

# DEPARTMENT OF FISH AND WILDLIFE SCIENCES

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Fish and wildlife sciences deals with the application of principles of biology and ecology to the understanding of how fish and wildlife populations interact with each other and with their environment, which includes humans. There are five areas of emphasis within the department: **aquaculture, fisheries, wildlife, conservation biology, and conservation genetics.** Persons interested in aquaculture or fisheries can design their major within the B.S. in Fishery Resources, those interested in wildlife, within the B.S. in Wildlife Resources, and those interested in conservation biology, within the B.S. in Ecology and Conservation Biology. Conservation genetics courses may be incorporated into either degree.

Fishery biologists and scientists conduct research or apply management principles to aquatic ecosystems. They may become involved with biological monitoring, environmental impact assessment, maintenance of endangered fish, hatchery operation, commercial fish farming, control and prevention of fish diseases, and management of stream or lake ecosystems.

Wildlife biologists, or managers, attempt to maintain adequate populations of game and nongame wildlife species. This involves studying wildlife and its habitat so that management programs can be biologically based. The job often involves coordinating wildlife management programs with other natural resource activities such as forest management, range management, and land use planning.

Professionals within Ecology and Conservation Biology use the tools and basic principles of ecology (such as population dynamics and genetics) and then incorporate social science principles to solve critical issues related to conserving species and ecosystems. They write species recovery plans, design parks and protected areas, and advise policy makers and land-use planners.

The professions offer opportunities in law enforcement, communications, and public relations. A common saying, and one with a great deal of truth, is that natural resource management is largely people management.

Bachelor of Science degrees are offered in fishery resources, wildlife resources, and ecology and conservation biology. In the fishery resources degree, students may design a program that emphasizes fisheries ecology, aquatic ecology, aquaculture, or fisheries management. In the wildlife resources degree, the program emphasizes the principles of wildlife ecology, population dynamics, and management. Elective courses in all programs provide an opportunity to gain additional knowledge in a special area of interest or to broaden into other fields. To ensure that the student gains practical experience, one season of approved work experience before graduation is required. For information on the Ecology and Conservation Biology program, see the section on "Natural Resources."

Our graduates find employment with numerous federal and state agencies, educational institutions, and in the private sector. These include the U.S. Fish and Wildlife Service, the Bureau of Land Management, the U.S. Forest Service, the National Marine Fisheries Service, the Army Corps of Engineers, state fish and game or conservation departments, tribal agencies, and private organizations such as power companies, commercial fish growers, consulting agencies, and non-profit organizations. Recent surveys have shown that baccalaureate graduates from the department obtain employment at a rate considerably above the national average.

The graduate program is offered to meet the needs of students who are interested in either specialized or generalized advanced study. Because specific requirements for each degree are determined by the student's supervisory committee, individual study plans allow for differences in preparation while providing all students with a comparable background by the time the graduate program is completed.

In addition to the admission requirements of the College of Graduate Studies, the prospective student should have maintained a cumulative grade-point average of at least 3.00 (on a 4.00 scale) during the undergraduate program. Acceptance of students who do not have this minimum grade-point average or other stated requirements is possible, sub-

ject to recommendation by the department head and approval of the College of Graduate Studies. The decision will be based on an analysis of the applicant's situation. The Graduate Record Examination is required for admission. At least one summer's experience with a natural resource agency is strongly recommended.

The graduate program in **fishery resources** is oriented toward the applied and basic aspects of fishery management, aquatic ecology, and fish health management. The fishery management area includes population analysis, management systems, and environmental stresses; the aquatic ecology area includes limnology and habitat management; and the fish health management area includes finfish culture (coldwater and warmwater), fish disease diagnostics and epidemiology, and fish physiology. The Idaho Cooperative Fish and Wildlife Research Unit and the Aquaculture Research Institute also provide important opportunities for graduate studies in fishery resources and aquaculture.

Students planning to begin graduate studies in fishery resources should have a broad background in the life sciences with specific emphasis on courses in the fishery sciences. They should also have a background in quantitative data processing and communication, both oral and written.

Admission to the graduate program in **wildlife resources** requires an undergraduate degree with a major in wildlife resources or a closely related field emphasizing the principles of wildlife ecology, population dynamics, and management. Students with differing backgrounds are also admitted if they have substantial preparation in the biological and physical sciences. Candidates must fulfill entrance requirements of the Graduate College and of the Department of Fish and Wildlife Sciences.

Graduate work in wildlife resources offers students the opportunity to do research in one of several areas including wildlife behavior, predator ecology, population dynamics, habitat relationships, and conservation biology, as well as big game, nongame, upland game, and waterfowl management. Students are encouraged to select topics that will benefit some portion of the wildlife program at the state or national level. Graduate projects in wildlife resources may be developed in cooperation with the Idaho Cooperative Fish and Wildlife Research Unit, an active participant in the department and research program of the college.

In addition to the requirements listed above, graduate admission is based on the compatibility of the student's research interests with the areas of concentration in the department and the availability of research faculty.

The **research mission** of the department is attainment of new knowledge and the understanding of natural resources, their interrelationships and uses. The objectives of the research program are to attain knowledge of the environment and to develop management alternatives that will assist in the conservation of resources while meeting society's needs. The dissemination of this knowledge through publications, continuing education, and other channels of communication is an essential departmental function.

For additional information, please call the department at (208) 885-6434 or visit the web at [www.cnrhome.uidaho.edu/fishwild](http://www.cnrhome.uidaho.edu/fishwild).

## Courses

See the course description section for courses in Fishery Resources (Fish) and Wildlife Resources (WLF).

## Fish and Wildlife Sciences Undergraduate Curricular Requirements

### Fishery Resources (B.S.Fish.Res.)

Students pursuing a B.S. degree in fishery resources (management or aquaculture emphasis) must have received a grade of C or better in each of the following four indicator courses to register for fish- and wildlife-prefixed upper-division courses and to graduate with a B.S.Fish.Res.: Biol 116 and 213, Stat 251, and For 221.

To graduate, students must achieve a grade of C or better in Biol 481, and each fish- and wildlife-prefixed upper-division course listed in the requirements for the B.S. degree in fishery resources.

Required course work includes the university requirements (see regulation J-3) and:

**First and Second Years**

Biol 115	Cells and the Evolution of Life (4 cr)
Biol 116	Organisms & Environments (4 cr)
Biol 213	Principles of biological Structure and Function (4 cr)
Chem 101	Introduction to Chemistry I (4 cr)
Comm 101	Fundamentals of Public Speaking (2 cr)
Econ 202	Principles of Microeconomics (3 cr)
Fish 102	The Fish and Wildlife Professions (1 cr)
For 235 or CSS 235	Society and Natural Resources (3 cr)
Math 160	Survey of Calculus (4 cr)
NR 101	Exploring Natural Resources (1 cr)
Stat 251	Statistical Methods (3 cr)

One of the following (3 cr):

Chem 275	Carbon Compounds (3 cr)
Chem 277	Organic Chemistry (3 cr)

One of the following (3 cr):

For 221	Ecology (3 cr)
REM 221	Ecology (3 cr)

One of the following (4 cr):

Geol 101L	Physical Geology and Lab (4 cr)
Geol 101L	
Soil 205, Soil 206	The Soil Ecosystem and Lab (4 cr)

One of the following (4 cr):

Phys 100,	Fundamentals of Physics and Lab (4 cr)
Phys 100L	
Phys 111,	General Physic I and Lab (4 cr)
Phys 111L	

**Third and Fourth Years**

Biol 250, Biol 255	General Microbiology and Lab (5 cr)
Biol 481	Ichthyology (4 cr)
CSS 383	Natural Resource and Ecosystem Service Economics (3 cr)
Fish 314	Fish Ecology (3 cr)
Fish 315	Fish Ecology Lab (1 cr)
Fish 316	Principles of Population Dynamics (2 cr)
Fish 415	Limnology (4 cr)
Fish 418	Fisheries Management (4 cr)
Fish 495	Seminar (1 cr)
For 375	Introduction to Spatial Analysis for Natural Resource Management (3 cr)
WLF 448	Fish and Wildlife Population Ecology (4 cr)

Approved work experience in major field required

One of the following (3 cr):

AVS 371	Anatomy and Physiology (3 cr)
Biol 423	Comparative Vertebrate Physiology (3 cr)

One of the following (3 cr):

Engl 313	Business Writing (3 cr)
Engl 317	Technical Writing (3 cr)

One of the following (3-4 cr):

Fish 422	Concepts in Aquaculture (3 cr)
Fish 424	Fish Health Management (4 cr)

One of the following (3-4 cr):

Biol 310, Biol 315	Genetics and Lab (4 cr)
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Gene 314 General Genetics (3 cr)

**Courses to total 120 credits for this degree**

**Ecology and Conservation Biology  
(B.S.Ecol.Cons.Biol.)**

See the section on "Natural Resources."

**Wildlife Resources (B.S.Wildl.Res.)**

Students pursuing a B.S. in wildlife resources must have received a grade of C or better in each of the following four indicator courses to register in fish- and wildlife-prefixed upper-division courses and to graduate with a B.S. in wildlife resources: Biol 116 and 213, Stat 251, and For 221.

To graduate, a student must receive a grade of C or better in each fish- and wildlife-prefixed upper-division course listed in the requirements for the B.S. in wildlife resources.

Required course work includes the university requirements (see regulation J-3) and:

**First and Second Years**

Biol 115	Cells and the Evolution of Life (4 cr)
Biol 116	Organisms & Environments (4 cr)
Biol 213	Principles of Biological Structure and Function (4 cr)
Chem 101	Introduction to Chemistry I (4 cr)
Comm 101	Fundamentals of Public Speaking (2 cr)
Econ 202	Principles of Microeconomics (3 cr)
For 235 or CSS 235	Society and Natural Resources (3 cr)
NR 101	Exploring Natural Resources (1 cr)
Stat 251	Statistical Methods (3 cr)
WLF 102	The Fish and Wildlife Professions (1 cr)

One of the following (3 cr):

Chem 275	Carbon Compounds (3 cr)
Chem 277	Organic Chemistry I (3 cr)

One of the following (3 cr):

For 221	Ecology (3 cr)
REM 221	Ecology (3 cr)

One of the following (3-4 cr):

For 320	Dendrology (4 cr)
REM 341	Systematic Botany (3 cr)

One of the following (4 cr):

Geol 101L	Physical Geology and Lab (4 cr)
Geol 101L	
Soil 205, Soil 206	The Soil Ecosystem and Lab (4 cr)

One of the following (4 cr):

Math 160	Survey of Calculus (4 cr)
Math 170	Analytic Geometry and Calculus I (4 cr)

**Third and Fourth Years**

AVS 371	Anatomy and Physiology (3 cr)
CSS 383	Natural Resource and Ecosystem Service Economics (3 cr)
For 375	Introduction to Spatial Analysis for Natural Resource Management (3 cr)
WLF 314,	Wildlife Ecology I and Lab (4 cr)
WLF 315	
WLF 316	Wildlife Ecology II (4 cr)
WLF 440	Conservation Biology (3 cr)
WLF 448	Fish and Wildlife Population Ecology (4 cr)
WLF 492	Wildlife Management (4 cr)
WLF 495	Wildlife Seminar (1 cr)

One of the following (3-4 cr):

Biol 310, Biol 315	Genetics and Lab (4 cr)
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Gene 314 General Genetics (3 cr)

One of the following (4 cr):

Phys 111,	General Physics I and Lab (4 cr)
Phys 111L	

One of the following (3 cr):

Comm 431	Applied Business and Professional Communication (3 cr)
Engl 208	Personal and Exploratory Writing (3 cr)
Engl 317	Technical Writing (3 cr)

Restricted electives, choose two courses from the following (must receive a grade of C or better):

Biol 481	Ichthyology (4 cr)
Biol 483	Mammalogy (3 cr)
Biol 489	Herpetology (4 cr)
WLF 482	Ornithology (4 cr)

Approved work experience in major field required

**Courses to total 120 credits for this degree**

**Fish and Wildlife Sciences Academic Minor  
Requirements****Aquaculture Minor**

Biol 250, Biol 255	General Microbiology and Lab (5 cr)
Biol 481	Ichthyology (4 cr)
Fish 422	Concepts in Aquaculture (3 cr)

Fish 424 Fish Health Management (4 cr)

Three of the following courses:

AgEc 278 Farm and Agribusiness Management (4 cr)  
 Fish 398 Renewable Natural Resources Internship (cr arr)  
 ASM 107 Beginning Welding (2 cr)  
 AVS 305 Animal Nutrition (3 cr)  
 Bus 321 Marketing (3 cr)

**Courses to total 18 credits for this minor**

### **Fishery Resources Minor**

Fish 314 Fish Ecology (3 cr)  
 Fish 315 Fish Ecology Lab (1 cr)  
 Fish 495 Seminar (1 cr)

Three of the following courses:

Biol 481 Ichthyology (4 cr)  
 Fish 415 Limnology (4 cr)  
 Fish 418 Fisheries Management (4 cr)  
 Fish 422 Concepts in Aquaculture (3 cr)  
 Fish 424 Fish Health Management (4 cr)  
 Fish 430 Riparian Ecology and Management (3 cr)

One of the following (3-4 cr):

For 221 Ecology (3 cr)  
 REM 221 Ecology (3 cr)  
 Biol 314 Ecology and Population Biology (4 cr)

**Courses to total 18 credits for this minor**

### **Wildlife Resources Minor**

WLF 314, WLF 315 Wildlife Ecology I and Lab (4 cr)

WLF 316 Wildlife Ecology II (4 cr)

One of the following (3-4 cr):

For 221 Ecology (3 cr)  
 REM 221 Ecology (3 cr)  
 Biol 314 Ecology and Population Biology (4 cr)

Any combination of the courses below:

Biol 483 Mammalogy (3 cr)  
 Biol 489 Herpetology (4 cr)  
 WLF 440 Conservation Biology (3 cr)  
 WLF 448 Fish and Wildlife Population Ecology (4 cr)  
 WLF 482 Ornithology (4 cr)  
 WLF 492 Wildlife Management (4 cr)

**Courses to total 18 credits for this minor**

## **Fish and Wildlife Sciences Graduate Degree Programs**

Candidates must fulfill the requirements of the College of Graduate Studies and of the Department of Fish and Wildlife Sciences. See the College of Graduate Studies section for the general requirements applicable to each degree.

**Master of Science. Major in Natural Resources.** The M.S. degree with major study in either fishery resources or wildlife resources is awarded when a student has met the requirements listed below. A formal graduate program of at least 30 semester hours is chosen in consultation with the major professor and the student's supervisory committee. At least 18 credits must be courses numbered 500 and above. For the thesis option, no more than 10 of the 500-level credits of Research and Thesis may be applied toward the degree. (A) Thesis option: General M.S. requirements apply except that the thesis requirement may be fulfilled by one or more journal publications at the discretion of the candidate's supervisory committee. (B) Non-thesis option: General M.S. requirements apply. A professional paper is required.

The Ph.D. degree is available with a major in natural resources. General Ph.D. requirements apply; see the section on "Natural Resources" for details.

# FISHERY RESOURCES COURSES

*Kerry Paul Reese, Dept. Head, Dept. of Fish and Wildlife Sciences (104 CNR Bldg. 83844-1136; phone 208/885-6434).*

**Prerequisite:** Courses in this subject field that are numbered above 299 are not open to undergraduate students on academic probation.

## **Fish 102 The Fish and Wildlife Professions (1 cr)**

Same as WLF 102. Orientation of students to the profession of fishery resources and wildlife resources: introduction to fish and wildlife faculty, review of fish and wildlife curriculum, awareness of career opportunities, employment procedures, associated job duties/responsibilities, job preparation, educational preparation, and management challenges in the Pacific Northwest. (Fall only)

## **Fish 200 (s) Seminar (cr arr)**

## **Fish 203 (s) Workshop (cr arr)**

## **Fish 204 (s) Special Topics (cr arr)**

## **Fish 299 (s) Directed Study (cr arr)**

## **Fish 314 Fish Ecology (3 cr)**

Examination of physical, chemical, and biological factors that affect fish populations and communities, with emphasis on environmental stressors. Cooperative: open to WSU degree-seeking students. (Fall only)

**Prereq:** For 221, REM 221, or Biol 314

## **Fish 315 Fish Ecology Lab (1 cr)**

Laboratory and field experience in fish ecology with emphasis on field techniques, laboratory experimentation, and habitat assessment. One weekend field trip and several day trips required. (Fall only)

**Prereq:** For 221, REM 221, or Biol 314

**Coreq:** Fish 314

## **Fish 316 Principles of Population Dynamics (2 cr)**

Basic principles of population ecology of animals. Taught first half of semester. (Spring only)

**Prereq:** Fish 314 and Fish 315 with a grade of 'C' or better and For 221, REM 221, or Biol 314; or Permission

## **Fish 398 (s) Renewable Natural Resources Internship (cr arr)**

Supervised field experience with an appropriate public or private agency. Req'd for cooperative education students. Graded P/F.

**Prereq:** Permission of department

## **Fish 400 (s) Seminar (cr arr)**

## **Fish 403 (s) Workshop (cr arr)**

## **Fish 404 (s) Special Topics (cr arr)**

## **Fish 415 Limnology (4 cr)**

Physical, chemical, and biological features of lakes and streams. Four 1-day field trips. (Fall only)

**Prereq:** Stat 251 and For 221, REM 221, or Biol 314

## **Fish 418 Fisheries Management (4 cr)**

Techniques employed in sampling and application of principles toward managing recreational and commercial aquatic resources. Three lec and one 3-hr lab a wk; two weekend field trips. Cooperative: open to WSU degree-seeking students. (Fall only)

**Prereq:** Fish 314, Biol 481, Stat 251

## **Fish 422 Concepts in Aquaculture (3 cr)**

Concepts and methods of extensive and intensive aquaculture in warm water and cold water systems. Two field trips req'd (a 1-day and a 3-day field trip). Cooperative: open to WSU degree-seeking students. (Spring only)

**Prereq or Coreq:** Biol 481

## **Fish 424 Fish Health Management (4 cr)**

Epidemiology, prevention, diagnostics, and treatment of infections and non-infectious diseases of free-living and confined finfish and shellfish. Two field trips req'd (a 1-day and a 3-day field trip). Recommended Preparation: Fish 422. Cooperative: open to WSU degree-seeking students. (Spring only)

**Prereq:** Biol 250

## **Fish 430 Riparian Ecology and Management (3 cr)**

Structure, function, and management of riparian ecosystems; interrelationships of terrestrial and aquatic components of riparian areas. 3 field trips. Special fee required. (Spring only)

**Prereq:** For 221, REM 221, or Biol 314

## **Fish 483 Senior Project Presentation (1 cr)**

See For 483.

## **Fish 485 Ecology and Conservation Biology Senior Project (1-3 cr, max 3)**

See WLF 485.

## **Fish 494 Current Issues in Fish Health (1 cr)**

Focus on a range of issues related to fish health that are of regional and/or global importance. It is designed as a discussion course focusing on published literature. Professionals working in the fish health field may also present guest lectures. Recommended Coreq: Biol 250. (Fall, Alt/yrs)

**Prereq:** Senior standing

## **Fish 495 (s) Seminar (1 cr)**

Discuss integrating biological, social, political, economic, and philosophic aspects of problems in managing fishery resources. (Spring only)

**Prereq:** Senior standing

## **Fish 497 Senior Thesis (1-3 cr, max 6)**

Preparation of thesis, exhibition, video, computer program, multimedia program, or other creative presentation based on research conducted under the guidance of a faculty mentor.

**Prereq:** Cumulative GPA of at least 3.2 in all college courses, completion of at least 90 credits, and permission of a faculty mentor

## **Fish 499 (s) Directed Study (cr arr)**

For the individual student; conferences, library, field, or lab work.

**Prereq:** Senior standing, GPA 2.5, and Permission

## **Fish 500 Master's Research and Thesis (cr arr)**

## **Fish 501 (s) Seminar (cr arr)**

Major philosophy, management, and research problems of wildlands; presentation of individual studies on assigned topics. Graded P (pass)/F (fail).

**Prereq:** Permission

## **Fish 502 (s) Directed Study (cr arr)**

## **Fish 503 (s) Workshop (cr arr)**

Selected topics in the conservation and management of natural resources.

**Prereq:** Permission

## **Fish 504 (s) Special Topics (cr arr)**

## **Fish 510 Advanced Fishery Management (3 cr)**

Contemporary management of marine and freshwater fish and shellfish populations of the world. Approaches, factors and models used to manage commercial, recreational and subsistence fisheries; and the policy interface of biological systems with governmental and social institutions. Cooperative: open to WSU degree-seeking students. (Spring, Alt/yrs)

## **Fish 511 Fish Physiology (2 cr)**

Principles and methods used to study vital organs, organ systems, growth, and reproduction of fishes; emphasis on osmoregulation, metabolism, endocrinology, and respiration. Cooperative: open to WSU degree-seeking students. (Fall, Alt/yrs)

**Prereq:** Permission

## **Fish 515 Large River Fisheries (2 cr)**

Management issues and problems in large river fisheries in North America and globally; importance of flood plains; ecological bases for management actions in large rivers; river fisheries in the context of multiple use of large rivers. Cooperative: open to WSU degree-seeking students. (Fall, Alt/yrs)

**Fish 521 Community Ecology (3 cr)**

Introduction to literature and contemporary research into processes structuring ecological communities. Topics will encompass community ecology in a range of ecological systems and across trophic levels, including community impacts on ecosystem processes. (Fall/Alt/yrs)

*Prereq: For 221 or REM 221*

**Fish 525 Aquaculture in Relation to Wild Fish Populations (2 cr)**

Historical and current relationships between wildness and domestication as it relates to fisheries management and aquaculture in mitigation and industry. Interactions between wild and hatchery-reared fishes, including salmon. Cooperative: open to WSU degree-seeking students. (Fall, alt/yrs)

**Fish 530 Stream Ecology (3 cr)**

Same as REM 530. Structure and function of running water ecosystems; principles of population, community, and ecosystem ecology in streams and rivers. Three 1-day field trips reqd. (Fall, Alt/yrs)

**Fish 540 Wetland Restoration (3 cr)**

This web-based course contains modules covering wetland science, restoration ecology, freshwater restoration, coastal restoration, and monitoring/maintenance. The emphasis is on the science of wetland ecosystems and the applied ecology/practice of restoration, with additional consideration of cultural and socio-political contexts. Extensive readings, an assignment, and a study guide are required for each module. Students apply their learning in and contribute relevant professional experience to weekly online discussions. Students are also responsible for obtaining documentation of at least one wetland restoration site in their region and conducting a site visit in order to evaluate the success of the restoration project. A final exam (re-design of a failed restoration project) is administered online, with partial credit earned through discussion with an interdisciplinary team of classmates and the remaining credit earned through individual analysis and synthesis. (Fall only)

*Prereq: Biol 115 and 116; and For 221 or Biol 314 or Permission*

**Fish 597 (s) Practicum (cr arr)****Fish 598 (s) Internship (cr arr)****Fish 599 (s) Non-thesis Master's Research (cr arr)**

Research not directly related to a thesis or dissertation.

*Prereq: Permission*

**Fish 600 Doctoral Research and Dissertation (cr arr)**

# WILDLIFE RESOURCES COURSES

*Kerry Paul Reese, Dept. Head, Dept. of Fish and Wildlife Sciences (104 CNR Bldg. 83844-1136; phone 208/885-6434).*

**Prerequisite:** Courses in this subject field that are numbered above 299 are not open to undergraduate students on academic probation.

**WLF 102 The Fish and Wildlife Professions (1 cr)**

See Fish 102.

**WLF 200 (s) Seminar (cr arr)**

**WLF 203 (s) Workshop (cr arr)**

**WLF 204 (s) Special Topics (cr arr)**

**WLF 299 (s) Directed Study (cr arr)**

**WLF 314 Wildlife Ecology I (3 cr)**

Ecology and natural history of birds, mammals, reptiles, and amphibians. (Fall only)

**Prereq:** For 221, REM 221, or Biol 314

**WLF 315 Wildlife Ecology I Laboratory (1 cr)**

Techniques associated with wildlife research and local habitats and areas where wildlife species are present. Three hours of lab a week. One weekend field trip required. Two additional animal trapping sessions also required. (Fall only)

**Prereq or Coreq:** WLF 314

**WLF 316 Wildlife Ecology II (4 cr)**

Application of principles of ecology to conservation and management of wildlife in natural and altered habitats. Three lec and one lab a wk; three days of field trips. (Spring only)

**Prereq:** WLF 314 and 315 with a grade of 'C' or better; or Permission

**WLF 396 Wilderness Research Internship (3 cr)**

Nine-week summer internship at UI Wilderness Field Station, located at Taylor Ranch in the heart of the Frank Church River of No Return Wilderness of central Idaho; research honorarium awarded; lodging and transportation to field station provided. Enrollment limited to 2-3 students based on available funding; competitive selection process by faculty committee based on research proposal, GPA, and resume. (Summer only)

**Prereq:** Junior standing

**WLF 398 (s) Renewable Natural Resources Internship (cr arr)**

Supervised field experience with an appropriate public or private agency. Req'd for cooperative education students. Graded P/F.

**Prereq:** Permission of department

**WLF 403 (s) Workshop (cr arr)**

**WLF 404 (s) Special Topics (cr arr)**

**WLF 415 Wildlife Conclave (1 cr)**

Objectives of the course are to 1) acquaint students with the procedures and rules used in the Wildlife Quiz Bowl at the Western Students Wildlife Conclave held annually in March, 2) practice in game situations so that our team is competitive at the event, and 3) to learn practical facts and trivia about wildlife natural history, identification, history of wildlife management and laws, wildlife ecology and management, and related natural resource sciences. The course meets twice a week from the beginning of spring semester until spring break (when Conclave is held). Students are assigned areas to study, have quizzes on those areas of knowledge and provide new written questions with answers for possible use in future classes.

**WLF J416/J516 Molecular Methods in Population Biology (1 cr)**

Introductory workshop on basic procedures in molecular biology that have applications in ecology and evolutionary biology. Course includes DNA/RNA extraction, PCR, simple recombinant DNA procedures, DNA sequencing, and data analysis. Graduate level will require independent study project. Recommended preparation: Introductory level genetics, general and organic chemistry courses. (Fall only)

**Prereq:** Permission

**WLF 440 Conservation Biology (3 cr)**

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. (Fall only)

**Prereq:** For 221, REM 221, or Biol 314 or Permission

**WLF 448 Fish and Wildlife Population Ecology (4 cr)**

Dynamics of animal populations resulting from balance between birth, death, and movement processes; quantitative methods for measuring distribution, abundance, survival and population growth; competition, predation, and self-regulation; viability and management of fish and wildlife populations. Three lec and one lab a wk. (Fall only)

**Prereq:** Stat 251; and Fish 316, WLF 316, or course in vertebrate ecology

**WLF 482 Ornithology (4 cr)**

Evolution, systematics, distribution, identification, and biology of birds, including current conservation efforts. Requires two days of field trips. (Spring only)

**Prereq:** Biol 213

**WLF 483 Senior Project Presentation (1 cr)**

See For 483.

**WLF 485 Ecology and Conservation Biology Senior Project (1-3 cr, max 3)**

Same as CSS/Fish/For/REM 485. Scholarly work; learning objectives include development and formal proposal of a specific project and conducting the project or research with the guidance of a faculty mentor.

**WLF 492 Wildlife Management (4 cr)**

Review of social and biological context for current practice of wildlife management. Three lec and one lab a wk; two days of field trips. (Spring only)

**Prereq:** WLF 316 and WLF 448

**Prereq or Coreq:** WLF 482, Biol 481 or Biol 483

**WLF 495 (s) Wildlife Seminar (1-2 cr)**

Discuss integrating biological, social, political, economic, and philosophic aspects of wildlife problems. (Fall only)

**Prereq:** Senior standing

**WLF 497 Senior Thesis (1-3 cr, max 6)**

Preparation of thesis, exhibition, video, computer program, multimedia program, or other creative presentation based on research conducted under the guidance of a faculty mentor.

**Prereq:** Cumulative GPA of at least 3.2 in all college courses, completion of at least 90 credits, and permission of a faculty mentor

**WLF 499 (s) Directed Study (cr arr)**

For the individual student; conferences, library, field, or lab work.

**Prereq:** Senior standing, GPA 2.5, and Permission

**WLF 500 Master's Research and Thesis (cr arr)**

**WLF 501 (s) Seminar (cr arr)**

Major philosophy, management, and research problems of wildlands; presentation of individual studies on assigned topics. Graded P (pass)/F (fail).

**Prereq:** Permission

**WLF 502 (s) Directed Study (cr arr)**

**WLF 503 (s) Workshop (cr arr)**

Selected topics in the conservation and management of natural resources.

**Prereq:** Permission

**WLF 504 (s) Special Topics (cr arr)**

**WLF 516 Molecular Methods in Population Biology (1 cr)**

See WLF J416/J516.

**WLF 540 Conservation Genetics (3 cr)**

Same as For 540. Basic principles of population genetics and phylogenetics and their applications to the field of conservation genetics and

natural resource management; case studies and examples from current literature; topics include genetic diversity, inbreeding, population structure, gene flow, genetic drift, molecular phylogenetics, and hybridization. (Fall, Alt/yrs)

**WLF 541 Advanced Population Biology (3 cr)**

Readings and discussion of current theories of population control, their biological basis, and applications to animal populations. (Fall, Alt/yrs)

*Prereq: WLF 448 or Permission*

**WLF 543 Fish and Wildlife Population Analysis (4 cr)**

Quantitative analysis of fish and wildlife habitat, diet, harvest, population density, survival, and natality data; development and application of population models in fish and wildlife management. Three lec and 3 hrs of lab a wk. (Fall, Alt/yrs)

*Prereq: WLF 448, Stat 431 or Permission*

**WLF 545 Wildlife Habitat Ecology (2-3 cr)**

Reading and discussion on habitat concepts, analyses, and applications. Students enrolled in the 3<sup>rd</sup> credit will complete additional readings and quantitative problem sets. Cooperative: open to WSU degree-seeking students.

*Prereq: WLF 492 or Permission, animal and plant ecology*

**WLF 549 Conservation Genetics Lab (1 cr)**

Same as For 542. This optional lab course is a complement to WLF540 Conservation genetics and should be taken concurrently. Students will learn to analyze and interpret phylogenetic and population datasets using a variety of software packages. Students will also design and implement a lab for their classmates. (Fall, alt/even yrs)

*Coreq: WLF 540 or For 540*

**WLF 552 Ecological Modeling (3 cr)**

Linear and nonlinear dynamical models of biological systems; computer-intensive introduction to concepts of stability, attractors, bifurcations, chaos; model identification, estimation, and evaluation; applications in aquatic and terrestrial ecological communities. (Spring, Alt/yrs)

*Prereq: Math 175 and For 221 or Permission*

**WLF 555 Statistical Ecology (3 cr)**

Same as Stat 555. Stochastic models in ecological work; discrete and continuous statistical distributions, birth-death processes, diffusion processes; applications in population dynamics, population genetics, ecological sampling, spatial analysis, and conservation biology. Cooperative: open to WSU degree-seeking students. (Spring, Alt/yrs)

*Prereq: Math 451 or Permission*

**WLF 561 Landscape Genetics (2 cr)**

Landscape genetics is an interdisciplinary field of study that evaluates how landscape and environmental features influence gene flow, population structure and local adaptation by integrating landscape ecology, population genetics and spatial statistics. This course covers applications of landscape genetics that can improve our understanding of ecology, evolution, and management of wild populations. Recommended Preparation: Population genetics or conservation genetics, and multivariate or spatial statistics. Cooperative: open to WSU degree-seeking students. (Spring, alt/even yrs)

**WLF 562 Landscape Genetics Lab (1-2 cr)**

This optional lab course is a complement to WLF561 Landscape genetics and should be taken concurrently. Students will learn to analyze and interpret landscape genetic datasets using a variety of methods. If taken for two credits, students will do a project analyzing landscape genetic data. Recommended Preparation: Population genetics or conservation genetics, and multivariate or spatial statistics. Cooperative: open to WSU degree-seeking students. (Spring, alt/even yrs)

*Coreq: WLF 561*

**WLF 597 (s) Practicum (cr arr)**

**WLF 598 (s) Internship (cr arr)**

**WLF 599 (s) Non-thesis Master's Research (cr arr)**

Research not directly related to a thesis or dissertation.

*Prereq: Permission*

**WLF 600 Doctoral Research and Dissertation (cr arr)**

*Prereq: Admission to the doctoral program in "natural resources" and Permission of department*

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