

Department of Watershed Sciences  
College of Natural Resources

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Effective for students beginning degree Summer Sem. 2009 thru Spring Sem. 2010

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## Admission Requirements For This Major

1. New freshmen admitted to USU in good standing qualify for admission to this major.

2. Transfer students from other institutions or from other USU majors need a 2.5 total GPA for admission to the Fisheries and Aquatic Sciences major in good standing. Special attention will be given to the amount of, and performance in, prerequisite math and science courses.

## The Program

### Objectives

The Department of Watershed Sciences offers comprehensive educational opportunities for graduate and undergraduate students in fisheries, aquatic ecology, hydrology, geomorphology, water quality, watershed management, remote sensing, and geographic modeling.

The first two years of the Fisheries and Aquatic Sciences curriculum include courses designed to give students a sound scientific background, an introduction to the field of natural resources management, and an introduction to aquatic and earth resources. Students attaining the BS in Fisheries and Aquatic Sciences will have strong quantitative skills; have an understanding of the interactions of the physics, chemistry, and biology inherent in aquatic ecosystems; have the knowledge necessary to manage freshwater fish populations; and be versed in geographic information analysis.

### Fisheries Science Minor

The minor in Fisheries Science will allow students in other degree programs to prepare themselves for careers with state and federal agencies involved with land management, aquatic resources, and natural resource policy.

## Career Opportunities

Graduates will be well-prepared to take positions in state and federal natural resource agencies; to enter graduate programs in the biological, ecological, and natural resources disciplines; and to take positions working with environmental consulting firms, nongovernmental organizations, and water-based industries.

Federal and state land management agencies, such as the USDA Forest Service and the Utah Division of Wildlife Resources, have indicated a tremendous need to hire fisheries biologists and aquatic resource specialists in the next few years. Up to 50 percent of positions in these agencies will be open in the next decade, due to retirements. The need for fisheries professionals has grown in recent years, as the economics of recreational fishing has become better understood and federal regulations concerning threatened and endangered aquatic species have increased.

Employment opportunities may be further enhanced by obtaining a master's degree in this field.

## Degrees and Programs Offered Through This Department

**Fisheries and Aquatic Sciences:** Bachelor of Science (BS)

**Watershed and Earth Systems:** BS

**Fisheries Biology:** Master of Science (MS) and  
Doctor of Philosophy (PhD)

Areas of Specialization: **Aquatic Ecology**  
**Conservation Biology**  
**Fisheries Management**

**Ecology:** MS and PhD

Area of Specialization: **Aquatic Ecology**

**Natural Resources:** Master of Natural Resources (MNR)

**Watershed Science:** MS and PhD

## Academic Advisement

First-year students are assigned to the department head for initial advising. After students have completed 20 credits in the program, they are assigned a faculty advisor. Students are encouraged to meet with their advisor each semester prior to enrolling for courses. If they do not know who their advisor is, students should contact the Department of Watershed Sciences (NR 210) or the College of Natural Resources Academic Service Center (NR 120).

## Graduation Requirements: BS Degree in Fisheries and Aquatic Sciences

### Minimum University Requirements\*

Total credits . . . . .	120
Grade point average (most majors require higher GPA) . . . . .	2.00 GPA
Credits of C- or better . . . . .	100
Credits of upper-division courses (#3000 or above) . . . . .	40
USU credits . . . . .	30
(20 of which must be upper division, including 10 required by major)	
Completion of approved major program of study . . . . .	See department
Credits in minor (if required by department) . . . . .	12
Credits in American Institutions (ECN 1500; HIST 1700, 2700, or 2710; POLS 1100; or USU 1300) . . . . .	3
University Studies requirements . . . . .	See next page

\*Colleges and departments may require more credits or a higher GPA. See requirements on this sheet.

## University Studies Requirements for Fisheries and Aquatic Sciences Major

**Note:** Approved University Studies courses and requirements are listed in the *General Catalog*. The most current listings are shown online at: <http://www.usu.edu/generalcatalog/>

### General Education Requirements (30-34 credits)

#### Competency Requirements (9-10 credits)

##### Communications Literacy (CL1 and CL2) (6 credits)

ENGL 1010 (CL1) (3 credits) or satisfactory AP, CLEP, IBO, ACT, or SAT score

AND

ENGL 2010 (CL2) (3 credits) or satisfactory IBO score

##### Quantitative Literacy (QL) (3-4 credits)

MATH 1050 (4 credits)

OR

MATH 1100 (3 credits)

OR

Satisfactory AP, CLEP, IBO, ACT, or SAT score

##### Computer and Information Literacy (0 credits)

Passing grade on six computer and information literacy related examinations. Students must pass all six examinations before earning 37 USU semester credits. (Effective Spring Semester 2010, students must fulfill this requirement prior to enrolling in ENGL 2010.)

#### Breadth Requirements (18-20 credits)

Select at least one approved course from each of the following six categories: **American Institutions (BAI)**, **Creative Arts (BCA)**, **Humanities (BHU)**, **Life Sciences (BLS)**, **Physical Sciences (BPS)**, and **Social Sciences (BSS)**. (CLEP or AP credit may be used.) At least two of the six breadth courses must be University Studies courses with a **USU prefix** (excluding USU 1000, 1010, 1100, 3330, 4900, and 6900). CHEM 1220 (BPS) and BIOL 1620 (BLS) may be used toward this requirement.

#### Exploration Requirement (3-4 credits)

Choose an additional class from one of the following General Education categories: QL, BAI, BCA, BHU, BLS, BPS, or BSS. Since MATH 1050 and 1100 are both required for the Fisheries and Aquatic Sciences major, one of these courses will fulfill the Quantitative Literacy requirement and the other will fulfill the Exploration requirement.

### Depth Education Requirements

#### Communications Intensive (CI) (2 courses)

WATS 3100 and 3700 will meet this requirement.

#### Quantitative Intensive (QI) (1 course)

STAT 3000 will meet this requirement.

#### Depth Course Requirements (4 credits minimum, including 2 credits minimum completed in each of two courses)

Complete at least 2 credits in approved 3000-level or above courses from each of the following two categories: **Humanities and Creative Arts (DHA)** and **Social Sciences (DSS)**. ENV5 4000 (DSS) may be used toward this requirement.

## Fisheries and Aquatic Sciences Major Requirements (96 credits)

All courses required for the major must be taken on an *A-B-C-D-F* basis. A grade of *C-* or better is required for all WATS courses used to meet requirements for a major in Fisheries and Aquatic Sciences. The grade point average for all courses taught by the College of Natural Resources must be 2.5 or higher.

#### A. Scientific Foundation (35 credits)

#### Credits

- BIOL 1610 Biology I (F) . . . . . 4
- BIOL 1620 (BLS) Biology II (Sp) . . . . . 4
- CHEM 1210 Principles of Chemistry I (F,Sp) . . . . . 4
- CHEM 1215 Chemical Principles Laboratory I (F,Sp) . . . . . 1

#### Credits

- CHEM 1220 (BPS) Principles of Chemistry II (F,Sp,Su) . . . . . 4
- CHEM 1225 Chemical Principles Laboratory II (F,Sp) . . . . . 1
- MATH 1050 (QL) College Algebra (F,Sp,Su) . . . . . 4
- MATH 1100 (QL) Calculus Techniques (F,Sp,Su) . . . . . 3
- NR 2220 General Ecology (F,Sp) . . . . . 3
- PHYS 2110 The Physics of Living Systems I . . . . . 4
- STAT 3000 (QI) Statistics for Scientists (F,Sp,Su) . . . . . 3

#### B. Common Departmental Core (23 credits)

- ENV5 4000 (DSS) Human Dimensions of Natural Resource Management (F) . . . . . 3
- WATS 1020 Watershed Sciences Professional Orientation (F) . . . . . 1
- WATS 2930 Introduction to Geographic Information Sciences (F) . . . . . 4
- WATS 3700 (CI) Fundamentals of Watershed Science (Sp) . . . . . 3
- WATS 4490 Small Watershed Hydrology (F) . . . . . 4
- WATS 4500 Limnology: Ecology of Inland Waters (Sp) . . . . . 3
- WATS 4930 Geographic Information Systems (F) . . . . . 4
- WATS 4980 Watershed Sciences Departmental Seminar (F,Sp) . . . . . 1

#### C. Fisheries Courses (16 credits)

- WATS 3100 (CI) Fish Diversity and Conservation (F) . . . . . 3
- WATS 3110 Fish Diversity Laboratory (F) . . . . . 1
- WATS 4310 Wetland Ecology and Management (Sp) . . . . . 3
- WATS 4650 Principles in Fishery Management (Sp) . . . . . 3
- WATS 5200 Fish Habitat Relationships in Managed Forests (Sp) . . . . . 3
- WATS/BIOL 5550 Freshwater Invertebrates (Sp) . . . . . 3

#### D. Capstone Courses (3 credits minimum)

- WATS 4510 Aquatic Ecology Practicum (F) . . . . . 3
- WATS 4530 Water Quality and Pollution (F) . . . . . 3
- WATS 5930 Geographic Information Analysis (Sp) . . . . . 3
- Approved Natural Resources Capstone Experience . . . . . 3

#### E. Directed Elective Courses (19 credits)

Students must choose a minimum of 19 elective credits to complete the Fisheries and Aquatic Sciences degree requirements. The majority of these elective credits must come from courses directly related to the degree program. **All elective courses must be approved by the student's faculty advisor before enrollment.** The following is a list of recommended courses that could be used to satisfy this requirement. Courses listed in *Section D* that were not used to meet the Capstone Course requirement may be taken as part of the suggested electives.

#### Credits

- ENV5 5320 Water Law and Policy in the United States (Sp) . . . . . 3
- HIST 3950 (DHA/CI) Environmental History . . . . . 3
- PHIL 3510 (DHA) Environmental Ethics (Sp) . . . . . 3
- POLS 4820 (DSS) Natural Resources and Environmental Policy: Political Economy of Environmental Quality (Sp) . . . . . 3
- WATS 3000 Oceanography (Sp) . . . . . 3
- WATS/CLIM 3820 (QI) Climate Change (Sp) . . . . . 3
- WATS/GEO 5150 Fluvial Geomorphology (F) . . . . . 3
- WATS 5640 Riparian Ecology and Management (Sp) . . . . . 3
- WILD 3810 Plant and Animal Populations (Sp) . . . . . 3
- WILD 4880 Genetics in Conservation and Management (F) . . . . . 3

**Note:** Students wanting to pursue federal employment should check the following U.S. Office of Personnel Management website for a listing of required coursework:

<http://www.opm.gov/qualifications/SEC-IV/B/GS0400/0482.HTM>

#### F. General Electives

Students may take the remainder of the 120 credits from any department. The guidelines described previously under "Breadth Requirements" and "Depth Education Requirements" should be consulted to ensure meeting University Studies Requirements.

Students who transfer to USU with an Associate of Arts (AA) or Associate of Science (AS) degree from an approved institution will have satisfied the General Education portion of the University Studies requirements, but will still need to complete the Depth Education portion.

## Fisheries and Aquatic Sciences Major Recommended Four-Year Plan of Study

Students should meet regularly with their faculty advisor and carefully plan their academic program, keeping in mind that many upper-division courses have prerequisites and must be taken in sequence.

Students following the recommended schedule listed below should be able to complete degree requirements in four years (eight semesters).

### A. Freshman Year (29 credits)

Fall Semester (15 credits)	Credits
<input type="checkbox"/> BIOL 1610 Biology I . . . . .	4
<input type="checkbox"/> ENGL 1010 (CL1) Introduction to Writing: Academic Prose . . . . .	3
<input type="checkbox"/> MATH 1050 (QL) College Algebra . . . . .	4
<input type="checkbox"/> WATS 1020 Watershed Sciences Professional Orientation . . . . .	1
<input type="checkbox"/> Breadth American Institutions (BAI) course . . . . .	3

<b>Spring Semester (14 credits)</b>	
<input type="checkbox"/> BIOL 1620 (BLS) Biology II . . . . .	4
<input type="checkbox"/> MATH 1100 (QL) Calculus Techniques . . . . .	3
<input type="checkbox"/> WATS 4980 Watershed Sciences Departmental Seminar . . . . .	1
<input type="checkbox"/> Breadth Creative Arts (BCA) course . . . . .	3
<input type="checkbox"/> Breadth Humanities (BHU) course . . . . .	3

### B. Sophomore Year (33 credits)

Fall Semester (16 credits)	
<input type="checkbox"/> CHEM 1210 Principles of Chemistry I . . . . .	4
<input type="checkbox"/> CHEM 1215 Chemical Principles Laboratory I . . . . .	1
<input type="checkbox"/> STAT 3000 (QI) Statistics for Scientists . . . . .	3
<input type="checkbox"/> WATS 2930 Introduction to Geographic Information Sciences . . . . .	4
<input type="checkbox"/> WATS 3100 (CI) Fish Diversity and Conservation . . . . .	3
<input type="checkbox"/> WATS 3110 Fish Diversity Laboratory . . . . .	1

<b>Spring Semester (17 credits)</b>	
<input type="checkbox"/> CHEM 1220 (BPS) Principles of Chemistry II . . . . .	4
<input type="checkbox"/> CHEM 1225 Chemical Principles Laboratory II . . . . .	1
<input type="checkbox"/> ENGL 2010 (CL2) Intermediate Writing: Research Writing in a Persuasive Mode . . . . .	3
<input type="checkbox"/> NR 2220 General Ecology . . . . .	3
<input type="checkbox"/> WATS 3700 (CI) Fundamentals of Watershed Science . . . . .	3
<input type="checkbox"/> Breadth Social Sciences (BSS) course . . . . .	3

### C. Junior Year (30 credits)

Fall Semester (15 credits)	
<input type="checkbox"/> PHYS 2110 The Physics of Living Systems I . . . . .	4
<input type="checkbox"/> WATS 4490 Small Watershed Hydrology . . . . .	4
<input type="checkbox"/> WATS 4930 Geographic Information Systems . . . . .	4
<input type="checkbox"/> Directed Elective or General Elective course(s) . . . . .	3

<b>Spring Semester (15 credits)</b>	
<input type="checkbox"/> WATS 4310 Wetland Ecology and Management . . . . .	3
<input type="checkbox"/> WATS 4500 Limnology: Ecology of Inland Waters . . . . .	3
<input type="checkbox"/> WATS/BIOL 5550 Freshwater Invertebrates . . . . .	3
<input type="checkbox"/> Depth Humanities and Creative Arts (DHA) course . . . . .	3
<input type="checkbox"/> Directed Elective or General Elective course(s) . . . . .	3

### D. Senior Year (32 credits)

Fall Semester (15 credits)	Credits
<input type="checkbox"/> ENVS 4000 (DSS) Human Dimensions of Natural Resource Management . . . . .	3
<input type="checkbox"/> Capstone Course (WATS 4510 and 4530 recommended) . . . . .	3
<input type="checkbox"/> Directed Elective or General Elective courses . . . . .	9

<b>Spring Semester (17 credits)</b>	
<input type="checkbox"/> WATS 4650 Principles in Fishery Management . . . . .	3
<input type="checkbox"/> WATS 5200 Fish Habitat Relationships in Managed Forests . . . . .	3
<input type="checkbox"/> Directed Elective or General Elective courses . . . . .	11

## Fisheries Science Minor Requirements (18 credits)

All courses required for the Fisheries Science minor must be taken on an A-B-C-D-F basis. A grade of C- or better is required for all WATS courses used to meet requirements for this minor.

A. Fisheries Science Core Courses (9 credits)	Credits
<input type="checkbox"/> NR 2220 General Ecology (F,Sp) . . . . .	3
<input type="checkbox"/> WATS 3100 (CI) Fish Diversity and Conservation (F) . . . . .	3
<input type="checkbox"/> WATS 3700 (CI) Fundamentals of Watershed Science (Sp) . . . . .	3

B. Electives (9 credits)	
Select three courses from the following:	
<input type="checkbox"/> WATS 4310 Wetland Ecology and Management (Sp) . . . . .	3
<input type="checkbox"/> WATS 4500 Limnology: Ecology of Inland Waters (Sp) . . . . .	3
<input type="checkbox"/> WATS 4650 Principles in Fishery Management (Sp) . . . . .	3
<input type="checkbox"/> WATS 5200 Fish Habitat Relationships in Managed Forests (Sp) . . . . .	3
<input type="checkbox"/> WATS/BIOL 5550 Freshwater Invertebrates (Sp) . . . . .	3
<input type="checkbox"/> WILD 3810 Plant and Animal Populations (Sp) . . . . .	3

## Requirement Changes

Graduation requirements shown on this sheet are subject to change. Students should check with their faculty advisor regarding possible changes or for additional information regarding degree requirements, course sequencing, and departmental specialization options and their related coursework.

## Materials for Persons with Disabilities

This requirement sheet is available in digital format, recordings, or large print upon request to the USU Disability Resource Center.

## For information contact

**Watershed Sciences Department;** Natural Resources 210;  
Utah State University; 5210 Old Main Hill; Logan UT 84322-5210;  
tel. (435) 797-2459; e-mail watershed@aggiemail.usu.edu;  
<http://www.cnr.usu.edu/wats>

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