

WILDLIFE AND FISHERIES SCIENCE

2023-24 Student Handbook

Ecosystem Science and Management
College of Agricultural Sciences
The Pennsylvania State University



ecosystems.psu.edu



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Academic Resources

University Bulletin	Resource for academic information, course descriptions, and program requirements	bulletins.psu.edu
Canvas	Online system for teaching and learning	canvas.psu.edu
DUSuccess	Tools and resources for academic success. Topics include motivation, direction & goals, adjustment to college, personal issues, study skills & time management, technology, tutoring, and finances for college.	dus.psu.edu/dusuccess/dus-success
LionPATH	Student Center for course registration, financial aid/tuition, transfer credit tool, graduation, academic changes and more	lionpath.psu.edu
Nittany Lion Careers	Recruiting platform for jobs, internships, and graduate assistantships	nittanylioncareers.psu.edu
Scholarships	College of Agricultural Sciences scholarships, and emergency loan funds. External scholarships about which we have been notified.	agsci.psu.edu/students/scholarships ecosystems.psu.edu/students/financial/external-scholarships
Starfish	Resource to communicate with advisers, instructors, and others who are here to support students.	starfish.psu.edu
University Registrar	Academic calendars, enrollment verifications, leaving the University, returning to the University, student forms, transcripts, transfer credits	registrar.psu.edu

Department of Ecosystem Science and Management

The Department of Ecosystem Science and Management is an academic unit in the College of Agricultural Sciences at Penn State. Our mission is to provide educational opportunities and science-based information to protect, manage, and use natural resources for sustained benefits. This is accomplished through educational, research, and outreach programs in forestry, wildlife and fisheries, soils, water, and related areas.

The Department of Ecosystem Science and Management offers two associate in science (A.S.) degree programs: Forest Technology (at Penn State Mont Alto) and Wildlife Technology (at Penn State DuBois); and two bachelor of science (B.S.) degree programs: Forest Ecosystem Management and Wildlife and Fisheries Science. A minor in each of these areas is also offered as is a minor in Environmental Soil Science and a certificate in Community Forestry. In addition, we offer graduate programs at both the master's and doctoral levels. We are committed to quality teaching.

Information about our academic programs, scholarships, student activities and professional societies, faculty, and facilities is available on our website, ecosystems.psu.edu.

Statement on Diversity and Inclusion

The Department of Ecosystem Science and Management is a community of students, staff, and faculty that values and is committed to advancing awareness and inclusion of diversity and strives to create a climate of mutual respect for all. We believe an environment of diversity and respect is critical to achieve and sustain excellence in learning, teaching, and research. Further, we recognize that the responsibility for our values lies with us all within the department – the leadership, faculty, staff, and students. As such, we will hold ourselves to a high standard of excellence and will not stand for the discrimination and harassment of any group or individual. To achieve this, we will:

1. Foster and maintain an environment of respect and inclusion.
2. Ensure equal opportunities for all students, including underrepresented students, and to provide resources to ensure quality learning environment.
3. Hold students, staff, and faculty accountable according to Penn State policies and the Student Code of Conduct.

Reporting Incidents

Students who believe they have experienced or observed a hate crime, an act of intolerance, discrimination, or harassment that occurs at Penn State are urged to report these incidents as outlined on the University's Report Bias webpage (equity.psu.edu/reportbias). Incidents of gender-based discrimination, abuse, or harassment should be reported online at: titleix.psu.edu.

Additional Resources

- Penn State policy: guru.psu.edu/policies/ad91.html
- Student Code of Conduct: studentaffairs.psu.edu/support-safety-conduct/student-conduct/code-conduct

Undergraduate Programs Office

The Undergraduate Programs Office is a resource for all students—regardless of campus location—who are enrolled in, or thinking about enrolling in Forest Ecosystem Management or Wildlife and Fisheries Science.

CONTACT US

Undergraduate Programs Office
113 Forest Resources Building
University Park, PA 16802
(814) 865-4237



Ms. Ellen Rom

Undergraduate Program Coordinator
114 Forest Resources Building
University Park, PA 16802
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Wildlife and Fisheries Science Undergraduate Program

Introduction

The major in Wildlife and Fisheries Science is designed for students interested primarily in conservation and management of wildlife and fish species and their habitats. The major provides a broad background in quantification, arts and humanities, physical and biological sciences, and natural resource management. Flexibility in course selection permits students to plan their programs in keeping with their specific interests, goals, and plans for the future. Graduates may pursue graduate-level training in the wildlife and fisheries sciences or careers in management, research, or information and education. The curriculum provides a firm base for graduate study and the opportunity to meet standards established by The Wildlife Society, The American Fisheries Society, and the federal Office of Personnel Management for employment in wildlife and fisheries biology.

Wildlife and fisheries scientists find employment as natural resource biologists, habitat managers, fish or wildlife technicians, conservation officers, environmental educators, research scientists, teachers, and administrators. Students seeking a career as a wildlife or fisheries biologist often pursue a master's degree. Graduates with a bachelor's degree are generally competitive for technician-level jobs in fisheries and wildlife with federal, state, and county agencies, environmental interpretation positions, and private sector jobs (e.g., environmental consultants, animal damage control, etc.).

Bachelor of Science graduates generally find jobs with state and federal agencies or with private firms. Federal agencies that employ wildlife and fisheries biologists include the U.S. Fish and Wildlife Service, Forest Service, National Park Service, Geological Survey, Bureau of Land Management, Bureau of Reclamation, Bureau of Indian Affairs, and Environmental Protection Agency. State agencies hire fisheries and wildlife biologists in departments of fish and wildlife, forestry, conservation, and environmental resources. Private firms hire fish and wildlife biologists in the areas of environmental consulting, forest management, animal damage control, and natural resource extraction (e.g., gas, oil, coal, and chemical companies). Nonprofit organizations such as The Nature Conservancy, Audubon Society, Trout Unlimited, Pheasants Forever, Quality Deer Management Association, and Ducks Unlimited also hire biologists and environmental educators.

Mission

The mission of the Wildlife and Fisheries Science program is threefold: (1) to provide a challenging and comprehensive curriculum in concepts, principles, and techniques of wildlife and fisheries science and natural resource conservation and management; (2) to educate future wildlife and fisheries professionals; and (3) to increase the awareness of students from all disciplines of the importance of wise stewardship of wildlife, fisheries, and other natural resources.

Wildlife and Fisheries Science Curriculum Requirements (reflects Gen Ed requirements effective Summer 2023)

The Bachelor of Science (B.S.) degree in Wildlife and Fisheries Science requires completion of 120-122 credits. Students enrolled in the B.S. program in Wildlife and Fisheries Science choose one of two options: (1) Wildlife option – 120 credits, and (2) Fisheries option – 122 credits. This specialization is designed to prepare students to enter professional employment or graduate studies.

Courses Required for BOTH Options:

(Individual course credits are given in parentheses)

Penn State General Education Requirement Designations:

GWS – Writing/Speaking	GH – Humanities	GA – Arts
GQ – Quantification	GS – Social and Behavioral Sciences	IL – International Cultures
GHW – Health and Wellness	GN – Natural Sciences	US – United States Cultures

COMMUNICATIONS

- ENGL 15 GWS – Rhetoric and Composition (3) *
- ENGL 202C GWS – Effective Writing: Technical Writing (3) *
- CAS 100 GWS – Effective Speech (3) *
- Communications Selection: AEE 440 – Communications Methods and Media (3), ENGL 416 - Science Writing (3), or ENGL 418 - Advanced Technical Writing and Editing (3). [Note: Also acceptable are AEE 330W – Communication in Ag and Natural Resources Careers, CAS 213 – Persuasive Speaking, CAS 250 – Small Group Communication, RPTM 325 – Principles of Environmental Interpretation, and WFS 497 – Avian Outreach.]

QUANTIFICATION

- MATH 110 or 140 GQ – Techniques of Calculus I (4) * [MATH 140B – Calculus and Biology I – is preferred, though not specifically required]
- MATH 111 or 141 GQ – Techniques of Calculus II (2-4)

- STAT 240 – Introduction to Biometry (3), or STAT 301 GQ– Statistical Analysis I (3) [Note: Also acceptable are STAT 200 GQ – Elementary Statistics, and STAT 250 GQ – Introduction to Biostatistics.] *
- FOR 350 – Forest Ecosystem Monitoring and Data Analysis (3) or STAT 460 – Intermediate Applied Statistics (3) [Also acceptable is WFS 340, Statistics for Conservation of Wild Populations (3)]

NATURAL SCIENCES and OTHER PRESCRIBED COURSES

- WFS 209N – Wildlife and Fisheries Conservation (3) *
- WFS 300 – The Vertebrates (2) * ^
- WFS 301 – Vertebrate Lab (2) *
- WFS 310 – Wildlife and Fisheries Measurements (3) *
- WFS 446 – Wildlife and Fisheries Population Dynamics (3)
- BIOL 110 GN – Biology: Basic Concepts and Biodiversity (4)
- BIOL 220W GN – Biology: Populations and Communities (4) *
- BIOL 133 – Genetics and Evolution of the Human Species, or BIOL 222 – Genetics, or BIOL 230W GN – Biology: Molecules and Cells, or ANSC 322 – Principles of Animal Breeding (3-4) [Also acceptable is FOR/WFS 497 Conservation Genetics (3)]
- BIOL 240W GN – Biology: Function and Development of Organisms (4)
- CHEM 110 GN – Chemical Principles (3)
- CHEM 111 GN – Experimental Chemistry (1)
- CHEM 202 – Organic Chemistry (3)
- PHYS 250 GN – Introductory Physics I (4) **
- SOILS 101 – Introduction to Soils (3)

*Indicates a course requiring at least a C grade.

**PHYS 250 requires “MATH 22 and MATH 26; or MATH 40; or MATH 41” as prerequisites. Students who have placed into MATH 140 have met the “MATH 22 and MATH 26” prerequisite. Students who have placed into or completed the prerequisites for MATH 110, need to take MATH 26 Trigonometry) before taking PHYS 250.

^ Effective Fall 2015, WFS 300 is no longer offered. WFS students must select either FOR 255 or a 400-level WFS course (for two or more credits) that is not otherwise required, except for WFS 494, WFS 495, and WFS 496. A ‘C’ or better grade is required.

ARTS [GA]

- Selection from the University-approved Arts list; must not be Inter-Domain (3)

HUMANITIES [GH]

- Selection from the University-approved Humanities list; must not be Inter-Domain (3)

SOCIAL AND BEHAVIORAL SCIENCES [GS]

- ECON 104 GS – Introductory Macroeconomic Analysis (3)

HEALTH AND WELLNESS [GHW]

- Selection(s) from the University-approved Health Sciences and Physical Education list; must not be Inter-Domain (3)

INTEGRATIVE STUDIES (6)

- Courses with the Inter-Domain attribute fulfill this requirement

EXPLORATION (3)

- May include GN, GA, GH, GN, GS, Inter-Domain, World Language (12th unit and beyond)

ELECTIVES (3-9)

- Selection(s) of choice, excluding remedial courses

UNITED STATES CULTURES AND INTERNATIONAL CULTURES (6)

- Select 3 credits of University-approved United States Cultures (US) and 3 credits of University-approved International Cultures (IL). This requirement can be satisfied in combination with other requirements.

FIRST-YEAR SEMINAR (0-3)

- A student’s campus of enrollment determines whether a First-Year Seminar is required.

WRITING-INTENSIVE COURSE (3)

- Must select 3 credits of writing-intensive (W) course work in your major or college of enrollment. Writing-intensive requirement is satisfied by completion of WFS 463W in the Fisheries option or WFS 447W in the Wildlife option.

Note: General Education course lists are available at bulletins.psu.edu/undergraduate/general-education/course-lists/.

Also required for BOTH options:

NATURAL RESOURCE POLICY, PLANNING, LAW, ADMINISTRATION (PPLA) and HUMAN DIMENSIONS (HD):

Six (6) semester hours in courses that demonstrate significant content or focus on natural resource policy and/or administration, wildlife or environmental law, or natural resource/land use planning will apply; as will courses that document contributions to the understanding of social, political, and ethical decisions for wildlife or natural resource management. Course descriptions are required. Up to three (3) semester hours in classes dealing with human dimension issues may count in this category depending on course content. Conservation Biology courses that effectively integrate legal and policy aspects of conservation planning will count toward this category. Courses that are tools supporting professional practice, e.g., photogrammetry, Land-Sat mapping, GIS techniques, or more general courses such as environmental science, resource management, law enforcement, criminology, political science, and introductory survey courses in conservation will not apply.

Choose 6 credits from the following list:

BLAW/RM 425*	Business and Environmental Regulation (3)
ERM 411*	Legal Aspects of Resource Management (3)
FOR 410	Forest Ecosystem Management (3)
FOR 450W	Human Dimensions of Natural Resources (3)
FOR 480	Policy and Administration (3)
GEOG 1N (GN/GS; US/IL)	Global Parks and Sustainability (3)
GEOG 30N (GN/GS; US/IL)	Environment and Society in a Changing World (3)
GEOG 430*	Human Use of Environment (3)
GEOG 431	Geography of Water Resources (3)
RPTM 120 (GS; US/IL)	Leisure and Human Behavior (3)
RPTM 320	Recreation Resource Planning and Management (3)
SOILS 71 (GN)	Environmental Sustainability (3)
SOILS 422	Natural Resources Conservation and Community Sustainability (4)
WFS 430	(fall 2019 and later) – Conservation Biology (3)
WFS 461	Animal Welfare: Science and Ethics (3)

* denotes course has prerequisites not included in the WFS program

ADDITIONAL COURSES REQUIRED FOR THE FISHERIES OPTION

- WFS 410 – General Fishery Science (3)
- WFS 452 – Ichthyology (2)
- WFS 453 – Ichthyology Lab (2)
- WFS 463W – Fishery Management (3)
- Fisheries and Aquatic Selection (*choose 3 credits from the following list*):
WFS 422 – Ecology of Fishes (3); FOR 470 – Watershed Management (3); WFS/ERM 435 – Limnology (3); ENT 425 – Freshwater Entomology (3)
- Physical Science Selection (*choose 3 credits from the following list*):
FOR 255 – GPS and GIS Applications for Natural Resources Professionals (3); GEOSC 303 – Introduction to Environmental Geology (3); GEOSC 340* – Geomorphology (3); GEOSC 412* – Water Resources Geochemistry (3); GEOSC 440 – Marine Geology (3); GEOSC 452* – Introduction to Hydrogeology (3); GEOG 160 – Mapping our Changing World (3); GEOG 260: Geographic Information in a Changing World: Introduction to GIScience (3); GEOG 363* – Geographic Information Systems (3)
- Physiology Selection (*choose 3-4 credits from the following list*):
BIOL 141 and 142 – Physiology and Lab [note: effective 2019, this changes to BIOL 161 & 162, Anatomy & Physiology I, lecture and lab]; BIOL 446 – Physiology Ecology (3); ANSC 201 – Animal Science (4) [Note that BIOL 142 (1) is no longer required; and that BIOL 161 (3) is also acceptable to fulfill this requirement]
- Wildlife Selection (*choose 3 credits from the following list*):
WFS 407 – Ornithology (3); WFS 408 – Mammalogy (3); WFS 447W – Wildlife Management (3); WFS 460 – Wildlife Behavior (3); WFS 462 – Amphibians and Reptiles (3)

*denotes course has prerequisites not included in the WFS program

ADDITIONAL COURSES REQUIRED FOR THE WILDLIFE OPTION

- FOR 203 – Field Dendrology (3)
- WFS 407 – Ornithology (3)
- WFS 408 – Mammalogy (3)
- WFS 447W – Wildlife Management (3)
- WFS 406 or 409 – Ornithology Lab (2) or Mammalogy Lab (2)
- Fisheries Selection (*choose 2-3 credits from the following list*):
WFS 410 – General Fishery Science (3); WFS 422 – Ecology of Fishes (3); WFS 452 – Ichthyology (2); WFS 453 – Ichthyology Lab (2); WFS 463 – Fishery management (3)
- Botany Selection (*choose 3 credits from the following list*):
BIOL 127 – Introduction to Plant Biology (3) *Students who have passed BIOL 240W may not schedule this course*; BIOL 414 – Taxonomy of Seed Plants (3); BIOL 441 – Plant Physiology (3); FOR 303 – Herbaceous Forest Plant Identification and Ecology (3); FOR 308 – Forest Ecology (3); FOR 403 – Invasive Forest Plants: Identification, Ecology and Management (3); HORT 101 – Horticultural Science (3); HORT 138 – Ornamental Plants – shrubs (3); HORT 445 – Plant Ecology (3)

Suggested Academic Plans for Wildlife and Fisheries Science

(These notes apply to the plans on pages 8-11.)

- **Bold** type indicates courses requiring a quality grade of C or better.
- *Italics* indicate courses that satisfy both major and General Education requirements.
- ***Bold Italics*** indicates courses requiring a quality grade of C or better and that satisfy both major and General Education requirements.
- GWS, GHA, GQ, GN, GA, GH, and GS are codes used to identify General Education requirements.
- US and IL are codes used to designate courses that satisfy United States/International Cultures requirements.
- W is the code used to designate courses that satisfy Writing Across the Curriculum requirements.

Notes:

All course “selections” are listed elsewhere in this handbook, which is also available on our website at ecosystems.psu.edu/undergraduate/resources/handbooks.

Many courses are offered only once per year – in the fall or in the spring.

US and IL cultures may be “double-counted” with Electives or General Education course selections.

STAT 200 and STAT 250 are acceptable alternatives to STAT 240 or 301.

PHYS 250 requires “MATH 22 and MATH 26; or MATH 40; or MATH 41” as prerequisites. Students who have placed into MATH 140 have met the “MATH 22 and MATH 26” prerequisite.

Students who have placed into or completed the prerequisites for MATH 110, need to take MATH 26 or MATH 41 (Trigonometry) before taking PHYS 250.

Students in WFS may count only one of the following towards degree requirements; FOR 255, GEOG 260, or WILDL 211.

The WFS program no longer requires BIOL 142 (1) to be taken with BIOL 141 (3); and BIOL 161 (3) is an acceptable alternative to BIOL 141.

Students should monitor their academic progress by checking their degree audits on LionPATH.

Questions about degree audits should be directed to academic advisers or to the Undergraduate Programs Office.

WFS students should change their campus location to University Park by the start of their junior year (fifth semester).

When a required course has both a lecture and practicum portion, such as PHYS 250L and PHYS 250R, students are required to take both portions.

General Education course lists are available at bulletins.psu.edu/undergraduate/general-education/course-lists/

Suggested Academic Plan for Wildlife and Fisheries Science – Fisheries Option
Starting at University Park, Effective Summer 2023

Semester 1 (fall)	Credits	Semester 2 (spring)	Credits
BIOL 110 (<i>GN</i>)	4	WFS 209N	3
MATH 110 or 140 (<i>GQ</i>)	4	MATH 111 or 141 (<i>GQ</i>)	2-4
ENGL 15 or 30 (<i>GWS</i>)	3	CHEM 110 (<i>GN</i>)	3
General Education selection*	3	CHEM 111 (<i>GN</i>)	1
First-Year Seminar	1-3	General Education selection*	3
		General Education selection*	3
Total Credits:	15-17	Total Credits:	15-17
Semester 3	Credits	Semester 4	Credits
BIOL 141 & 142 , or BIOL 446 , or AN SC 201	3-4	PHYS 250	4
CHEM 202	3	BIOL 240W	4
BIOL 133 , 222 , 230W , or ANSC 322	3-4	SOILS 101 (<i>GN</i>)	3
BIOL 220W (<i>GN</i>)	4	CAS 100 (<i>GWS</i>)	3
STAT 240 or 301 (<i>GQ</i>)	3	General Education selection*	3
Total Credits:	16-18	Total Credits:	17
Semester 5	Credits	Semester 6	Credits
WFS 300	2	FOR 350 or STAT 460	3
WFS 301	2	Fisheries and Aquatic Sci. selection	3
WFS 310	3	Wildlife selection	3
WFS 452	2	ECON 104 (<i>GS</i>)	3
PPLA/HD selection	3	PPLA/HD selection	3
Elective	0-4		
Total Credits:	12-16	Total Credits:	15
Semester 7	Credits	Semester 8	Credits
WFS 410	3	WFS 463W	3
WFS 453	2	WFS 446	3
ENGL 202C (<i>GWS</i>)	3	General Education selection*	3
Communications selection	3	Elective	3
General Education (GHW)	1.5	General Education (GHW)	1.5
Physical science selection	3		
Total Credits:	15.5	Total Credits:	13.5

*Refer to your degree audit to determine which General Education requirements need yet to be fulfilled.

Bold type indicates courses requiring a grade of C or better; *italics* indicates courses that satisfy both major and Gen Ed.

Suggested Academic Plan for Wildlife and Fisheries Science – Fisheries Option
Starting at Commonwealth Campuses, Effective Summer 2023

Semester 1 (fall)	Credits	Semester 2 (spring)	Credits
BIOL 110 (GN)	4	BIOL 220W (GN)	4
MATH 110 or 140 (GQ)	4	MATH 111 or 141 (GQ)	2-4
ENGL 15 or 30 (GWS)	3	CHEM 110 (GN)	3
General Education selection*	3	CHEM 111 (GN)	1
First-Year Seminar	0-3	General Education (GHW)	1.5
		General Education selection*	3
Total Credits:	14-17	Total Credits:	14.5-16.5
Semester 3	Credits	Semester 4	Credits
BIOL 141 and 142 , or BIOL 446 , or AN SC 201	3-4	PHYS 250	4
CHEM 202	3	BIOL 240W	4
BIOL 133 , 222 , 230W , or ANSC 322	3-4	ENGL 202C (GWS)	3
CAS 100 (GWS)	3	General Education selection*	3
STAT 240 or 301 (GQ)	3	ECON 104 (GS)	3
Total Credits:	15-17	Total Credits:	17
Semester 5	Credits	Semester 6	Credits
WFS 209N	3	FOR 350 or STAT 460	3
WFS 300	2	Fisheries and Aquatic Science selection	3
WFS 301	2	SOILS 101 (GN)	3
WFS 310	3	PPLA/HD selection	3
WFS 452	2	Elective	0-4
General Education selection*	3		
Total Credits:	15	Total Credits:	12-16
Semester 7	Credits	Semester 8	Credits
WFS 410	3	WFS 463W	3
WFS 453	2	WFS 446	3
General Education selection*	3	Elective	3
Communications selection	3	PPLA/HD selection	3
General Education (GHW)	1.5	Physical science selection	3
Wildlife selection	3		
Total Credits:	15.5	Total Credits:	15

*Refer to your degree audit to determine which General Education requirements need yet to be fulfilled

Bold type indicates courses requiring a grade of C or better; *italics* indicates courses that satisfy both major and Gen Ed.

Suggested Academic Plan for Wildlife and Fisheries Science – Wildlife Option
Starting at University Park, Effective Summer 2023

Semester 1 (fall)	Credits	Semester 2 (spring)	Credits
BIOL 110 (<i>GN</i>)	4	WFS 209N	3
MATH 110 or 140 (<i>GQ</i>)	4	MATH 111 or 141 (<i>GQ</i>)	2-4
ENGL 15 or 30 (<i>GWS</i>)	3	CHEM 110 (<i>GN</i>)	3
General Education selection*	3	CHEM 111 (<i>GN</i>)	1
First-Year Seminar	1-3	General Education selection*	3
Total Credits:	15-17	Total Credits:	12-14
Semester 3	Credits	Semester 4	Credits
FOR 203	3	PHYS 250	4
CHEM 202	3	BIOL 240W	4
BIOL 133 , 222 , 230W , or ANSC 322	3-4	SOILS 101 (<i>GN</i>)	3
BIOL 220W (<i>GN</i>)	4	CAS 100 (<i>GWS</i>)	3
STAT 240 or 301 (<i>GQ</i>)	3	General Education selection*	3
Total Credits:	16-17	Total Credits:	17
Semester 5	Credits	Semester 6	Credits
WFS 300	2	FOR 350 or STAT 460	3
WFS 301	2	WFS 406 or 409 (one required)	2
WFS 310	3	WFS 407 or 408 (both required)	3
General Education selection*	3	ECON 104 (<i>GS</i>)	3
PPLA/HD selection	3	PPLA/HD selection	3
Elective	3	General Education (<i>GHW</i>)	1.5
Total Credits:	16	Total Credits:	15.5
Semester 7	Credits	Semester 8	Credits
WFS 447W	3	WFS 407 or 408 (both required)	3
Fisheries selection	2-3	WFS 446	3
ENGL 202C (<i>GWS</i>)	3	General Education selection*	3
Communications selection	3	Elective	1-5
Botany selection	3	General Education (<i>GHW</i>)	1.5
Total Credits:	14-15	Total Credits:	11.5-15.5

*Refer to your degree audit to determine which General Education requirements need yet to be fulfilled

Bold type indicates courses requiring a grade of C or better, *italics* indicates courses that satisfy both major and Gen Ed.

Suggested Academic Plan for Wildlife and Fisheries Science – Wildlife Option
Starting at Commonwealth Campuses, Effective Summer 2023

Semester 1 (fall)	Credits	Semester 2 (spring)	Credits
BIOL 110 (GN)	4	BIOL 220W (GN)	4
MATH 110 or 140 (GQ)	4	MATH 111 or 141	2-4
ENGL 15 or 30 (GWS)	3	CHEM 110 (GN)	3
First-Year Seminar	0-3	CHEM 111 (GN)	1
General Education selection*	3	General Education selection*	3
		General Education selection*	3
Total Credits:	14-17	Total Credits:	16-18
Semester 3	Credits	Semester 4	Credits
CHEM 202	3	PHYS 250	4
BIOL 133 , 222 , 230W , or ANSC 322	3-4	BIOL 240W	4
CAS 100 (GWS)	3	ECON 104 (GS)	3
STAT 240 or 301 (GQ)	3	General Education selection*	3
General Education (GHW)	1.5	ENGL 202C (GWS)	3
Total Credits:	13.5-14.5	Total Credits:	17
Semester 5	Credits	Semester 6	Credits
WFS 209N	3	FOR 350 or STAT 460	3
WFS 300	2	WFS 406 or 409 (one required)	2
WFS 301	2	WFS 407 or 408 (both required)	3
WFS 310	3	SOILS 101 (GN)	3
FOR 203	3	Elective	3
PPLA/HD selection	3		
Total Credits:	16	Total Credits:	14
Semester 7	Credits	Semester 8	Credits
WFS 447W	3	WFS 407 or 408 (both required)	3
Fisheries selection	2-3	WFS 446	3
General Education selection*	3	PPLA/HD selection	3
Communications selection	3	Elective	1-5
Botany selection	3	General Education (GHW)	1.5
Total Credits:	14-15	Total Credits:	11.5-15.5

*Refer to your degree audit to determine which General Education requirements need yet to be fulfilled.

Bold type indicates courses requiring a grade of C or better; *italics* indicates courses that satisfy both major and Gen Ed.

Name _____
 Student Number _____
 User ID _____

Adviser _____
 Gen Ed Year _____
 Program Year _____

**Wildlife and Fisheries Science
 Fisheries Option, 122 credits required
 effective summer 2008**

<i>Sem.</i>	<i>Course</i>	<i>Grade</i>	<i>Sem.</i>	<i>Course</i>	<i>Grade</i>
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Prescribed Courses for the Major (45 cr.)

_____	BIOL 110 GN	4 cr.	_____
_____	BIOL 220W* GN	4 cr.	_____
_____	BIOL 240W GN	4 cr.	_____
_____	CHEM 110 GN	3 cr.	_____
_____	CHEM 111 GN	1 cr.	_____
_____	CHEM 202	3 cr.	_____
_____	ECON 104	3 cr.	_____
_____	ENGL 202C GWS	3 cr.	_____
_____	PHYS 250 GN	4 cr.	_____
_____	SOILS 101 GN	3 cr.	_____
_____	WFS 209N*	3 cr.	_____
_____	WFS 300*	2 cr.	_____
_____	WFS 301*	2 cr.	_____
_____	WFS 310*	3 cr.	_____
_____	WFS 446	3 cr.	_____

Additional Courses for the Major (18-21 cr.)

_____	AEE 440, ENGL 416, or ENGL 418	3 cr.	_____
_____	ANSC 322, BIOL 133, BIOL 222, or 230W	3-4 cr.	_____
_____	FOR 350 or STAT 460	3 cr.	_____
_____	MATH 110* or 140* GQ	4 cr.	_____
_____	MATH 111 or 141 GQ	2-4 cr.	_____
_____	STAT 240 or 301 GQ	3 cr.	_____

Prescribed Courses for the Option (10 cr.)

_____	WFS 410	3 cr.	_____
_____	WFS 452	2 cr.	_____
_____	WFS 453	2 cr.	_____
_____	WFS 463W	3 cr.	_____

Additional Courses for the Option (12-13 cr.)

_____	BIOL 141 & 142; BIOL 446; or ANSC 201	3-4 cr.	_____
_____	WFS 407, 408, 447, 460, or 462	3 cr.	_____
_____	GEO SC 303, 340, 412, 440, 452, GEOG 160, or GEOG 363	3 cr.	_____
_____	ENT 425, FOR 470, WFS 422, or WFS/ERM 435	3 cr.	_____

Supporting Courses for the Option (6 cr.)

PPLA/HD selections – Select 6 credits in natural resource economics, policy, planning, law, administration, or human dimensions from departmental list

_____	_____	3 cr.	_____
_____	_____	3 cr.	_____

Electives (3-7 cr.)

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

*Courses requiring at least a C grade.
 A minimum cumulative GPA of 2.00 is required for graduation.
 Use this checksheet in conjunction with the LionPATH degree audit to confirm completion of all degree requirements.

General Education (45 cr.)

21 of these 45 credits are included in the requirements listed above; that is, 9 credits of GN; 6 credits of GQ; 3 credits of GS; and 3 credits of GWS.

continued

continued

Name _____

**Wildlife and Fisheries Science, Fisheries Option
General Education (45 cr.) - effective summer 2023**

FOUNDATIONS (15 cr.) – all must be completed with a grade of 'C' or better

Writing/Speaking GWS 9 cr.

____ CAS 100 GWS 3 cr. ____

____ ENGL 15 GWS 3 cr. ____

and ENGL 202C GWS if 'C' or better grade is earned

Quantification GQ 6 cr.

satisfied by MATH GQ and STAT GQ if 'C' or better grades are earned

KNOWLEDGE DOMAINS (21 cr.) – 3 credits each in GA, GH, GN, GS, and GHW must not be Inter-Domain

Arts GA 3 cr.

____ 3 cr. ____

Humanities GH 3 cr.

____ 3 cr. ____

Social and Behavioral Sciences GS 3 cr.

satisfied by ECON 104 GS

Natural Sciences GN 9 cr.

satisfied by required BIOL GN, CHEM GN, SOILS GN courses

Health and Wellness GHW 3 cr.

____ cr. ____

____ cr. ____

INTEGRATIVE STUDIES (6 cr.) *Inter-Domain courses*

____ 3 cr. ____

____ 3 cr. ____

EXPLORATION (3 cr.) – may include GN, GA, GH, GN, GS,

Inter-Domain, World Language (12th unit and beyond)

____ 3 cr. ____

ADDITIONAL UNIVERSITY REQUIREMENTS (9-12 cr.) – may double count with other requirements

United States Cultures (US)

____ 3 cr. ____

International Cultures (IL)

____ 3 cr. ____

First-Year Experience (FYS) 0-3 cr. – depending upon

the campus at which you first enrolled

____ cr. ____

Writing Across the Curriculum 3 cr.

satisfied by WFS 463W

Name _____
 Student Number _____
 User ID _____

Adviser _____
 Gen Ed Year _____
 Program Year _____

**Wildlife and Fisheries Science
 Wildlife Option, 120 credits required
 effective summer 2008**

<i>Sem.</i>	<i>Course</i>	<i>Cr.</i>	<i>Grade</i>	<i>Sem.</i>	<i>Course</i>	<i>Cr.</i>	<i>Grade</i>
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Prescribed Courses for the Major (45 cr.)

_____	BIOL 110 GN	4 cr.	_____
_____	BIOL 220W* GN	4 cr.	_____
_____	BIOL 240W GN	4 cr.	_____
_____	CHEM 110 GN	3 cr.	_____
_____	CHEM 111 GN	1 cr.	_____
_____	CHEM 202	3 cr.	_____
_____	ECON 104 GS	3 cr.	_____
_____	ENGL 202C GWS	3 cr.	_____
_____	PHYS 250 GN	4 cr.	_____
_____	SOILS 101 GN	3 cr.	_____
_____	WFS 209N*	3 cr.	_____
_____	WFS 300*	2 cr.	_____
_____	WFS 301*	2 cr.	_____
_____	WFS 310*	3 cr.	_____
_____	WFS 446	3 cr.	_____

Additional Courses for the Major (18-21 cr.)

_____	AEE 440, ENGL 416, or ENGL 418	3 cr.	_____
_____	ANSC 322, BIOL 133, BIOL 222, or 230W	3-4 cr.	_____
_____	FOR 350 or STAT 460	3 cr.	_____
_____	MATH 110* or 140* GQ	4 cr.	_____
_____	MATH 111 or 141 GQ	2-4 cr.	_____
_____	STAT 240 or 301 GQ	3 cr.	_____

Prescribed Courses for the Option (12 cr.)

_____	FOR 203	3 cr.	_____
_____	WFS 407	3 cr.	_____
_____	WFS 408	3 cr.	_____
_____	WFS 447W	3 cr.	_____

Additional Courses for the Option (7-8 cr.)

_____	WFS 406 or 409	2 cr.	_____
_____	WFS 410, 422, 452, 453, or 463W	2-3 cr.	_____
_____	BIOL 127, 414, 441, FOR 308, HORT 101, 138, or 445	3 cr.	_____

Supporting Courses for the Option (6 cr.)

PPLA/HD selections – Select 6 credits in natural resource economics, policy, planning, law, administration, or human dimensions from departmental list

_____	_____	3 cr.	_____
_____	_____	3 cr.	_____

Electives (4-8 cr.)

_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

*Courses requiring at least a C grade.
 A minimum cumulative GPA of 2.00 is required for graduation.
 Use this checksheet in conjunction with the LionPATH degree audit to confirm completion of all degree requirements.

General Education (45 cr.)

21 of these 45 credits are included in the requirements listed above; that is, 9 credits of GN; 6 credits of GQ; 3 credits of GS; and 3 credits of GWS.

continued

continued

Name _____

**Wildlife and Fisheries Science, Wildlife Option
General Education (45 cr.) - effective summer 2023**

FOUNDATIONS (15 cr.) – all must be completed with a grade of 'C' or better

Writing/Speaking GWS 9 cr.

_____ CAS 100 GWS 3 cr. _____

_____ ENGL 15 GWS 3 cr. _____

and ENGL 202C GWS if 'C' or better grade is earned

Quantification GQ 6 cr.

satisfied by MATH GQ and STAT GQ if 'C' or better grades are earned

KNOWLEDGE DOMAINS (21 cr.) – 3 credits each in GA, GH, GN, GS, and GHW must not be Inter-Domain

Arts GA 3 cr.

_____ 3 cr. _____

Humanities GH 3 cr.

_____ 3 cr. _____

Social and Behavioral Sciences GS 3 cr.

satisfied by ECON 104 GS

Natural Sciences GN 9 cr.

satisfied by required BIOL GN, CHEM GN, SOILS GN courses

Health and Wellness GHW 3 cr.

_____ cr. _____

_____ cr. _____

INTEGRATIVE STUDIES (6 cr.) *Inter-Domain courses*

_____ 3 cr. _____

_____ 3 cr. _____

EXPLORATION (3 cr.) – may include GN, GA, GH, GN, GS, Inter-Domain, World Language (12th unit and beyond)

_____ 3 cr. _____

ADDITIONAL UNIVERSITY REQUIREMENTS (9-12 cr.) – may double count with other requirements

United States Cultures (US)

_____ 3 cr. _____

International Cultures (IL)

_____ 3 cr. _____

First-Year Experience (FYS) 0-3 cr. – depending upon the campus at which you first enrolled

_____ cr. _____

Writing Across the Curriculum 3 cr.

satisfied by WFS 447W

Technology Resources

Currently enrolled Penn State students have access to free online video tutorials at linkedinlearning.psu.edu, including tutorials on Excel, Illustrator, Dreamweaver, Photoshop, Access, PowerPoint, and more.

Penn State IT (Information Technology) provides chat, phone, and email support 24/7. Penn State recommends that you own a laptop that meets or exceeds the minimum technical specifications. Visit **Basic Recommended Specifications** for information regarding computer purchases. At **Penn State IT Learning and Development**, students may search for technology training solutions that best meet their needs.

Tech tutors, techtutors.psu.edu, provide personalized, face-to-face, and online help with Access, Photoshop, Excel, PowerPoint, Visio, Word, Acrobat, Indesign, Sites at Penn State, WikiSpaces, Prezi, and more.

Internships, Independent Study, and Undergraduate Research

Practical work or research experience that supplements a student's course work is an asset when seeking employment after graduation. All Wildlife and Fisheries Science students are encouraged to get related experience through either summer jobs or internships. Academic credit can be awarded for Independent Studies (WFS 496), Undergraduate Research (WFS 494), or Internship experiences (WFS 495); however, it is not required.

A handbook of guidelines for WFS 495 internships is available in the Ecosystem Science and Management Undergraduate Programs Office, 113 Forest Resources Building. These guidelines must be followed before a student registers for internship credits. Students must have a minimum cumulative 2.0 GPA in order to register for internship credits. The Ecosystem Science and Management Internship Handbook is also available online at: ecosystems.psu.edu/undergraduate/resources/handbooks/internship-handbook

The Department Ecosystem Science and Management forwards all natural-resource related job announcements to Nittany Lion Careers, nittanylioncareers.psu.edu. Nittany Lion Careers is open to all students, alumni, and employers. Job and internships are posted daily, so check Nittany Lion Careers often. It is important to remember that this is only one resource and that an effective job search may utilize a variety of sources. Links to natural resources employers and various other job boards are listed on our department website at ecosystems.psu.edu/undergraduate/resources/employment.

Details about Undergraduate Research are posted at agsci.psu.edu/students/research.

Study Abroad

School for Field Studies

Penn State's College of Agricultural Sciences has established a formal affiliation with **The School for Field Studies (SFS)**. For more information, please contact Ketja Lingenfelter, Education Abroad Adviser, Office of International Programs, College of Agricultural Sciences, 122 Agricultural Administration Building, Phone: 814-863-4164; e-mail ketja@psu.edu.

Ag Sciences Global

Staff at Ag Sciences Global are available to help students find the right program and identify financial support. Learn more at <https://agsci.psu.edu/global>.

Penn State Global

Penn State Global offers help in planning an international experience. Penn State has more than 180 summer, semester, and full-year programs in more than 45 countries! The Office of Global Programs also offers numerous other short-term, faculty-led programs. With all these options, it is possible for students in nearly any discipline to study abroad. A listing of these programs may be found at global.psu.edu. In addition, Penn State accepts transfer credits from many other programs.

The Wildlife Society

The Wildlife Society (TWS) is an international organization committed to addressing national and international issues that affect the current and future status of wildlife in North America and throughout the world. Founded in 1937, the organization's mission is "To inspire, empower, and enable wildlife professionals to sustain wildlife populations and habitats through science-based management and conservation."

TWS supports the development and advancement of wildlife professionals throughout their careers. Certification constitutes recognition by TWS that, to its best knowledge, a member meets the minimum educational, experience, and ethical standards adopted by the society for professional wildlife biologists.

TWS is the only organization to provide the peer-reviewed wildlife biologist certification process that bestows the title of Associate Wildlife Biologist and Certified Wildlife Biologist.

Associate Wildlife Biologist® - An individual who has completed rigorous academic standards and is judged able to represent the profession as an ethical practitioner will be designated as an Associate Wildlife Biologist®. The AWB® certification is granted for 10 years and cannot be renewed. An AWB® certified individual can upgrade to Certified Wildlife Biologist® during the 10-year time period once the necessary experience requirements are obtained.

Certified Wildlife Biologist® - An individual with the educational background and demonstrated expertise in the art and science of applying the principles of ecology to the conservation and management of wildlife and its habitats and is judged able to represent the profession as an ethical practitioner, will be designated as a Certified Wildlife Biologist®. The CWB® certification is valid for 5 years and may be renewed.

For the most current certification information and application forms visit <https://wildlife.org/certification-programs/>. Membership in TWS is required to apply for certification.

Educational Requirements for Certification

Applicants must have completed a course of study in a college or university leading to a Bachelor of Science, or Bachelor of Arts, or equivalent, or higher degree, and should have the following, or equivalent, course work listed below. **All courses must be taken for credit and passed** (i.e., C- or better, "Pass in the ca"se of pass/fail, or "Satisfactory" in the case of unsatisfactory/satisfactory). Each application for certification is individually reviewed. TWS membership is required for valid certification.

For the most current certification information and application forms, visit <https://wildlife.org/certification-programs/>.

Penn State courses understood to meet these requirements are listed; however, it is important to note that courses are not pre-approved and the acceptability of specific courses to TWS can, and does, change.

- A. Wildlife Management and Biology (minimum 12 semester hours): Courses emphasizing the principles and practices of wildlife management and an understanding of the biology of wildlife species and their habitat relationships as the basis for management. **Course descriptions are required.** At least one course (≥3 credits) must demonstrate training in understanding and manipulating wildlife habitat relationships and population dynamics in the context of objectives and influences established by human concerns and activities. Conservation biology courses are accepted if they contain a specific focus on wildlife management and decision making. One course (≥3 credits) must focus solely on the science of mammalogy, ornithology, or herpetology (this course must be taken at a college/university and cannot be substituted by experience). Courses that combine herpetology, mammalogy and/or ornithology will meet this requirement. Up to 3 credit hours of invertebrate biology courses can be counted as long as there is specific focus on natural resource management applications. Ichthyology, marine biology (except courses

focusing on marine mammals, birds or reptiles), microbiology, or related courses will not count in this category, but will qualify in the Zoology category.

WFS 209N – Wildlife and Fisheries Conservation	3
WFS 310 – Wildlife and Fisheries Measurements	3
WFS 446 – Wildlife and Fisheries Population Dynamics	3
WFS 447W – Wildlife Management	3
WFS 407 – Ornithology	3
WFS 408 – Mammalogy	3
<i>Total</i>	18

- B. Ecology (minimum 3 semester hours): Courses in general plant or animal ecology (excludes human ecology). **Course descriptions are required**

BIOL 220W – Populations and Communities	4
<i>Total</i>	4

- C. Zoology (minimum 9 semester hours): Courses in taxonomy, biology, behavior, physiology, anatomy, and natural history of vertebrates and invertebrates. **Course descriptions are required.** Courses in genetics, nutrition, physiology, disease, and other biology or general zoology courses are accepted. Credits in general genetics and general biology should be split evenly between Zoology and Botany categories. Ichthyology or fisheries biology courses are accepted.

ANSC 322, BIOL 133 or 222 ▲ – Genetics/Breeding	3
WFS 301 – Vertebrate Laboratory	2
WFS 406 or 409 – Ornithology or Mammalogy Laboratory	2
BIOL 110 – Basic Concepts and Biodiversity	2
BIOL 240W – Function and Development Organisms	2
<i>Total</i>	11

[▲Credits for BIOL 222, a general genetics course, are to be split evenly between Zoology and Botany categories.]

- D. Botany (minimum 9 semester hours): Courses in general botany, plant anatomy, plant genetics, plant morphology, plant physiology, or plant taxonomy and other botany courses. **Course descriptions are required.** Dendrology and silvics are accepted. Partial course credit may be allowed for silviculture if content related to dendrology and or/silvics is included. At least one course (≥2 semester hours) or the equivalent must be primarily concerned with plant taxonomy or identification. Credits in general genetics and general biology should be split evenly between the Zoology and Botany categories.

FOR 203 – Dendrology	3
Botany Selection	3
BIOL 110 – Basic Concepts and Biodiversity	2
BIOL 240W – Function and Development Organisms	2
<i>Total</i>	10

- E. Physical Sciences (minimum 9 semester hours): Includes courses in chemistry, physics, geology, or soils, with at least two disciplines represented. **Course descriptions are NOT required.**

CHEM 110 – Chemical Principles	3
CHEM 111 – Experimental Chemistry	1
CHEM 202 – Organic Chemistry	3
PHYS 250 – Introductory Physics	4
SOILS 101 – Introduction to Soils	3
<i>Total</i>	14

- F. Basic Statistics (minimum 3 semester hours): Course(s) in basic statistics. **Course descriptions are required.**

STAT 200, 240, or 250	3-4
FOR 350 – Forest Ecosystem Monitoring and Data Analysis or STAT 460 – Intermediate Applied Statistics or WFS 340 – Statistics for Conservation of Wild Populations	3
<i>Total</i>	<i>6-7</i>

- G. Quantitative Sciences (minimum 6 semester hours): Courses in calculus, biometry, college algebra, advanced algebra, trigonometry, systems analysis, mathematical modeling, sampling, computer science, or other quantitative science. **Course descriptions are required.** Elementary algebra, remedial algebra, and introductory personal computing courses do not count in this category.

MATH 110 or 140 – Calculus I	4
MATH 111 or 141 – Calculus II	2-4
<i>Total</i>	<i>6-8</i>

- H. Humanities and Social Sciences (minimum 9 semester hours): Courses such as economics, sociology, psychology, political science, government, history, literature, or foreign language. **Course descriptions are NOT required.**

GS and GH General Education selections	9
<i>Total</i>	<i>9</i>

- I. Communications (minimum 12 semester hours): Courses designed to improve communication skills such as English composition, technical writing, journalism, public speaking, or use of mass media. **Course descriptions are required.** A maximum of three semester hours each will be allowed for a completed master's thesis and Ph.D. dissertation. Courses in literature interpretation, foreign languages, and classes requiring a term paper, class projects, and semesters in non-communication courses generally will not count toward this category. However, non-communication courses designated by the college or university as communication-intensive (e.g., writing-intensive course) will be accepted in this category. The applicant must provide official university documentation describing how the course meets the communication-intensive requirement. Applicants may receive partial credit for non-communication, such as senior thesis and other capstone courses, and natural resource-related seminars. A course syllabus or letter from an instructor describing the communication component of the course is required.

ENGL 15 – Rhetoric and Composition	3
ENGL 202C – Technical Writing	3
CAS 100 – Effective Speech	3
Communications Selection	3
<i>Total</i>	<i>12</i>

- J. Policy, Administration, and Law (minimum 6 semester hours): Courses that demonstrate significant content or focus on natural resource policy and/or administration, wildlife, or environmental law, or natural resource/land use planning will apply in addition to courses that document contributions to the understanding of social, political, and ethical decisions for wildlife and natural resources management. **Course descriptions are required.** Up to three (3) semester hours in classes dealing with human dimension issues may count in this category, depending on course content. Conservation Biology courses that effectively integrate legal and policy aspects of conservation planning will count toward this category. Courses that are tools supporting professional practice, e.g., Landsat, GIS techniques, or more general courses such as environmental science, resource management, law enforcement, criminology, political science, and introductory survey courses in conservation will not apply.

Policy, Planning, Law, and Administration (PPLA) and Human Dimensions selections (HD)	6
<i>Total</i>	<i>6</i>

The American Fisheries Society

The American Fisheries Society (AFS) is the world’s leading association of fisheries professionals, and it has established certification criteria. The society’s certification program is fully developed and reputable, providing a meaningful credential for those who meet the certification standards. A board of certified fisheries professionals objectively reviews the qualifications of applicants. Practiced across a broad range of professions, certification programs provide standards and guidelines for professional recognition. While certification is not a license to practice for fisheries professionals as is required of physicians, architects, lawyers, or accountants, it does provide an extra measure of professionalism.

Only members of AFS may apply for certification.

Associate Fisheries Professional – An applicant who satisfies coursework and degree (minimum of B.S. or B.A.) requirements but has insufficient or no experience

Certified Fisheries Professional – An applicant who satisfies course work and degree requirements and has a specific number of years of qualifying experience and a specific number of professional development quality points

For the most current certification information and application forms visit <https://fisheries.org/membership/afs-certification/> or contact AFS, 5410 Grosvenor Lane, Bethesda, MD 20814; phone (301) 897-8616.

Penn State courses understood to meet these requirements are listed; however, it is important to note that courses are not pre-approved and the acceptability of specific courses to AFS can, and does, change.

A minimum grade of C- is required to receive credit. Pass/fail credits are not viewed as an acceptable measure of competency for a subject area. However, if the institution attended by the applicant provides evidence that a “pass” grade is equivalent to a “C-” grade then AFS will allow that course to be used for requirements.

Educational Requirements for Certification

- A. Fisheries and Aquatic Sciences: A minimum of four courses, for a total of 12 semester credits. Of the four courses, at least three must be directly related to fisheries science. At least one course must cover principles of fisheries science and management and one course must cover fisheries and/or aquatic sampling techniques or its equivalent.

WFS 410 – General Fishery Science	3
WFS 422 – Ecology of Fishes	3
WFS 452 – Ichthyology	2
WFS 453 – Ichthyology Lab	2
WFS 463W – Fishery Management	3
<i>Total</i>	<i>13</i>

- B. Other Biological Sciences: When added to the preceding courses, total to thirty (30) semester hours.

BIOL 110 – Basic Concepts and Biodiversity	4
BIOL 220W – Populations and Communities	4
BIOL 240W – Function and Develop. Organisms	4
ANSC 322, BIOL 133 or 222 – Genetics/Breeding	3
Physiology Selection	3
<i>Total</i>	<i>18</i>

- C. Physical Sciences: Fifteen (15) semester hours. Includes chemistry, physics, soils, geology, hydrology, earth science, astronomy, and meteorology.

CHEM 110 – Chemical Principles	3
CHEM 111 – Experimental Chemistry	1
CHEM 202 – Organic Chemistry	3
PHYS 250 – Introductory Physics	4
SOILS 101 – Introduction to Soils	3
Physical Science Selection	3
<i>Total</i>	<i>17</i>

- D. Mathematics and Statistics: Six (6) semester hours, including one (1) calculus and one (1) statistics course or two (2) statistics courses.

MATH 110 or 140 – Calculus I	4
MATH 111 or 141 – Calculus II	2-4
STAT 200, 240, or 250 STAT 240	3-4
FOR 350 – Forest Ecosystem Monitoring and Data Analysis or STAT 460 – Intermediate Applied Statistic or WFS 340 – Statistics for Conservation of Wild Applications	3
<i>Total</i>	<i>12-15</i>

- E. Communications: Nine (9) semester hours in communication courses that require oral and written communication skills. A minimum of 3 semester hours must be completed in oral communications and minimum of 3 semester hours must be completed in written communications. The remaining semester hours can be in either oral or written communications. Communication intensive courses, if officially designated as such by the college or university, can be applied in this category. However, if such courses are used in this category, they cannot be counted in another category (e.g., Category A).

ENGL 15 – Rhetoric and Composition	3
ENGL 202C – Technical Writing	3
CAS 100 – Effective Speech	3
Communications Selection	3
<i>Total</i>	<i>12</i>

- F. Human Dimensions: Six semester hours. Human Dimensions courses must be focused towards socioeconomic topics of natural resource science and management, preferably those issues and aspects that directly pertain to fisheries management. They include courses such as named courses in human dimensions of natural resources and courses in policy, planning, administration, law, ethics, public relations, leadership, conflict resolution, natural resource economics, and others related to natural resource management. Introductory social science courses, such as sociology and psychology, do not qualify. Courses in this group may be double counted as fulfilling course requirements in the Fisheries and Aquatic Sciences category but the credit hours must be apportioned between the two categories based on the percentage time devoted to the human dimensions topic.

Policy, Planning, Law, and Administration (PPLA) and Human Dimensions selections (HD)	6
<i>Total</i>	<i>6</i>

Course Descriptions

A complete listing of course descriptions can be found at bulletins.psu.edu.

WFS/FOR 150S FIRST-YEAR SEMINAR (2) The objectives of this first-year seminar course are to: (1) Engage and prepare first-year college students for academic success by orienting them to the scholarly community and introducing them to available academic resources. (2) Introduce students to Pennsylvania's forests and some of the research and other activities currently underway at Penn State that supports the conservation and management of these resources. (3) Introduce students to strategies they can use while at Penn State to prepare for careers related to forestry, wildlife/fisheries, and other natural resources disciplines.

WFS 209N WILDLIFE AND FISHERIES CONSERVATION (3) Survey of current and historical issues in wildlife and fisheries conservation; emphasis on vertebrate biodiversity, habitat management and protection, and populations. Prerequisite: Recommended preparation: a course in high school biology.

WFS 296 INDEPENDENT STUDIES (1-18) Creative projects, including research and design, that are supervised on an individual basis and that fall outside the scope of formal courses.

WFS 297 SPECIAL TOPICS (1-9) Formal courses given infrequently to explore, in depth, a comparatively narrow subject which may be topical or of special interest.

WFS 299 IL FOREIGN STUDIES (1-12) Courses offered in foreign countries by individual or group instruction.

WFS 300 THE VERTEBRATES (2) Overview of the evolution, systematics, ecology, and behavior of the subphylum vertebrata. Prerequisite: BIOL 110

WFS 301 VERTEBRATE LABORATORY (2) Overview of the anatomy, identification, collection, and preservation of the vertebrates. Concurrent courses: BIOL 110 and (WFS 209 or WILDL 101)

WFS 310 WILDLIFE AND FISHERIES MEASUREMENTS (3) Introduction to field and laboratory approaches for collecting, analyzing, and communicating data regarding wildlife and fish populations and their habitats. Prerequisite: or concurrent: WFS 209, STAT 240

WFS 340 STATISTICS FOR CONSERVATION OF WILD POPULATIONS (3) Overview of the statistical techniques used by wildlife and fisheries biologists to research wild animal populations and guide management and conservation. Wildlife and fisheries researchers use many approaches that are not taught in general statistics classes, because they deal with wild populations that cannot be censused, randomly sampled, or consistently resampled. We will cover methods used to estimate animal abundance, survival, occupancy, and habitat use, as well as how we can test hypotheses about individual, temporal, and spatial variation. Students will learn how to implement these methods using standard statistical software (such as program R and MARK), how to determine the best method for answering a question, and how to interpret statistical results in the context of management and conservation. Prerequisites: STAT 200 or STAT 240 or STAT 250 with a C or higher grade

WFS 406 ORNITHOLOGY LABORATORY (2) Laboratory and field identification of Pennsylvania birds, avian ecology, and behavior, field survey techniques. Concurrent: WFS 407

WFS 407 ORNITHOLOGY (3) Introduction to the biology, ecology, adaptations, and conservation of birds. Prerequisite: BIOL 110

WFS 408 MAMMALOLOGY (3) Identification, systematics, characteristics, adaptations, ecology, behavior, natural history and conservation, and socio-economic aspects of mammals. Prerequisite: BIOL 110

WFS 409 MAMMALOLOGY LABORATORY (2) Laboratory and field identification of mammals, ecology and behavior of mammals, field survey techniques. Concurrent: WFS 408

WFS 410 GENERAL FISHERY SCIENCE (3) Introduction to the study, management, and uses of fish populations; methods of investigation, culture, and harvest of fishes. Concurrent: BIOL 110 or WFS 209 or WILDL 101

WFS 422 ECOLOGY OF FISHES (3) Role of fishes in aquatic communities and general ecosystems. Environmental factors influencing fish as individuals, populations, and communities. Prerequisite: BIOL 110

WFS/FOR 430 CONSERVATION BIOLOGY (3) The application of biological principles to issues in the conservation of biodiversity. Prerequisite: BIOL 220W or FOR 308 or WFS 209

WFS/ERM 435 LIMNOLOGY (3) Biogeochemistry and natural history of freshwater ecosystems. Prerequisite: BIOL 110, BIOL 220W, CHEM 110

WFS 446 WILDLIFE AND FISHERIES POPULATION DYNAMICS (3) Concepts and estimation of mammalian, avian, and fish populations; processes of mortality, natality, growth, and regulation. Prerequisite: WFS 209N

WFS 447W WILDLIFE MANAGEMENT (3) Management of renewable wildlife resources by applying ecological concepts, habitat evaluation, and decision-making; writing and editing reports are emphasized. Prerequisite: WFS 209

WFS/ERM 450 WETLAND CONSERVATION (3) Wetland types, classification, functions, and values; hydrology, soils, and plants; introduction to wetland identification and delineation; wetland regulations. Prerequisite: ERM 300 or WFS 209

WFS 452 ICHTHYOLOGY (2) Study of the structure, taxonomy, systematics, and natural history of freshwater and marine fishes. Prerequisites: BIOL 110, BIOL 240W

WFS 453 ICHTHYOLOGY LABORATORY (2) Identification of fishes, major fish families, use of keys. Prerequisites: BIOL 110, BIOL 240W. Prerequisite or concurrent: WFS 452

WFS 454 FIELD ICHTHYOLOGY (2) Field Ichthyology is designed to familiarize students with collection, observation, and field identification of Pennsylvania's fish fauna. Students will get hands-on instruction on how to collect, preserve, catalog, curate, and observe fishes. Additionally, students will learn how to gather pertinent in situ behavioral and distribution information on fishes and how to manage, record, and store field data. With the increasing emphasis on biodiversity and environmental monitoring, students need to be able to collect, manage, and store data as well as secure the chain of custody. Prerequisite: BIOL 110

WFS 460 WILDLIFE BEHAVIOR (3) Scholarly discussion and critique of history, concepts, and application of wildlife behavioral concepts to conservation issues. Prerequisite: at least 6 credits in general wildlife or biology

WFS 461 ANIMAL WELFARE: SCIENCE AND ETHICS (3) Understanding animal welfare and well-being in farmed, wild and captive animals, and the implications for policy legislation and conservation. Prerequisite: BIOL 110 or WFS 209

WFS 462 AMPHIBIANS AND REPTILES (3) Critique of global evolution and conservation of amphibians and reptiles, focusing on Northeastern U.S. natural history and ecology. Prerequisite: 5th semester standing or higher and 6 credits of general biology

WFS 463W FISHERY MANAGEMENT (3) Management of sport and commercial fisheries, including biological, political, social, and economic factors; regulations and other management techniques. Prerequisite: WFS 209, WFS 300, WFS 301, WFS 310

WFS 489 SUPERVISED EXPERIENCE IN COLLEGE TEACHING (1-3) The Supervised Experience in College Teaching course provides select undergraduate students with formal, supervised teaching experience in a Wildlife and Fisheries Science course. Prerequisites: Permission of program

WFS 494 UNDERGRADUATE RESEARCH (1-12) Supervised student activities on research projects identified on an individual or small group basis.

WFS 495 WILDLIFE/FISHERIES INTERNSHIP (1-6) Supervised field experience related to the student's major. Prerequisite: approval of proposed assignment by instructor prior to registration.

WFS 496 INDEPENDENT STUDIES (1-18) Creative projects, including research and design, which are supervised on an individual basis, and which fall outside the scope of formal courses.

WFS 497 SPECIAL TOPICS (1-9) Formal courses given infrequently to explore, in depth, a comparatively narrow subject which may be topical or of special interest.

WFS 499 IL FOREIGN STUDIES (1-12) Courses offered in foreign countries by individual or group instruction.

Ecosystem Science and Management Undergraduate Course Offerings by Semester at University Park

These offerings are subject to change as circumstances require

Course	Title (cr.)	Fall 2023	Spring 2024	Fall 2024	Spring 2025	Fall 2025	Spring 2026	Fall 2026	Spring 2027
FOR 150S	First-Year Seminar (2)	X		X		X		X	
FOR 200	Forest Profession (1)								
FOR 201	Global Change and Ecosystems (3)		X		X		X		X
FOR 203	Field Dendrology (3)	X		X		X		X	
FOR 204	Dendrology (2)		X		X		X		X
FOR 228	Chnsaw in For Mgmt (1)	X		X		X		X	
FOR 255	GPS/GIS Nat Res (3)	X		X		X		X	
FOR 266	For Res Measurements (4)		X		X		X		X
FOR 303	Forest Herbs (3)		X		X		X		X
FOR 308	Forest Ecology (3)	X		X		X		X	
FOR 320	Forest Fire Mgmt (2)		X		X		X		X
FOR 350	For Monit & Analy (3)		X		X		X		X
FOR 401	Urban Forest Mgmt (3)	X		X		X		X	
FOR 403	Invasive Plants (3)				X				X
FOR 409	Tree Physiology (2)								
FOR 410	Forest Ecosys Mgmt (3)	X		X		X		X	
FOR 418	Agroforestry (3)		X				X		
FOR 421	Silviculture (3)	X		X		X		X	
FOR/WFS 430	Conservation Biol (3)	X		X		X		X	
FOR 439	Timber Sale Admin (3)								
FOR 440	For & Consv Econ (3)	X		X		X		X	
FOR 450W	Hum Dimen Nat Res (3)		X		X		X		X
FOR 455	Rem Sens & Spa Dat (3)		X		X		X		X
FOR 466W	For Mgmt & Plan (3)		X		X		X		X
FOR 470	Watershed Mgmt (3)		X		X		X		X
FOR 471	Watershed Mgmt Lab (1)								
FOR 475	Forest Soils Mgmt (3)								
FOR 480	Policy & Adm (3)		X		X		X		X
FOR 488Y	Global Forest Cons (3)								
SOILS 071	Env Sustainability (3)	X	X	X	X	X	X	X	X
SOILS 101	Intro Soil Science (3)	X	X	X	X	X	X	X	X

Course	Title (cr.)	Fall 2023	Spring 2024	Fall 2024	Spring 2025	Fall 2025	Spring 2026	Fall 2026	Spring 2027
SOILS 102	Intro Soil Science Lab (3)	X	X	X	X	X	X	X	X
SOILS 401	Soil Comp/Phy Prop (3)		X		X		X		X
SOILS 402	Soil Nutr Behav (3)		X		X		X		X
SOILS 403	Soil Morph Prac (2)	X		X		X		X	
SOILS 404	Urban Soils (3)		X		X		X		X
SOILS 405	Hydropedology (3)								
SOILS 412W	Soil Ecol (3)	X		X		X		X	
SOILS 416	Soil Gen Class Map (4)	X		X		X		X	
SOILS 418	Nutr Mgmt Ag Sys (3)	X		X		X		X	
SOILS 420	Soil Remediation (3)	X		X		X		X	
SOILS 422	Natural Res Cons (4)		X		X		X		X
SOILS 450	Environmental GIS (3)	X		X		X		X	
SOILS 489	Supv Exp Col Tchg (1-3)	X	X	X	X	X	X	X	X
WFS 209N	Wild/Fish Conservation (3)	X	X	X	X	X	X	X	X
WFS 300	The Vertebrates (2)								
WFS 301	Vertebrate Laboratory (2)	X		X		X		X	
WFS 310	W F S Measurements (3)	X		X		X		X	
WFS 340	Stat for Conserv of Wld Pop (3)	X		X		X		X	
WFS 406	Ornithology Lab (2)		X		X		X		X
WFS 407	Ornithology (3)		X		X		X		X
WFS 408	Mammalogy (3)		X		X		X		X
WFS 409	Mammalogy Lab (2)		X		X		X		X
WFS 410	Fisheries Science (3)	X		X		X		X	
WFS 422	Ecology of Fish (3)	X				X			
WFS/FOR 430	Conservation Biology (3)	X		X		X		X	
WFS 435	Limnology (3)		X		X		X		X
WFS 446	Wildl Fish Pop Dyn (3)		X		X		X		X
WFS 447W	Wildl Management (3)	X		X		X		X	
WFS/ERM 450	Wetland Conservation (3)	X		X		X		X	
WFS 452	Ichthyology (2)	X		X		X		X	
WFS 453	Ichthyology Lab (2)	X		X		X		X	
WFS 454	Field Ichthyology (2)	X		X		X		X	
WFS 460	Wildlife Behavior (3)	X		X		X		X	
WFS 461	Animal Welfare: Sci & Ethics (3)	X				X			
WFS 462	Amphibians and Reptiles (3)		X		X		X		X
WFS 463W	Fishery Management (3)		X		X		X		X

The University is committed to equal access to programs, facilities, admission and employment for all persons. It is the policy of the University to maintain an environment free of harassment and free of discrimination against any person because of age, race, color, ancestry, national origin, religion, creed, service in the uniformed services (as defined in state and federal law), veteran status, sex, sexual orientation, marital or family status, pregnancy, pregnancy-related conditions, physical or mental disability, gender, perceived gender, gender identity, genetic information or political ideas. Discriminatory conduct and harassment, as well as sexual misconduct and relationship violence, violates the dignity of individuals, impedes the realization of the University's educational mission, and will not be tolerated. Direct all inquiries regarding the nondiscrimination policy to the Affirmative Action Office, The Pennsylvania State University, 328 Boucke Building, University Park, PA 16802-5901, Email: aao@psu.edu, Tel (814) 863-0471.