framed as a population phenomena.

**586 Principles of Surgery** 1 Course Prerequisite: Veterinary Medicine student. Principles of surgery for the professional veterinary student.

**587 Clinical Anesthesiology** 2 (1-3) Course Prerequisite: Veterinary Medicine student. Clinical anesthesiology for the professional veterinary student.

**588 Radiology** 3 (2-3) Course Prerequisite: Veterinary Medicine student. Introduction to radiography and diagnostic radiology.

**589 Clinical Pathology** 3 (2-3) Course Prerequisite: Veterinary Medicine student. Laboratory diagnostic procedures and interpretation.

**590 Veterinary Clinical Nutrition** V 1-3 May be repeated for credit; cumulative maximum 3 hours. Large and small animal clinical nutrition; nutrient composition; nutritional diseases and practical feeding methods.

**591 Practice Management** 2 Course Prerequisite: Veterinary Medicine student. A correlation of the veterinary medical and business aspects of practice management.

**592 Small Animal Transfusion Therapy** 1 (0-3) Course Prerequisite: VET MED 589. Blood collection, storage, pretransfusion testing, component therapy and transfusion reactions.

**593 Pain and Analgesics** 2 Course Prerequisite: VET MED 587. Supplemental core course for DVM students; anatomy and

physiology of pain; recognition and treatment of pain in veterinary patients.

**594 Applied Clinical Simulation** 1 (0-2) May be repeated for credit; cumulative maximum 2 hours. Course Prerequisite: VET MED 587 or concurrent enrollment; Veterinary Medicine student. Clinical simulation applied to anesthesia practice.

**595 Internship in Veterinary Medicine** V 1-3 Work experience related to academic learning; under supervision of veterinary professionals and/or faculty.

**596 Special Topics** V 1-4 May be repeated for credit; cumulative maximum 15 hours. Course Prerequisite: Veterinary Medicine student. Professional leadership skill development for veterinarians.

**597 Special Topics** V 1-4 May be repeated for credit; cumulative maximum 15 hours. Course Prerequisite: Veterinary Medicine student. Special topics in veterinary medicine.

**598 Introduction to Clinics** 1 (0-3) Course Prerequisite: Veterinary Medicine student. Introduction to the practice of clinical veterinary medicine and surgery within the Veterinary Teaching Hospital including records, presentation and protocol.

**599 Special Problems** V 1 (0-3) to 4 (0-12) May be repeated for credit; cumulative maximum 8 hours. Course Prerequisite: Veterinary Medicine student.

**600 Scientific Writing and Presentation** 1 Course Prerequisite: Veterinary Medicine student. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**603 Clinical Elective at Oregon State University** V 1-4 May be repeated for credit; cumulative maximum 8 hours. Course Prerequisite: Veterinary Medicine student. Clinical medicine training in diseases of food animals and horses; clinic rounds and diagnostic procedures.

**605 Small Animal Community Practice Medicine** V 1 (0-3) to 4 (0-12) Course Prerequisite: Veterinary Medicine student. Required clinical experience with the small animal community practice service in the small animal clinic of the Veterinary Medicine Hospital.

**606 Small Animal Referral Medicine** V 1 (0-3) to 4 (0-12) Course Prerequisite: Veterinary Medicine student. Required clinical experience with the small animal referral medicine service in the small animal clinic of the Veterinary Medicine Hospital.

**607 Small Animal Soft Tissue Surgery V 1 (0-3) to 4 (0-12) Course**  
Prerequisite: Veterinary Medicine student. Required clinical experience with the soft tissue surgery service in the small animal clinic of the Veterinary Medicine Hospital.

**608 Orthopedic Surgery and Sports Medicine - Small Animal V 1 (0-3) to 14 (0-42) Course** Prerequisite: Veterinary Medicine student. Clinical rotation emphasizing the diagnostics and treatment of orthopedic and sports medicine-related diseases in small animals.

**609 Small Animal Clinical Neurology V 1 (0-3) to 4 (0-12) Course**  
Prerequisite: Veterinary Medicine student. Required clinical experience with the small animal neurology service in the small animal clinic of the Veterinary Medicine Hospital.

**611 Orthopedic Surgery and Sports Medicine - Small Animal Supplemental Core V 1-4** May be repeated for credit; cumulative maximum 8 hours. Course Prerequisite: Veterinary Medicine student. Supplemental core for clinical rotation emphasizing the diagnostics and treatment of orthopedic and sports medicine-related diseases in small animals.

**612 Small Animal Soft Tissue Surgery Elective V 1-4** May be repeated for credit; cumulative maximum 8 hours. Course Prerequisite: Veterinary Medicine student. Elective clinical experience with the Small Animal Soft Tissue Surgery Service in the Small Animal Clinic of the Veterinary Teaching Hospital.

**613 Small Animal Referral Medicine Elective V 1-4** May be repeated for credit; cumulative maximum 8 hours. Course Prerequisite: Veterinary Medicine student. Elective clinical experience with the Small Animal Medicine Referral Practice Service in the Small Animal Clinic of the Veterinary Teaching Hospital.

**614 Small Animal Community Practice Elective V 1-4** May be repeated for credit; cumulative maximum 8 hours. Course Prerequisite: Veterinary Medicine student. Elective clinical experience with the Small Animal Medicine Local Practice Service in the Small Animal Clinic, Veterinary Teaching Hospital.

**615 Small Animal Medicine - Special Topics V 1-4** May be repeated for credit; cumulative maximum 8 hours. Course Prerequisite: Veterinary Medicine student. Elective clinical experience in a specialty practice area of small animal clinical medicine or surgery.

**616 Exotic Animal Medicine V 1-4** May be repeated for credit; cumulative maximum 8 hours. Course Prerequisite:

Veterinary Medicine student. Elective clinical experience with the Small Animal Medicine Exotic Practice Service in the Small Animal Clinic, Veterinary Teaching Hospital.

**617 Small Animal Clinical Neurology Elective V 1-3 Course**  
Prerequisite: Veterinary Medicine student. Rotation will emphasize neuroanatomical localization, differential diagnosis, diagnostic testing, and treatments.

**620 Clinical Oncology V 1 (0-3) to 4 (0-12)** May be repeated for credit; cumulative maximum 4 hours. Course Prerequisite: Veterinary Medicine student. Diagnosing, staging and treating the veterinary cancer patient.

**621 Clinical Cardiology V 1 (0-3) to 4 (0-12)** May be repeated for credit; cumulative maximum 4 hours. Course Prerequisite: Veterinary Medicine student. Basics in physical assessment, diagnosis and treatment of common cardiac disorders.

**628 Equine Surgery Clinical Rotation V 2-6 Course** Prerequisite: Veterinary Medicine student. Required rotation through the Equine Surgery Services of the Veterinary Teaching Hospital.

**629 Equine Medicine Clinical Rotation V 2-6 Course** Prerequisite: Veterinary Medicine student. Required rotation through the Equine Medicine Services of the Veterinary Teaching Hospital.

**630 Agricultural Animal Clinical Rotation V 2-6 Course** Prerequisite: Veterinary Medicine student. Elective rotation for Agricultural Animal Medical, Surgical, and Ambulatory Service of the Veterinary Teaching Hospital.

**631 Population Medicine V 1 (0-3) to 4 (0-12) Course** Prerequisite: Veterinary Medicine student. Required rotation for agricultural animal species emphasis through the population medicine laboratory of the Veterinary Teaching Hospital.

**632 Large Animal Theriogenology - Special Topics V 1-4** May be repeated for credit; cumulative maximum 8 hours. Course Prerequisite: Veterinary Medicine student. Elective clinical theriogenology subjects in large animals.

**633 Agricultural Animal Special Topics V 1-4** May be repeated for credit; cumulative maximum 8 hours. Course Prerequisite: Veterinary Medicine student. Elective clinical subjects in food animal diseases and herd health/preventive medicine.

**635 Preventive Medicine at Canine Center V 1-4** May be repeated for credit;

cumulative maximum 8 hours. Course Prerequisite: Veterinary Medicine student. Preventive medicine and management practices related to control of animal diseases at Canine Center, UI, Caldwell Idaho.

**636 Equine Medicine Elective V 1-4** May be repeated for credit; cumulative maximum 8 hours. Course Prerequisite: Veterinary Medicine student. Elective clinical experience with the Equine Medicine Service in the Large Animal Clinic of the Veterinary Teaching Hospital.

**637 Equine Surgery Elective V 1-4** May be repeated for credit; cumulative maximum 8 hours. Course Prerequisite: Veterinary Medicine student. Elective clinical experience with the Equine Surgery Service in the Large Animal Clinic, Veterinary Teaching Hospital.

**638 Equine Track V 1-4 Course**  
Prerequisite: Veterinary Medicine student. Clinical experience with the Equine Surgery Service of the Large Animal Clinic, Veterinary Teaching Hospital.

**650 Anesthesia Case Management V 1-4 Course** Prerequisite: Veterinary Medicine student. Required rotation through the Clinical Anesthesia Service of the Small Animal Clinic and Large Animal Clinic of the Veterinary Teaching Hospital.

**651 Pharmacy and Therapeutics 1 Course** Prerequisite: Veterinary Medicine student. One-week overview of Washington and federal drug laws, inventory control, formulary management, therapeutics for a successful practice.

**652 Technical and Diagnostic Radiology V 1-4** May be repeated for credit; cumulative maximum 4 hours. Course Prerequisite: Veterinary Medicine student. Laboratory exercises and instructional sessions to increase proficiency in clinical diagnostic radiology.

**653 Imaging Services Elective V 1 (0-3) to 4 (0-12)** May be repeated for credit; cumulative maximum 8 hours. Course Prerequisite: Veterinary Medicine student. Elective clinical and laboratory experience with the Radiology Section in the Small Animal Clinic, Veterinary Teaching Hospital.

**656 Diagnostics V 1-4 Course**  
Prerequisite: Veterinary Medicine student. Advanced study in diagnostic pathology, toxicology, and microbiology.

**657 Clinical Pathology V 1-4** May be repeated for credit; cumulative maximum 4 hours. Course Prerequisite: Veterinary Medicine student. Clinical laboratory diagnosis and interpretation.

**673 Small Animal Critical Care V** 1 (0-3) to 4 (0-12) May be repeated for credit; cumulative maximum 4 hours. Course Prerequisite: Veterinary Medicine student. Elective clinical experience, didactic topic discussions, and instructional sessions in small animal critical care.

**674 Small Animal Intensive Care V** 1 (0-3) to 4 (0-12) Course Prerequisite: Veterinary Medicine student. Required rotation for all students through the small animal intensive care unit.

**675 Emergency and Critical Care V** 1-4 Course Prerequisite: Veterinary Medicine student. Required rotation for all students through the large animal emergency and critical care unit.

**676 Veterinary Research Practicum V** 1-8 May be repeated for credit; cumulative maximum 14 hours. Course Prerequisite: Veterinary Medicine student. Individualized research project.

**690 Externship V** 1-4 May be repeated for credit; cumulative maximum 4 hours. Course Prerequisite: Veterinary Medicine student. Theory of practice of veterinary medicine in a non-university situation.

**691 Guided Preceptorship V** 1-4 Course Prerequisite: Veterinary Medicine student. Guided preceptorship in an accepted extramural clinical or laboratory setting.

**692 Government, Corporate, and Zoological Practice Elective V** 1-6 May be repeated for credit; cumulative maximum 10 hours. Course Prerequisite: Veterinary Medicine student. Elective experience in government, corporate, and zoological veterinary medicine arranged through nationwide matching program.

**693 Laboratory Animal Medicine V** 1-4 May be repeated for credit; cumulative maximum 8 hours. Course Prerequisite: Veterinary Medicine student. Elective clinical and laboratory experience with major research facilities such as the Department of Comparative Medicine, University of Washington.

**694 Avian Medicine V** 1-4 Course Prerequisite: Veterinary Medicine student. Laboratory diagnosis and pathology of avian (pet bird and commercial fowl) diseases.

**698 Special Topics V** 1-4 May be repeated for credit; cumulative maximum 15 hours. Course Prerequisite: Veterinary Medicine student. Special clinical topics or opportunities in veterinary medicine.

**699 Advanced Clinical Special Topics V** 1-4 May be repeated for credit; cumulative maximum 8 hours. Course Prerequisite: Veterinary Medicine student.

Advanced clinical subjects developed as courses for fourth year veterinary students. Veterinary Microbiology V MIC

**535 Advanced Readings in Veterinary Microbiology** 1 May be repeated for credit. Course Prerequisite: Admission to the MS or PhD in Veterinary Science program. Supervised reading program which peruses publications of intermediate technical difficulty and advanced textbooks.

**541 Advanced Diagnostic Microbiology** 1 (0-3) May be repeated for credit; cumulative maximum 8 hours. Course Prerequisite: VET MED 534; VET MED 535; VET MED 536. Microbiology laboratory for performing and interpreting virologic, serologic, and related tests for the diagnosis of animal diseases.

**563 Deconstruction of Research** 3 Course Prerequisite: Graduate standing in a WSU biomedical based graduate program. Nature and development of scientific investigation through oral and written avenues, and methods of critical analyses applied to questions of biomedical interest. (Crosslisted course offered as NEUROSCI 563, GLANHLTH 563, MBIOS 563, VET MICR 563, VET PATH 563, VET PH 563).

**564 Topics in Biomedical Experimentation V** 1-3 May be repeated for credit; cumulative maximum 6 hours. Examination of the philosophy of experimental design and practical application and analysis of various experimental approaches in biomedical research. Recommended preparation: graduate standing in a WSU biomedical-based program, and an advanced undergraduate or graduate statistics course. (Crosslisted course offered as NEUROSCI 564, GLANHLTH 564, MBIOS 564, VET MICR 564, VET PATH 564, VET PH 564).

**572 Advanced Topics in Microbiology, Parasitology, or Immunology V** 1-3 May be repeated for credit; cumulative maximum 4 hours. Advanced topics in microbiology, parasitology, or immunology presented in short-course, or workshop format.

**591 Seminar in Diagnostic Microbiology** 1 May be repeated for credit; cumulative maximum 8 hours. Seminar in diagnostic veterinary microbiology.

**592 Advances in Immunobiology** 1 May be repeated for credit.

**600 Special Projects or Independent Study V** 1-18 May be repeated for credit. Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with

their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: MS in Veterinary Science only. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**800 Doctoral Research, Dissertation, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Veterinary Science PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit. Veterinary Clinical Medicine And Surgery V MS

**565 Oncology Journal Seminar** 1 May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Admission to the MS or PhD in Veterinary Science program. Small group discussion of veterinary literature, peer-reviewed literature and textbooks covering biological basis of cancer diagnosis, therapy and treatment.

**570 Special Topics** 1 May be repeated for credit; cumulative maximum 9 hours. Course Prerequisite: Admission to the MS or PhD in Veterinary Science program. Weekly small group discussions of problems in clinical veterinary medicine, surgery, or reproductive sciences using current literature and recent cases from Veterinary Teaching Hospital.

**573 Special Topics in Equine Surgery** 1 May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Admission to the MS or PhD in Veterinary Science program. Small group discussion and periodic laboratory/practical experience related to large animal surgery.

**574 Cardiology Special Topics** 1 May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Admission to the MS or PhD in Veterinary Science program. Clinical cardiology topics and special problems; current medical or interventional information.

**576 Introduction to Veterinary Clinical Research** 2 Course Prerequisite: Admission to the MS or PhD in Veterinary

Science program. Designing, executing, analyzing and reporting clinical research fundamental to practicing evidence-based medicine.

**577 Applied Veterinary Physiology I** 2 Course Prerequisite: Admission to the MS or PhD in Veterinary Science program.

Review of physiology as it relates to clinical veterinary medicine and specific diseases of animals through analysis of recent medical literature.

**578 Applied Veterinary Physiology II** 2 Course Prerequisite: VET CLIN 577; admission to the MS or PhD in Veterinary Science program. Continuation of VET CLIN 577.

**579 Oncology Rounds Seminar 1** May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Admission to the MS or PhD in Veterinary Science program. Presentation and discussion of veterinary oncology cases include imaging, pathology, clinical pathology, appropriate diagnostic steps, therapy options and potential outcomes.

**580 Advanced Clinical Pathology 1** May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Admission to the MS or PhD in Veterinary Science program. Weekly small group discussion of laboratory and cytologic abnormalities in recent cases from the Veterinary Teaching Hospital.

**582 Seminar in Clinical Medicine 1** May be repeated for credit. Course Prerequisite: Admission to the MS or PhD in Veterinary Science program.

**584 Comparative Theriogenology V** 1-2 May be repeated for credit; cumulative maximum 12 hours. Course Prerequisite: Admission to the MS or PhD in Veterinary Science program. Lectures from WSU College of Veterinary Medicine and Department of Animal Sciences and from UI Department of Animal and Veterinary Sciences.

**585 Selected Topics in Advanced Clinical Neurology V** 1-2 May be repeated for credit; cumulative maximum 10 hours. Course Prerequisite: Admission to the MS or PhD in Veterinary Science program. Advanced veterinary neurology as applied to clinical practice.

**586 Diagnostic Ultrasound 2** Course Prerequisite: Admission to the MS or PhD in Veterinary Science program. Diagnostic ultrasound and its application to clinical medicine in large and small animals.

**587 Hospital Rotation 3** May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Admission to the MS or PhD in Veterinary Science program.

Supervised practical experience in all service areas of the veterinary hospital.

**589 Advanced Clinical Veterinary Medicine V** 1-3 May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Admission to the MS or PhD in Veterinary Science program. Special topics.

**590 Special Topics in Equine Medicine 1** May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Admission to the MS or PhD in Veterinary Science program. Weekly small group discussion of problems in equine medicine, surgery or reproductive medicine using current or recent case material from the Veterinary Teaching Hospital.

**591 Advanced Clinical Diagnosis V** 1-3 May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Admission to the MS or PhD in Veterinary Science program. Advanced course in systems clinical and laboratory examination.

**592 Seminar 1** May be repeated for credit.

**593 Anesthesia Seminar 1** May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Admission to the MS or PhD in Veterinary Science program. Critical review of current topics in veterinary anesthesia.

**596 Advanced Radiology 2** (1-3) May be repeated for credit; cumulative maximum 12 hours. Course Prerequisite: Admission to the MS or PhD in Veterinary Science program. Advanced study in the field of veterinary radiology and radiation treatment.

**597 Diagnosis and Treatment of Surgically Correctable Soft Tissue Diseases in Small Animals V** 1-2 May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Admission to the MS or PhD in Veterinary Science program. Review of recent advances in diagnosis and treatment of diseases in the field of small animal surgery.

**598 Surgery Residents Seminar 1** May be repeated for credit. Course Prerequisite: Admission to the MS or PhD in Veterinary Science program. Surgery residents' and interns' presentations of case reports, literature reviews and research.

**599 Critical Analysis of Veterinary Medicinal Information: Illusional Medicine 1** May be repeated for credit; cumulative maximum 6 hours. Course Prerequisite: Admission to the MS or PhD in Veterinary Science program. Weekly small group discussion, lecture and critical analysis of medical information.

**600 Special Projects or Independent Study V** 1-18 May be repeated for credit. Independent study, special projects, and/or

internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: MS in Veterinary Science only. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**702 Master's Special Problems, Directed Study, and/or Examination V** 1-18 May be repeated for credit. Independent research in special problems, directed study, and/or examination credit for students in a non-thesis master's degree program. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 702 credit.

**800 Doctoral Research, Dissertation, and/or Examination V** 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Veterinary Science PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit. Veterinary Pathology V PA

**501 Case-based Learning in Veterinary Pathology V** 1 (0-3) to 3 (0-9) Course Prerequisite: Admission to the MS or PhD in Veterinary Science program. Principles of pathophysiology, infectious disease, laboratory diagnosis, zoonoses, and food safety learned through the development of multistep teaching cases.

**525 Introductory Readings in Veterinary Pathology 1** (0-3) May be repeated for credit; cumulative maximum 2 hours. Supervised introductory readings of publications, books, and research proposals.

**542 Advanced Diagnostic Pathology V** 1 (0-3) to 4 (0-12) May be repeated for credit; cumulative maximum 8 hours. Course Prerequisite: VET MED 546. Necropsy laboratory for techniques and skills in performing and interpreting necropsy material.

**544 Immunopathology 4** Course Prerequisite: VET MED 545; VET MED

531. The role of immune processes in the pathogenesis of disease.

**545 Mechanisms of Disease** 4 Course

Prerequisite: VET MED 545; VET MED

531. Biochemical and immunological mechanisms involved in disease processes from the comparative standpoint.

548 Introduction to Research 1  
Introduction to research.

**555 Research in Progress Seminar** 1

May be repeated for credit; cumulative maximum 8 hours. Presentation of on-going student research project results.

**563 Deconstruction of Research** 3

Course Prerequisite: Graduate standing in a WSU biomedical based graduate program.

Nature and development of scientific investigation through oral and written avenues, and methods of critical analyses applied to questions of biomedical interest. (Crosslisted course offered as NEUROSCI 563, GLANHLTH 563, MBIOS 563, VET MICR 563, VET PATH 563, VET PH 563).

**564 Topics in Biomedical**

**Experimentation** V 1-3 May be repeated for credit; cumulative maximum 6 hours.

Examination of the philosophy of experimental design and practical application and analysis of various experimental approaches in biomedical research. Recommended preparation: graduate standing in a WSU biomedical-based program, and an advanced undergraduate or graduate statistics course. (Crosslisted course offered as NEUROSCI 564, GLANHLTH 564, MBIOS 564, VET MICR 564, VET PATH 564, VET PH 564).

**571 Advanced Topics in Pathology** V

1-3 May be repeated for credit; cumulative maximum 4 hours. Advanced topics in pathology presented in short-course, or workshop, format.

**592 Anatomic Pathology Seminar** 1

May be repeated for credit. Histopathologic **Description:** and diagnosis.

**700 Master's Research, Thesis,**

**and/or Examination** V 1-18 May be

repeated for credit. Course Prerequisite: MS in Veterinary Science only. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**800 Doctoral Research, Dissertation,**

**and/or Examination** V 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Veterinary Science PhD program. Independent research and advanced study for students working on

their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.

Veterinary Physiology And Pharmacology V PH

**505 Design and Analysis of**

**Biomedical Experiments** 4 Design of experiments with application to clinical and basic biomedical research; choosing, applying, and evaluating appropriate data analysis methods.

**555 General and Cellular Physiology**

4 (3-3) Physiochemical mechanisms of cellular function. (Crosslisted course offered as VET PH 555, PHARMSCI 555).

Recommended preparation: Concurrent enrollment in MBIOS 513.

**563 Deconstruction of Research** 3

Course Prerequisite: Graduate standing in a WSU biomedical based graduate program.

Nature and development of scientific investigation through oral and written avenues, and methods of critical analyses applied to questions of biomedical interest. (Crosslisted course offered as NEUROSCI 563, GLANHLTH 563, MBIOS 563, VET MICR 563, VET PATH 563, VET PH 563).

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**600 Special Projects or Independent**

**Study** V 1-18 May be repeated for credit.

Independent study, special projects, and/or internships. Students must have graduate degree-seeking status and should check with their major advisor before enrolling in 600 credit, which cannot be used toward the core graded credits required for a graduate degree.

**700 Master's Research, Thesis,**

**and/or Examination** V 1-18 May be repeated for credit. Independent research and advanced study for students working on their master's research, thesis and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 700 credit.

**800 Doctoral Research, Dissertation,**

**and/or Examination** V 1-18 May be repeated for credit. Course Prerequisite: Admitted to the Veterinary Science PhD program. Independent research and advanced study for students working on their doctoral research, dissertation and/or final examination. Students must have graduate degree-seeking status and should check with their major advisor/committee chair before enrolling for 800 credit.