

## FWS Grad courses (12/17/17)

\* indicates online/video option, ^ indicates accelerated workshop taught in 2-4 days, # indicates ½ semester course accelerated course (last ½ fall or first ½ spring)

**All Semesters:** WLF/Fish 501, WLF506\*

### Fall (Even)

Fish 511 Fish Physiology (2 cr) \*  
Fish 525 Aquaculture in Relation to Wild Fish Populations\* (2 cr)  
Fish 516 Animal Movement, Dispersal and Migration (3 cr)  
Fish 540 Wetland Restoration\* (3 cr – online only - Crandall)  
WLF 504 Applied Mixed Effects Modeling (2 cr)  
WLF503 Matrix Population Modeling^ (1 cr)  
Fish504 Climate Change and Fish/WLF Cons Mngt\* (1-2 cr)  
WLF 504 Forest Management and Bird Conservation\* (1-2 cr)  
Fish 521 Community Ecology # (2 cr)

### Fall (Odd)

Fish 515 Large River Fisheries\* (2 cr)  
WLF504 Applied Population Analysis (2-3 cr)  
WLF540 Conservation Genetics\* (1-3 cr)  
Fish 504 Advanced Fish Physiology \* (1 cr)

### Spring (Even)

WLF 552 Ecological Modeling\* (3 cr)  
WLF 561 Landscape Genetics\* (2 cr)  
WLF 562 Landscape Genetics Lab\* (1-2 cr)  
NR 511 Scientific Manuscript Preparation\* (1 cr)  
WLF575 Behavioral Ecology# (2 cr)  
WLF504 Resource Selection Analysis^ (2 cr)  
Fish 510 Advanced Fishery Management (3 cr)

### Spring (Odd)

WLF 555 Statistical Ecology\* (3 cr)  
NR 511 Scientific Manuscript Preparation\* (1 cr)  
WLF 545 Wildlife Habitat Ecology# (2-3 cr)  
Fish 504 Freshwater Invertebrates# (2-3 cr)  
WLF/Fish 504 Applied Community Ecology# (2 cr)

Two courses that we hope to add back into the rotation but not yet sure when:

**Fish 530 Stream Ecology and Fish503 Advanced Limnology (1-3)**

## Course Descriptions

### 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)

**Credits** 3 cr

**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

**Credits** 2 cr

**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)

**Credits** 2 cr

**Fish 516 Animal Movement, Dispersal and Migration (3 cr)**

Key theories and approaches for studying animal movement and dispersal in aquatic, marine and terrestrial environments, with critical analysis of empirical examples. Students are expected to develop an independent research project.

**Credits** 3 cr

**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

**Credits** 3 cr

**Prerequisites** FOR 221 or REM 221

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**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)

**Credits** 2 cr

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

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/years)

**Credits** 3 cr

**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 114 and Biol 115/115L; and For 221 or Biol 314 or Permission

**Credits** 3 cr

**Prerequisites**

BIOL 114 and BIOL 115/115L; and FOR 221 or BIOL 314 or Permission

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

Presentation of individual studies on assigned topics – usually thesis proposal. Graded P (pass)/F (fail).

**Prereq:** Permission

**Credits** 1-16 cr

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

Selected topics in the conservation and management of natural resources.

**WLF 506 External Speakers (1 cr)**

Students will attend seminars of fish and wildlife researchers and managers invited to present in our departmental seminar series. Students will read papers of external speakers, lead discussions of papers and assist with hosting speakers. Graded Pass/Fail.

**Credits** 1 cr

**WLF 540 Conservation Genetics (1-3 cr, max 3)**

Basic principles of population genetics and phylogenetics and their applications to the field of conservation and natural resource management. Taught in three 1-credit modules, and students can register for 1-3 credits. Module 1 includes introduction to conservation genetics and phylogenetics, module 2 includes population genetic theory and methods, and module 3 includes applications in conservation genetics and genomics. Cooperative: open to WSU degree-seeking students. (Spring, Alt/yr)

**Credits** 1-3 cr - Max 3 cr

**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

**Credits** 3 cr

**Prerequisites**

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

**Credits** 4

**Prerequisites**

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 3rd 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

**Credits** 2-3 cr

**Prerequisites**

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 WLF 540 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

**Credits** 1 cr

**Corequisites**

WLF 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 only, Alt/yrs)

**Prereq:** Math 175 and For 221 or Permission

**Credits**

3 cr

**Prerequisites**

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

**Credits**

3 cr

**Prerequisites**

MATH 451 or Permission

**Cross Listed Courses**

STAT 555

**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)

**Credits**

2 cr

**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

**Credits** 1-2 cr

**NR 511 - Scientific Manuscript Preparation, 1-2 cr.**

M. Coleman and C. Conway

Spring semester, every year

This course details the preparation of manuscripts for thesis chapters and submission to peer-reviewed journals. Students are guided through writing a manuscript of their own from beginning to end. Two 75 min classes per week, first half of semester. During the second half of the semester, we will meet periodically to work on your manuscript. Exercises will include identifying the scope, preparing manuscript parts, reviewing published and student writings, use of graphing and reference database tools, editing and peer reviewing.