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

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 Watershed and Earth Systems 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 hydrology, geomorphology, water quality, watershed management, remote sensing, geographic modeling, fisheries, and aquatic ecology.

Students attaining the BS in Watershed and Earth Systems will have strong quantitative skills; be versed in geographic information analysis; and have an understanding of the interactions of the physics, chemistry, and biology inherent in earth ecosystems.

Geographic Information Science Minor

The Geographic Information Science minor will appeal to students interested in computer-enhanced mapping and integration of a variety of types of information. Students who complete this minor will have ample opportunities to select jobs in a variety of geographic information systems applications. Many of these positions will be in private industry or in planning departments for states and municipalities.

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 earth science industries.

Federal and state land management agencies, such as the USDA Forest Service, U.S. Geological Survey, and the Utah Department of Natural Resources, have indicated a need to hire specialists in watershed management and the geographic sciences. Up to 50 percent of positions in these agencies will be open in the next decade, due to retirements.

The Forest Service and the Department of Natural Resources have recently shifted their management organization to focus on watersheds, reflecting their understanding of the need to integrate land and water resources in their assessment of all natural resources. State water agencies are growing in importance and influence as demands on both the quality and quantity of water resources increase, due to human population pressures and urban development in the Intermountain West.

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

All students should contact their academic advisor for assistance with course selection, program planning, and meeting graduation requirements. 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 Watershed and Earth Systems

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 Watershed and Earth Systems 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 (31-34 credits)

Competency Requirements (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) (4 credits)

MATH 1050 (4 credits)

OR

MATH 1210 (4 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). GEO 1110 (BPS) 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. CHEM 1220 (BPS), MATH 1220 (QL), or PHYS 2220 (BPS/QI) (if chosen as a Directed Elective course) will fulfill this requirement for students in the Watershed and Earth Systems major.

Depth Education Requirements

Communications Intensive (CI) (2 courses)

WATS 3700, plus another course having a CI designation, 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)**. ENVS 4000 (DSS) may be used toward this requirement.

Watershed and Earth Systems Major Requirements (90 credits)

All courses required for the major and minors 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 Watershed and Earth Systems. The grade point average for all courses taught by the College of Natural Resources must be 2.5 or higher.

A. Science Foundation (19 credits)	Credits
<input type="checkbox"/> CHEM 1210 ¹ Principles of Chemistry I (F,Sp)	4
<input type="checkbox"/> GEO 1110 (BPS) The Dynamic Earth: Physical Geology (F,Sp)	4
<input type="checkbox"/> MATH 1210 (QL) ² Calculus I (F,Sp,Su)	4
<input type="checkbox"/> STAT 3000 (QI) Statistics for Scientists (F,Sp,Su)	3
<input type="checkbox"/> PHYS 2210 (QI) General Physics—Science and Engineering I	4

¹CHEM 1210 requires a Math ACT score of at least 25 or completion of MATH 1050 or higher. High School chemistry is recommended.

²MATH 1210 requires completion of *both* MATH 1050 and 1060, or an AP calculus score of at least 3 on the AB test, or a Math ACT score of at least 27.

B. Common Departmental Core (23 credits)

<input type="checkbox"/> ENVS 4000 (DSS) Human Dimensions of Natural Resource Management (F)	3
<input type="checkbox"/> WATS 1020 Watershed Sciences Professional Orientation (F)	1
<input type="checkbox"/> WATS 2930 Introduction to Geographic Information Sciences (F)	4
<input type="checkbox"/> WATS 3700 (CI) Fundamentals of Watershed Science (Sp)	3
<input type="checkbox"/> WATS 4490 Small Watershed Hydrology (F)	4
<input type="checkbox"/> WATS 4500 Limnology: Ecology of Inland Waters (Sp)	3
<input type="checkbox"/> WATS 4930 Geographic Information Systems (F)	4
<input type="checkbox"/> WATS 4980 Watershed Sciences Departmental Seminar (F,Sp)	1

C. Watershed and Earth Systems Courses (15 credits)

<input type="checkbox"/> SOIL 3000 Fundamentals of Soil Science (F)	4
<input type="checkbox"/> WATS/CLIM 3820 (QI) Climate Change (Sp)	3
<input type="checkbox"/> WATS/GEO 5150 Fluvial Geomorphology (F)	3
<input type="checkbox"/> WATS/GEO 5170 Fluvial Geomorphology Lab (F)	2
<input type="checkbox"/> WILD 5750 Applied Remote Sensing (F)	3

D. Capstone Courses (3 credits minimum)

<input type="checkbox"/> WATS 4510 Aquatic Ecology Practicum (F)	3
<input type="checkbox"/> WATS 4530 Water Quality and Pollution (F)	3
<input type="checkbox"/> WATS 5760 Remote Sensing: Modeling and Analysis (Sp)	3
<input type="checkbox"/> WATS 5930 Geographic Information Analysis (Sp)	3
<input type="checkbox"/> Approved Natural Resources Capstone Experience	3

E. Directed Elective Courses (30 credits)

Suggested Electives

Students must choose a minimum of 30 elective credits to complete the Watershed and Earth Systems 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
<input type="checkbox"/> CHEM 1220 (BPS) Principles of Chemistry II (F,Sp,Su)	4
<input type="checkbox"/> ENVS 5320 Water Law and Policy in the United States (Sp)	3
<input type="checkbox"/> MATH 1220 (QL) Calculus II (F,Sp,Su)	4
<input type="checkbox"/> PHYS 2220 (BPS/QI) General Physics— Science and Engineering II	4
<input type="checkbox"/> STAT 6810 Topics in Statistics (Spatial Statistics) (F)	3
<input type="checkbox"/> WATS 5200 Fish Habitat Relationships in Managed Forests (Sp)	3
<input type="checkbox"/> WATS 5250 Remote Sensing of Land Surfaces (Sp)	4
<input type="checkbox"/> WATS 5640 Riparian Ecology and Management (Sp)	3
<input type="checkbox"/> WATS 5760 Remote Sensing: Modeling and Analysis (Sp)	3
<input type="checkbox"/> WILD/SOIL 5350 Wildland Soils (Sp)	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/GS1300/1315.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.

Watershed and Earth Systems 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 (33 credits)

Fall Semester (17 credits)	Credits
<input type="checkbox"/> ENGL 1010 (CL1) Introduction to Writing: Academic Prose	3
<input type="checkbox"/> GEO 1110 (BPS) The Dynamic Earth: Physical Geology	4
<input type="checkbox"/> MATH 1060 Trigonometry (prereq. for MATH 1210).	2
<input type="checkbox"/> WATS 1020 Watershed Sciences Professional Orientation	1
<input type="checkbox"/> WATS 2930 Introduction to Geographic Information Sciences.	4
<input type="checkbox"/> ENVS 2340 (BSS) Natural Resources and Society (3 cr) or	
<input type="checkbox"/> Other approved Breadth Social Sciences (BSS) course (3 cr)	3
Spring Semester (16 credits)	
<input type="checkbox"/> MATH 1210 (QL) Calculus I	4
<input type="checkbox"/> WATS 3700 (CI) Fundamentals of Watershed Science	3
<input type="checkbox"/> Breadth Creative Arts (BCA) course	3
<input type="checkbox"/> Breadth Humanities (BHU) course.	3
<input type="checkbox"/> Breadth American Institutions (BAI) course	3

B. Sophomore Year (30-31 credits)

Fall Semester (16-17 credits)	Credits
<input type="checkbox"/> CHEM 1210 Principles of Chemistry I	4
<input type="checkbox"/> MATH 1220 (QL) Calculus II (4 cr) and/or	
<input type="checkbox"/> Other approved elective courses (2-7 cr).	6 or 7
<input type="checkbox"/> STAT 3000 (QI) Statistics for Scientists	3
<input type="checkbox"/> Breadth Life Sciences (BLS) course.	3
Spring Semester (14 credits)	
<input type="checkbox"/> CHEM 1220 (BPS) Principles of Chemistry II (recommended)	4
<input type="checkbox"/> ENGL 2010 (CL2) Intermediate Writing: Research Writing in a Persuasive Mode	3
<input type="checkbox"/> PHYS 2210 (QI) General Physics—Science and Engineering I	4
<input type="checkbox"/> WATS/CLIM 3820 (QI) Climate Change	3

C. Junior Year (31 credits)

Fall Semester (15 credits)	Credits
<input type="checkbox"/> ENVS 4000 (DSS) Human Dimensions of Natural Resource Management	3
<input type="checkbox"/> SOIL 3000 Fundamentals of Soil Science	4
<input type="checkbox"/> WATS 4490 Small Watershed Hydrology	4
<input type="checkbox"/> WATS 4930 Geographic Information Systems.	4
Spring Semester (16 credits)	
<input type="checkbox"/> WATS 4500 Limnology: Ecology of Inland Waters.	3
<input type="checkbox"/> Depth Humanities and Creative Arts (DHA) course	3
<input type="checkbox"/> Communications Intensive (CI) course.	3
<input type="checkbox"/> Directed Elective or General Elective courses	7

D. Senior Year (29-30 credits)

Fall Semester (15 credits)	Credits
<input type="checkbox"/> WATS 4980 Watershed Sciences Departmental Seminar	1
<input type="checkbox"/> WATS/GEO 5150 Fluvial Geomorphology	3
<input type="checkbox"/> WATS/GEO 5170 Fluvial Geomorphology Lab	2

Credits

<input type="checkbox"/> WILD 5750 Applied Remote Sensing	3
<input type="checkbox"/> Directed Elective or General Elective course(s).	3
<input type="checkbox"/> Capstone course	3
Spring Semester (14-15 credits)	
<input type="checkbox"/> Directed Elective or General Elective courses	14-15

Geographic Information Science Minor Requirements (17-19 credits)

All courses required for the Geographic Information 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. Watershed and Earth Resources Core Courses (8 credits) Credits

<input type="checkbox"/> CS 1400 Introduction to Computer Science—CS 1 (F,Sp,Su)	3
<input type="checkbox"/> CS 1405 Introduction to Computer Science—CS 1 Lab (F,Sp,Su).	1
<input type="checkbox"/> WATS 2930 Introduction to Geographic Information Sciences (F).	4

B. Electives (9-11 credits)

Select three courses from the following:

<input type="checkbox"/> CEE 6440 Geographic Information Systems in Water Resources (F)	3
<input type="checkbox"/> WATS 4930 Geographic Information Systems (F).	4
<input type="checkbox"/> WATS 5250 Remote Sensing of Land Surfaces (Sp)	4
<input type="checkbox"/> WATS 5760 Remote Sensing: Modeling and Analysis (Sp)	3
<input type="checkbox"/> WATS 5930 Geographic Information Analysis (Sp)	3
<input type="checkbox"/> WILD 5750 Applied Remote Sensing (F).	3

Watershed Science Minor Requirements (16 credits)

All courses required for the Watershed 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. Required Courses (10 credits) Credits

<input type="checkbox"/> WATS 3700 (CI) Fundamentals of Watershed Science (Sp)	3
<input type="checkbox"/> WATS 4490 Small Watershed Hydrology (F)	4
<input type="checkbox"/> WATS 4530 Water Quality and Pollution (F).	3

B. Electives (6 credits)

Select two courses from the following:

<input type="checkbox"/> WATS/CLIM 3820 (DSC/QI) Climate Change (Sp)	3
<input type="checkbox"/> WATS 4500 Limnology: Ecology of Inland Waters (Sp).	3
<input type="checkbox"/> WATS/GEO 5150 Fluvial Geomorphology (F)	3
<input type="checkbox"/> WATS 5640 Riparian Ecology and Management (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

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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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