DEPARTMENT OF BIOLOGICAL SCIENCES

The Department of Biological Sciences offers B.S. degrees in Biochemistry, Biology (B.A. & B.S.), Microbiology, and Molecular Biology and Biotechnology. The core curriculum, used for every major, involves exposure to concepts fundamental to all living things at several levels of organization and emphasizes a broad cultural base and specific training in biology, chemistry, mathematics, and physics. A diverse range of upper division electives are available that support each of the majors. Courses offered by the Department of Biological Sciences are available to students majoring in other disciplines, who wish to increase their knowledge of science, or who wish to obtain an academic minor.

Well-equipped laboratories are available and students are encouraged to undertake research projects with the faculty. A wide variety of ongoing projects have produced a stimulating environment for graduate and undergraduate research. These projects include areas such as: pathophysiology of diseases that affect gastrointestinal functions; gene regulation changes in response to selection and the evolution of disorders of proteins; behavioral development, play, sexual selection and female mate choice; intraflagellar transport; the diversity and distribution of prokaryotes; mechanisms behind morbidity and mortality in infants congenitally infected with human cytomegalovirus; characterizing evolutionarily permissible ecological structures in microbial ecosystems and on developing bioinformatics for very large sequence datasets; molecular cues that promote development of the nervous system; patterns of species diversification across the tree of life; prokaryote motility system; the genomic architecture of evolving populations; protein structure and function; neuromuscular biomechanics of vertebrate organisms; models of adaptive evolution and experimental evolution in viruses; regulation of the immune response to coronavirus infection in the lung; effect of environmental factors on fish reproductive biology; cellular and molecular mechanisms of vertebrate retinal development and regeneration; phylogenetic methodology and comparative phylegeography; the ecology and evolution of prokaryotic organisms; adaptive evolution and mammalian genome evolution.

For more complete information on research concentrations, please see faculty profiles on the departmental web site at www.uidaho.edu/sci/biology/.

Graduates from the department enter a variety of fields and many continue their education toward an advanced degree. Recent graduates have entered health-related professions, primary and secondary teaching, agribusiness, veterinary school, graduate school, law school, state and national agencies that deal with biology (e.g., Idaho Department of Fish and Game, Environmental Protection Agency, United States Forest Service), as well as a variety of environmental consulting agencies and biotechnology companies.

Prospective students, or students desiring more information, may write, call (208-885-6280) or email the department (biosci@uidaho.edu).


*BALEMB, Onesmo B; 2008; Associate Professor of Medical History/ Biological Sciences; Ph.D.; 2001; Royal Veterinary and Agricultural University.

*BOHACH, Carolyn H; 1990; Distinguished Professor of Biological Sciences; Ph.D.; 1985; University of Minnesota.

*BROWN, Celeste J; 2010; Research Professor in Biological Sciences; Affiliate Faculty in Bioinformatics and Computational Biology; Ph.D.; 1989; University of Georgia.

CHASE, Jennifer R; 2006; Adjunct Professor of Biological Sciences; Ph.D.; 1998; Yale University.

*COLE, Douglas G; 1998; Professor of Biological Sciences; Associate Chair, Biological Sciences; Ph.D.; 1990; Washington State University.

DOEBELI, Michael W; 2005; Adjunct Associate Professor of Biological Sciences; Ph.D.; 1992; University of Basel.

*FORNEY, Larry J; 2000; Distinguished Professor of Biology; Affiliate Faculty in Bioinformatics and Computational Biology; Ph.D.; 1982; Michigan State University.

*FORTUNATO, Elizabeth; 2000; Professor of Biological Sciences; Ph.D.; 1994; University of California San Diego.

*FOSTER, James A; 1990; Distinguished Professor of Biological Sciences; Affiliate Professor of Computer Science, Philosophy, and Bioinformatics and Computational Biology; Ph.D.; 1990; Illinois Institute of Technology.

*FUERST, Peter G; 2010; Associate Professor in Biological Sciences and WWAMI Medical Education; Affiliate Faculty in Bioinformatics and Computational Biology; Ph.D.; 2003; Iowa State University.

GRIESHABER, Nicole; 2014; Research Assistant Professor of Biological Sciences; Ph.D.; 2000; University of Wyoming.

GRIESHABER, Scott; 2014; Associate Professor of Biological Sciences; Ph.D.; 2000; University of Wyoming.

HARMON, Lisa L; 2013; Senior Instructor of Biological Sciences; M.S.; 2008; University of Idaho.

*HARMON, Luke J; 2007; Professor in Biological Sciences; Affiliate Faculty of Statistical Science; Affiliate Faculty in Bioinformatics and Computational Biology; Ph.D.; 2005; Washington University.

*HARNER, Archibald; 2007; Professor in Biological Sciences; Affiliate Faculty of Statistical Science; Affiliate Faculty in Bioinformatics and Computational Biology; Ph.D.; 2005; Washington University.

HEGGLAND, Sara J; 2006; Adjunct Associate Professor of Biological Sciences; Ph.D.; 1995; Kent State University.

HEIMGARTNER, Candi K; 2013; Senior Instructor of Biological Sciences; M.S.; 1999; University of Idaho.

*HOHENLOHE, Paul; 2011; Associate Professor in Biological Sciences; Affiliate Faculty in Bioinformatics and Computational Biology; Ph.D.; 2000; University of Washington.

*JOHNSON, Jill L; 2002; Professor of Biological Sciences; Ph.D.; 1994; Mayo Graduate School.

JORCKY, Cheryl L; 2006; Adjunct Associate Professor of Biological Sciences; Ph.D.; 1991; Johns Hopkins University.

*KELLIHER, Kevin R; 2006; Assistant Professor of Neurobiology, Biological Sciences and WWAMI; Ph.D.; 2001; Boston University.
*MAKI, Wusi C; 2002; Research Assistant Professor of Biological Sciences; Ph.D.; 1996; University of Cape Town.

*MARX, Christopher; 2014; Professor of Biological Sciences; Ph.D.; 2003; University of Washington.

*MCOWAN, Craig P; 2010; Associate Professor of Biological Sciences and WWAMI Medical Education; Ph.D.; 2006; Harvard University.

MESERVE, Peter L; 2013; Adjunct Faculty of Biological Sciences; Ph.D.; 1972; University of California Irvine.

MILLER, Craig R; 2011; Research Associate Professor in Biological Sciences; Ph.D.; 2003; University of Idaho.

*MORRIS, Scott A; 1989; Professor of Biological Sciences; Ph.D.; 1981; Iowa State University.

MITCHELL, Diana M; 2014; Research Assistant Professor of Biological Sciences; Ph.D.; 2012; University of Utah.

*MUWA, Tanya A; 2008; Associate Professor of Immunology; Ph.D.; 2000; Colorado State University.

*NAGLER, James J; 1996; Professor of Zoology; Department Chair, Department of Biological Sciences; Ph.D.; 1991; Memorial University of Newfoundland.

*NUISMER, Scott L; 2003; Professor of Biological Sciences; Affiliate Faculty in Mathematics and Bioinformatics and Computational Biology; Ph.D.; 2000; Washington State University.

OSWALD, Mary E; 2014; Senior Instructor in Biological Sciences; Ph.D.; 2010; University of Idaho.

*PARENT, Christine; 2013; Assistant Professor of Biological Sciences; Affiliate Faculty in Bioinformatics and Computational Biology; Ph.D.; 2008; Simon Fraser University.

PARKS, Donna H; 2016; Clinical Assistant Professor in Biology; Ph.D.; 1987; Bowling Green State University.

*PASZCZYNSKI, Andrzej; 1987; Professor of Biological Sciences; Affiliate Professor of Environmental Science; Ph.D.; 1980; M Curie-Sklodowska.

PFEIFFER, David C; 2014; Professor in Biological Sciences; Ph.D.; 1997; University of British Columbia.

PIERCE, Andrew L; 2009; Adjunct Professor of Biological Sciences; Ph.D.; 2003; University of Washington.

RIDENHOUR, Benjamin J; 2014; Research Assistant Professor of Biological Sciences; Affiliate Faculty in Bioinformatics and Computational Biology; Ph.D.; 2004; Indiana University.

*ROBISON, Barrie D; 2003; Professor of Biological Sciences; Affiliate Faculty in Bioinformatics and Computational Biology and Neuroscience; Ph.D.; 1999; Washington State University.

ROSENBLOOM, Erica B; 2008; Adjunct Faculty of Biological Sciences; Ph.D.; 2005; University of California Berkeley.

*ROSENZWEIG, R. Francis; 1992; Adjunct Associate Professor of Biology; Ph.D.; 1991; University of Pennsylvania.

ROWLEY, Paul; 2016; Assistant Professor in Biological Sciences; Affiliate Faculty in Bioinformatics and Computational Biology; Ph.D.; 2007; The University of Aberdeen.

SCHULTZ, Irvin R; 2002; Adjunct Associate Professor of Biological Sciences; Ph.D.; 1990; Washington State University.

SIMOKAT, Kristin A; 2008; Lecturer in Biological Sciences; Ph.D.; 2005; University of Wisconsin.

STABEN, Chuck A; 2014; Professor of Biology; President, University of Idaho; Ph.D.; 1984; University of California Berkeley.

STOLYAR, Sergey M; 2016; Research Associate Professor in Biological Sciences; Ph.D.; 1991; Institute of Microbiology and Virology.

STROHMeyer, Ronald W; 2006; Adjunct Assistant Professor of Biological Sciences; Ph.D.; 2001; Arizona State University.

*TANK, David C; 2008; Associate Professor of Biological Sciences; Director of the Herbarium; Affiliate Faculty in Bioinformatics and Computational Biology; Ph.D.; 2006; University of Washington.

*TOP, Eva M; 2001; Professor of Biological Sciences; Affiliate Faculty and Director, Bioinformatics and Computational Biology; Ph.D.; 1993; Ghent University (Belgium).

YOUNG, William P; 2003; Adjunct Assistant Professor of Biological Sciences; Ph.D.; 1996; Washington State University.

YOUNG, William P; 2003; Adjunct Assistant Professor of Biological Sciences; Ph.D.; 1996; Washington State University.

Majors
- Biochemistry (B.S.Biochem)  (https://catalog.uidaho.edu/colleges-related-units/science/biological-science/biochemistry-bsbiochem)
- Biology (B.A. or B.S.)  (https://catalog.uidaho.edu/colleges-related-units/science/biological-science/biology-ba-bs)
- Medical Sciences (B.S.) (https://catalog.uidaho.edu/colleges-related-units/science/biological-science/medical-sciences-bs)
- Microbiology (B.S.Microbiol.) (https://catalog.uidaho.edu/colleges-related-units/science/biological-science/microbiology-bsmicrobiol)

Minors
- Bioethics Minor (See Department of Politics and Philosophy (https://catalog.uidaho.edu/colleges-related-units/letters-arts-social-sciences/politics-philosophy))
- Biology Minor (https://catalog.uidaho.edu/colleges-related-units/science/biological-science/biology-minor)
- Microbiology Minor (https://catalog.uidaho.edu/colleges-related-units/science/biological-science/microbiology-minor)
Biological Sciences Graduate Program

Candidates must fulfill the requirements of the College of Graduate Studies and of the Department of Biological Sciences. See the College of Graduate Studies (https://catalog.uidaho.edu/colleges-related-units/graduate-studies) section for the general requirements applicable to each degree and the Department of Biological Sciences Graduate Student Handbook for required courses and procedures.

- Biology (M.S.) (https://catalog.uidaho.edu/colleges-related-units/science/biological-science/biology-ms)
- Biology (Ph.D.) (https://catalog.uidaho.edu/colleges-related-units/science/biological-science/biology-phd)

Biology

BIOL 101 Perspectives in Biology
1 credit
Open only to majors. Intro to the disciplines in the fields of biology; current research topics.

BIOL 102 Biology and Society
3 credits
Gen Ed: Natural and Applied Sciences
Not open to majors or for minor cr. Principles of biology and their relationship to social issues. Three lecture and one 3-hour lab a week.

BIOL 102L Biology and Society Lab
1 credit
Gen Ed: Natural and Applied Sciences
Not open to Biology majors or for minor credit. Principles of biology and their relationship to social issues. Three lectures and one 3-hour lab a week.

BIOL 114 Organisms and Environments
4 credits
Gen Ed: Natural and Applied Sciences
The evolution of diversity, the biology of plants and animals, and their environments. Three lectures and one 3-hour lab a week.

BIOL 115 Cells & the Evolution of Life
3 credits
Gen Ed: Natural and Applied Sciences
The cell, heredity and evolutionary processes. Prereq or Coreq: CHEM 101 or CHEM 111.

BIOL 115L Cells and the Evolution of Life Laboratory
1 credit
Laboratory for introductory biology; experiments are designed to teach problem solving, scientific methods and the aspects of biology related to the cell. Coreq or Prereq: BIOL 115.

BIOL 120 Human Anatomy
4 credits
Study of the anatomy of the major organ systems of the human body; lab consists of studying human gross anatomy models and prosected cadavers. Three lec and one 3-hr lab a wk. (Fall only)

BIOL 121 Human Physiology
4 credits
Study of the physiology of the major organ systems of the human body. Three lectures and one 3-hour lab a week. (Spring only) Prereq: BIOL 120.

BIOL 154 Introductory Microbiology
3 credits
Gen Ed: Natural and Applied Sciences
Carries no credit after Biol 250. May be taken by microbiology majors, but carries no credit after BIOL 250. Introduction to microorganisms and their role in disease, health, foods, and the environment; current topics in microbiology. (Spring only)

BIOL 155 Introductory Microbiology Laboratory
1 credit
Gen Ed: Natural and Applied Sciences
May be taken by microbiology majors but carries no credit after Biol 255. Introductory laboratory training in basic microbiology; includes sterile technique, bacterial enumeration methods, culturing techniques, yogurt preparation and analysis, recombinant DNA techniques. Three hrs lab a wk. (Spring only) Coreq: BIOL 154.

BIOL 204 (s) Special Topics
Credit arranged.

BIOL 213 Principles of Biological Structure and Function
4 credits
Principles of physiology in plants and animals (homeostasis, hormonal and neural control systems, organismal physiology). Three lectures and one 3-hour lab a week. (Spring only) Prereq: BIOL 115.

BIOL 250 General Microbiology
3 credits
Gen Ed: Natural and Applied Sciences
Introduction to nature and activity of bacteria and other microorganisms; their importance in all life systems. Three hours of lecture per week. (Fall only) Prereq: BIOL 115 and either CHEM 101 or CHEM 111.

BIOL 255 General Microbiology Lab
2 credits
Gen Ed: Natural and Applied Sciences
Training in the handling of microscopes, basic lab equipment, and manipulation of microbes. Two 2-hour labs per week. Prereq or Coreq: BIOL 250.

BIOL 299 (s) Directed Study
Credit arranged.

BIOL 300 Survey of Biochemistry
3 credits
Carries no credit after BIOL 380. Survey of biochemical principles and the molecular structure and function that describe the chemical basis of life. (Fall only) Prereq: CHEM 101 or CHEM 111 Coreq: CHEM 275 or CHEM 277.

BIOL 301 Undergraduate Research
1-4 credits, max 8
Undergraduate research for students without senior standing. Preq: Permission.

BIOL 310 Genetics
Biol 310 Genetics (3 cr)
Genetic mechanisms in animals, plants, and microorganisms. Three hours of lec per. (Fall only) Prereq: Biol 115 or Biol 250.
BIOL 312 Molecular and Cellular Biology
3 credits
Current theory and experimental basis of the structure/function of eukaryotic cells. Topics include plasma membrane, organelles, cytoskeleton and cell mobility, the nature of genes, gene expression, DNA replication and cellular reproduction, and signal transduction. Three lectures and one 1-hour recitation a wee. (Spring only)
Prereq: BIOL 115.

BIOL 313 Molecular and Cellular Laboratory
1 credit
Laboratory experiments and techniques related to molecular and cellular biology. One 3-hour lab per week. (Spring only)
Coreq: BIOL 312.

BIOL 314 Ecology and Population Biology
4 credits
Population genetics, population ecology, species interactions, community ecology, biodiversity, and data analysis. Three lectures and one 3-hour lab per week. (Spring only)
Prereq: BIOL 114 and BIOL 115; STAT 251 or 301; and MATH 160 or MATH 170.

BIOL 315 Genetics Lab
1 credit
Laboratory on genetic mechanisms in animals, plants, and microorganisms. One three hour lab per week. (Fall only)
Prereq: BIOL 115 or BIOL 250
Coreq: BIOL 310.

BIOL 324 Comparative Vertebrate Anatomy
4 credits
Evolution of vertebrates and their organ systems with an emphasis on structure – function relationships. Two lectures and two 3-hour labs a week. (Spring only)
Prereq: BIOL 114 and BIOL 115 and BIOL 213; or Permission.

BIOL 380 Biochemistry I
4 credits
Carries one credit after Biol 300. Introduction to the structure and function of major molecular constituents of living systems. Emphasis on proteins, enzyme kinetics and catalysis, carbohydrate metabolism. Three hrs lecture and one hr with interactive problem solving. (Fall only)
Prereq: CHEM 112 and CHEM 277.

BIOL 382 Biochemistry I Laboratory
2 credits
Lab training in modern methods. One 3-hour lab and one 1-hour recitation a week. (Fall only)
Coreq: BIOL 380 or equivalent.

BIOL 398 (s) Internship
1-3 credits, max 3
Supervised internship in professional biological, non-university settings, integrating academic study with work experience; requires formal written plan of activities to be approved by academic advisor and department chair before engaging in the work; a final written report will be evaluated by on-campus faculty. Graded P/F.
Prereq: Permission.

BIOL 400 (s) Seminar
1 credit, max arranged
May be used as a science elective after 1 required credit, up to a maximum of 4 credits. Graded P/F.

BIOL 401 Undergraduate Research
1-4 credits, max 8
Gen Ed: Senior Experience
Undergraduate research at the senior level.
Prereq: Senior Standing and Permission of Instructor.

BIOL 403 (s) Workshop
Credit arranged.

BIOL 404 (s) Special Topics
Credit arranged.

BIOL 405 Practicum in Anatomy Laboratory Teaching
2-4 credits, max 8
Gen Ed: Senior Experience
Organization, preparation, and teaching of anatomy laboratory objectives under faculty supervision. (Fall only)
Prereq: Permission.

BIOL 407 Practicum in Biology Laboratory Teaching
2-6 credits, max 12
Gen Ed: Senior Experience
Organization, preparation, and teaching of lab experiments or demonstrations under faculty supervision.
Prereq: Any four of the following courses: BIOL 114, BIOL 115, BIOL 213, BIOL 310, BIOL 312, or BIOL 314; and Permission.

BIOL 408 Practicum in Human Physiology Laboratory Teaching
2-4 credits, max 8
Gen Ed: Senior Experience
Organization, preparation, and teaching of human physiology laboratory objectives under faculty supervision. (Spring only)
Prereq: BIOL 121 and Permission.

BIOL 411 Senior Capstone
2 credits
Gen Ed: Senior Experience
Application of biological principles and information to the analysis of societal and philosophical issues. (Spring only)
Prereq: BIOL 213, BIOL 310, BIOL 312, BIOL 314, and Senior standing.

BIOL 416 Plant Diversity and Evolution
4 credits
Origin, evolution, and diversity of major land plant groups; emphasis on systematics, anatomy, morphology, ecological diversity, and macroevolution. Two lectures and one 3-hour lab a week; one field trip. Cooperative: open to WSU degree-seeking students. (Fall only)
Prereq: BIOL 114 and BIOL 115.

BIOL 421 Advanced Evolution/Population Dynamics
3 credits
Macro and Micro evolutionary patterns and processes examined from molecular, ecological, and paleontological perspectives. (Spring only)
Prereq: BIOL 314, FOR 221 or REM 221.

BIOL 425 Special Topics: Experimental Field Ecology
3 credits
Intensive course on diverse aspects of field ecology to be held off-campus. Various global locations (i.e. Costa Rica, Oregon coast, Hawaii) are possible. The course will be scheduled during an 8-10 day period preceding/following the Spring Term (i.e. January or May). Will involve travel and lodging costs at student expense.
Prereq: BIOL 114, BIOL 115, BIOL 213, BIOL 310, BIOL 312, and BIOL 314.
BIOL 426 Systems Biology  
3 credits  
Joint-listed with BIOL 526  
Two lectures per week. Systems Biology will use quantitative approaches including theory and computation to understand the complex function that emerges from physiological systems. Topics will include transcriptional networks and their common motifs, robustness in chemotaxis and development, noise and variability, evolution of modularity, and optimality in metabolism. Cooperative: open to WSU degree-seeking students. (Fall only, alt/yr)  
Prereq: BIOL 115 and MATH 170 or permission of instructor .  

BIOL 428 Microscopic Anatomy  
4 credits  
Basic principles of histology and advanced microscopic anatomy of vertebrate tissues and organs. (Fall, alt/even yrs)  
Prereq: BIOL 213 or BIOL 312 .  

BIOL 432 Immunology  
3 credits  
Joint-listed with BIOL 532  
Theory and mechanisms of the cellular basis of immune response; antibody structure, function, and synthesis; cell-mediated immunity; complement; hypersensitivity; immunologic diseases; transplantation; tumor immunity. Extra oral and/or written assignments required for graduate credit. (Spring only)  
Prereq: BIOL 300 or BIOL 380 .  

BIOL 433 Pathogenic Microbiology  
Biol J433/J533 Pathogenic Microbiology (3 cr)  
Epidemiology, host-parasite relationships, pathology, host response; treatment, prevention, and control of pathogenic microorganisms. Extra oral and/or written assignments required for graduate credit. (Fall, alt/odd yr)  
Prereq: BIOL 250 .  

BIOL 444 Genomics  
3 credits  
Structural, functional, and comparative genomics of animals, plants, fungi, and microbes. Case studies illustrating a genomic approach to questions of fundamental biological and societal relevance will be drawn from diverse fields such as human medicine, evolutionary biology, agriculture, and bioterrorism. (Spring, alt/yr)  
Prereq: BIOL 114 and BIOL 310; or BIOL 250.  

BIOL 447 Virology  
3 credits  
Joint-listed with BIOL 547  
A survey of virology, with special emphasis on the molecular basis of replication, host-pathogen interactions and diseases associated with animal viruses. Extra oral and/or written assignments required for grad credit. Recommended preparation: BIOL 250. (Fall, alt/yr)  
Prereq: BIOL 312 or Permission .  

BIOL 454 Biochemistry II  
3 credits  
Joint-listed with BIOL 554, Cross-listed with CHEM 452  
Intermediate biochemistry; areas of emphasis include molecular biology, nitrogen and lipid metabolism. Extra oral and/or written assignments required for grad credit. (Spring only)  
Prereq: CHEM 372; BIOL 380 or CHEM 302 or 306; or Permission.  

BIOL 456 Computer Skills for Biologists  
3 credits  
Joint-listed with BIOL 549  
Management and analysis of complicated datasets such as those in molecular evolution, systematics, and genomics. Demonstrations, exercises, and student projects to teach advanced Unix skills, programming (e.g. Perl and R), and data management. Cooperative: open to WSU degree-seeking students. (Fall, alt/yr)  
Prereq: BIOL 310 and STAT 251 or STAT 301; or Permission .  

BIOL 460 Advanced Field Botany  
3 credits  
Joint-listed with BIOL 560  
Hands-on training in field botany as applied to evolutionary, ecological, and floristic studies; two-week field course in the Inland Northwest. Additional projects/assignments required for grad credit. (Summer only)  
Prereq: Instructor Permission.  

BIOL 461 Neurobiology  
3 credits  
Joint-listed with BIOL 565  
Study of the nervous system, with an emphasis on mechanisms of neuronal signaling, the function of sensory and motorsystems, and neural development. Recommended: PHYS 111, PHYS 112, and CHEM 275 or CHEM 277. Cooperative: open to WSU degree-seeking students. (Fall, Alt/yr)  
Prereq: BIOL 213, BIOL 310, BIOL 312, GENE 314, BIOL 300, or BIOL 380 .  

BIOL 474 Principles of Developmental Biology  
3 credits  
Joint-listed with BIOL 573  
Analysis of mechanisms at cellular and molecular level during metazoan development. (Spring, Alt/yr)  
Prereq: BIOL 114 and BIOL 312, or BIOL 312.  

BIOL 478 Animal Behavior  
3 credits  
Evolution, causation, development, and function of behavior in vertebrates and invertebrates. (Spring only)  
Prereq: BIOL 114 and BIOL 115.  

BIOL 482 Protein Structure and Function  
3 credits  
Joint-listed with BIOL 582  
Detailed analysis of protein structure and function including enzyme activity, binding, folding and stability, and techniques for structure determination. Additional projects/assignments required for graduate credit. (Fall, alt/yr)  
Prereq for 482: BIOL 380 .  

BIOL 483 Mammalogy  
3 credits  
Evolution, systematics, distribution, and biology of mammals. Two lectures and one 3-hour lab a week; one field trip. (Fall only)  
Prereq: BIOL 114 and BIOL 115.  

BIOL 484 Invertebrate Zoology  
4 credits  
Morphology of freshwater, marine, and terrestrial invertebrates and phylogeny of major groups. Three lectures and one 3-hour lab a week. One required, weekend field trip. (Fall only)  
Prereq: BIOL 114 and BIOL 115.
BIOL 485 Prokaryotic Molecular Biology
3 credits
Joint-listed with BIOL 585
Current theory and experimental basis for prokaryotic DNA, RNA, and protein synthesis, gene regulation and cell wall metabolism. Extra oral and/or written assignments required for graduate credit. (Spring only)
Prereq: BIOL 250 and BIOL 380.

BIOL 487 Eukaryotic Molecular Genetics
3 credits
Joint-listed with BIOL 587
Molecular basis of genetics in eukaryotes. Extra oral and/or written assignments required for graduate credit. Recommended preparation: BIOL J485/J585 and PLSC J488/J588. (Fall only)
Prereq: BIOL 380; and BIOL 310 or GENE 314.

BIOL 489 Herpetology
4 credits
Evolution, systematics, physiology, and ecology of reptiles and amphibians. Three lectures and one 3-hr lab a wk; field trip. (Fall only)
Prereq: BIOL 114 and BIOL 115.

BIOL 491 Practicum in Teaching
2 credits
Gen Ed: Senior Experience
Teaching by advanced students under faculty supervision.
Prereq: Permission.

BIOL 499 (s) Directed Study
Credit arranged.

BIOL 500 Master's Research and Thesis
Credit arranged.

BIOL 501 (s) Seminar
Credit arranged.

BIOL 502 (s) Directed Study
Credit arranged.

BIOL 503 (s) Workshop
Credit arranged.

BIOL 504 (s) Special Topics
Credit arranged.

BIOL 505 Colloquium
1 credit
Oral presentation required for credit. Graded P/F.
Prereq: Permission.

BIOL 508 Topics in Neuroscience
1 credit, max arranged
Seminars and discussion of current topics in neuroscience.
Prereq: Graduate standing.

BIOL 521 Graduate Teaching Practicum
3 credits
Organization, preparation, and teaching of lab experiments or demonstrations under faculty supervision. Graded pass/fail.
Prereq: Graduate standing and Permission.

BIOL 522 Molecular Evolution
3 credits
Understanding evolutionary processes and patterns at the molecular level, techniques for using genetic and genomic data understand evolutionary history of organisms, 3 lectures per week. Cooperative: open to WSU degree-seeking students. (Fall, alt/ys)
Prereq: Undergraduates require permission of instructor.

BIOL 524 Research & Curriculum Progress
1 credit, max arranged
Required of all graduate students one semester per year. The grade is based on preparation of an oral and written presentation of research goals and coursework for the completion of the degree. A letter grade is assigned by committee members at the time of the student's graduate committee meeting. Recommended preparation: Undergraduate degree in Microbiology, Biochemistry, or related topic.
Prereq: Permission.

BIOL 526 Systems Biology
3 credits
Joint-listed with BIOL 426
Two lectures per week. Systems Biology will use quantitative approaches including theory and computation to understand the complex function that emerges from physiological systems. Topics will include transcriptional networks and their common motifs, robustness in chemotaxis and development, noise and variability, evolution of modularity, and optimality in metabolism. Cooperative: open to WSU degree-seeking students. (Fall only, alt/ys).
Prereq: BIOL 115 and MATH 170 or permission of instructor.

BIOL 536 Phylogenetics Reading Group
1 credit, max arranged
Review recent articles in phylogenetics and systematics journals. Students choose, critically review, and discuss the articles to develop critical-thinking skills and confidence in their knowledge of the literature. Graded P/F. Cooperative: open to WSU degree-seeking students.

BIOL 545 Principles of Systematic Biology
3 credit
The inference of evolutionary trees (phylogeny) and the processes that generate biodiversity from analyses of morphological, molecular, and behavioral data; uses of phylogenies in testing evolutionary and other hypotheses at both inter and intraspecific levels. Two hours of lecture and one 3-hour lab a week. Cooperative: open to WSU degree-seeking students. (Spring, Alt/ys)
Prereq: PLSC 205 or BIOL 213 and BIOL 310.

BIOL 547 Virology
3 credits
Joint-listed with BIOL 447
A survey of virology, with special emphasis on the molecular basis of replication, host-pathogen interactions and diseases associated with animal viruses. Extra oral and/or written assignments required for grad credit. Recommended preparation: BIOL 250. (Fall, alt/ys)
Prereq: BIOL 312 or Permission.

BIOL 548 Evolutionary Ecology
3 credits
This course develops the theoretical underpinnings for the field of evolutionary ecology and illustrates how this conceptual basis is used to address major questions of social and economic importance such as the spread of invasive species and the evolution of infectious disease. This is a cooperative course available to WSU degree-seeking students. (Spring, alt/ys)
BIOL 549 Computer Skills for Biologists  
3 credits  
Joint-listed with BIOL 456  
Management and analysis of complicated datasets such as those in molecular evolution, systematics, and genomics. Demonstrations, exercises, and student projects to teach advanced Unix skills, programming (e.g. Perl and R), and data management. Cooperative: open to WSU degree-seeking students. (Fall, alt/even yrs)  
Prereq: BIOL 310 and STAT 251 or STAT 301; or Permission.

BIOL 551 Seminar on Reproductive Biology  
1 credit, max 5  
Current topics in reproductive biology. Cooperative: open to WSU degree-seeking students. (Spring only)  
Prereq: Graduate standing.

BIOL 552 Professional Development for Biologists  
3 credits  
Oral and written presentation skills for communicating scientific information, including grant writing and data presentation for manuscripts and seminars.  
Prereq: Graduate standing.

BIOL 553 Ethical Issues in Biological Research  
1 credit  
Practical ethical issues for biologists.  
Prereq: Graduate standing.

BIOL 554 Biochemistry II  
3 credits  
Joint-listed with BIOL 454  
Intermediate biochemistry; areas of emphasis include molecular biology, nitrogen and lipid metabolism. Extra oral and/or written assignments required for grad credit. (Spring only)  
Prereq: CHEM 372; BIOL 380 or CHEM 302 or 306; or Permission.

BIOL 560 Advanced Field Botany  
3 credits  
Joint-listed with BIOL 460  
Hands-on training in field botany as applied to evolutionary, ecological, and floristic studies; two-week field course in the Inland Northwest. Additional projects/assignments required for grad credit. (Summer only)  
Prereq: Instructor Permission.

BIOL 563 Mathematical Genetics  
3 credits  
Cross-listed with MATH 563 See Math 563.

BIOL 565 Neurobiology  
3 credits  
Joint-listed with BIOL 461  
Study of the nervous system, with an emphasis on mechanisms of neuronal signaling, the function of sensory and motorsystems, and neural development. Recommended: PHYS 111, PHYS 112, and CHEM 275 or CHEM 277. Cooperative: open to WSU degree-seeking students. (Fall, Alt/ yrs)  
Prereq: BIOL 213, BIOL 310, BIOL 312, GENE 314, BIOL 300, or BIOL 380.

BIOL 573 Principles of Developmental Biology  
3 credits  
Joint-listed with BIOL 474.  
Analysis of mechanisms at cellular and molecular level during metazoan development. (Spring, Alt/yr)  
Prereq: BIOL 114 and BIOL 115; or BIOL 312.