

COLLEGE OF NATURAL RESOURCES AND ENVIRONMENT
Department of Forest Resources and Environmental Conservation
B.S. Degree in Water: Resources, Policy, and Management
Major: Water: Resources, Policy, and Management
For students entering under UG Catalog 2021-2022

Minimum credits required for graduation is 120.

Degree Core Requirements (20 credits)

- ALS/WATR 4614 Watershed Assessment, Management, and Policy* (2 credits)
- ENSC 3604 Fundamentals of Environmental Science* (3 credits)
- FREC/WATR 3104 Principles of Watershed Hydrology* (3 credits)
- FREC/WATR 3754 Watersheds and Water Quality Monitoring* (3 credits)
- FREC/WATR 4464 Water Resources Policy & Economics* (3 credits)
- GEOG/WATR 2004 Water, Environment, and Society (3 credits)
- PHYS 2205 General Physics* (3 credits)

Major Requirements (33 hours)

Water Law and Planning (3 credits – choose one course)

- AAEC 3314 Environmental Law (3 credits)
- UAP 3354 Introduction to Environmental Policy and Planning (3 credits)
- UAP 4344 Law of Critical Environmental Areas (3 credits)
- UAP 4374 Land Use and Environment: Planning and Policy* (3 credits)

Geospatial Technology and Informatics (3 credits – choose one course)

- BSE 4344 GIS for Engineers* (3 credits)
- FREC 3004 Environmental Informatics* (3 credits) [Pathways Core 5a]
- FREC 4114 Information Technologies for Natural Resource Management* (3 credits)
- FREC 4214 Forest Photogrammetry and Spatial Data Processing* (3 credits)
- GEOG 2084 Principles of Geographic Information Systems (3 credits)
- GEOG/GEOS 4354 Introduction to Remote Sensing (3 credits)

Labs (3 credits)

- BIOL 1116 Principles of Biology Lab* (1 credit)
- CHEM 1045 General Chemistry Lab* (1 credit) [Pathways Core 4]
- PHYS 2215 General Physics Lab* (1 credit) [Pathways Core 4]

Water Science Specialization (12 credits – choose 9 credits in one of the three specializations listed below and the remaining 3 credits in any of the three specializations listed below)

(see Water Science Specialization course list)

- I. Aquatic Ecosystems _____
- II. Hydrology _____
- III. Water Quality _____

Water Policy Specialization (12 credits – choose 9 credits in one of the two specializations listed below and the remaining 3 credits in either of the two specializations listed below)

(see Water Policy Specialization course list)

- I. Water Planning, Policy, and Economics _____
- II. Water, Climate, Energy, and Global Issues _____

*Courses may have prerequisites, corequisites, or other restrictions. Consult Course Catalog for details.

Restricted Electives (15 credits) – see course lists: choose from courses listed under the Water Science or Water Policy Specializations or from those listed as Restricted Electives

Free Electives (7 credits)

Pathways Requirements (45 Pathways credits)

1. Discourse (9 credits: 6 foundational credits, 3 applied/advanced)

___ Choose course: Foundational Discourse (3 credits)

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___ ENGL 3534 Literature and the Environment* (3 credits) **or** ENGL 3764 Technical Writing (3 credits)

2. Critical Thinking in the Humanities (6 credits)

___ Choose course (3 credits)

___ Choose course (3 credits)

*Suggested: FREC 2554 Leading Global Sustainability (3 credits) **or** HIST 3144 American Environmental History (3 credits)*

3. Reasoning in the Social Sciences (6 credits)

___ AAEC 1005 Economics of the Food and Fiber System (3 credits) **or** ECON 2005 Principles of Economics (3 credits)

___ AAEC 1006 Economics of the Food and Fiber System (3 credits) **or** ECON 2006 Principles of Economics (3 credits)

4. Reasoning in the Natural Sciences (6 credits)

___ BIOL 1106 Principles of Biology* (3 credits)

___ CHEM 1035 General Chemistry* (3 credits)

5. Quantitative and Computational Thinking (9 credits: 6 foundational credits, 3 applied/advanced credits)

___ MATH 1025 Elementary Calculus (3 credits) **or** MATH 1225 Calculus of a Single Variable (4 credits)

___ MATH 1026 Elementary Calculus (3 credits) **or** MATH 1226 Calculus of a Single Variable (4 credits)

___ Choose advanced/applied course (3 credits)

Suggested: FREC 3004 Environmental Informatics (3 credits) **or** FREC 4354 Forest Soil and Watershed Management* (3 credits)*

6. Critique and Practice in Design and the Arts (6 credits: 3 design & 3 arts, or 6 integrated)

___ Choose course (3 credits)

___ Choose course (3 credits)

Suggested: FREC 4554 Creating the Ecological City (3 credits)

7. Critical Analysis of Identity and Equity in the United States (3 credits) – may be double-counted with another core outcome or major requirement

___ Choose course (3 credits)

WATER: RESOURCES, POLICY, AND MANAGEMENT NOTES

1. **In-Major GPA Computation:** Degree core requirements and major requirements (with the exception of PHYS 2205 and Lab major requirements) count toward in-major GPA. This includes courses in the water science specialization and water policy specialization. For restricted electives and free electives, any course taken from either a water science specialization or a water policy specialization counts toward the in-major GPA.
2. **Satisfactory Progress:** By the end of the semester in which the student has attempted 60 credits (including transfer, advanced placement, advanced standing, and credit by examination), “satisfactory progress” towards a B.S. degree in Water: Resources, Policy, and Management will include the following minimum criteria:
 - Having an in-major and overall grade point average of at least 2.0
 - Passing at least 24 semester credits that apply to Pathways Requirements
 - Passing the following courses, or their equivalents: BIOL 1106, 1116; CHEM 1035, 1045; and MATH 1026
3. **Foreign Language Requirement:** Students who did not successfully complete at least two years of a single foreign, classical, or sign language during high school must successfully complete six semester hours of a single foreign, classical, or sign language at the college level. Course taken to meet this requirement do not count toward the hours required for graduation. Please consult the Undergraduate Catalog for details.
4. **Policy on Student Exchanges:** If studying overseas or at another U.S. university, begin planning at least 9 months prior to your departure to allow time to determine what substitutions, if any, will be allowed and to arrange your schedule to ensure that all requirements for graduation will be met.
5. **GPA for Graduation:** An in-major and overall GPA of 2.0 is required for graduation.
6. In accordance with university guidelines, courses satisfying degree core requirements may not be double counted to satisfy other areas of a degree (e.g., Pathways Requirements).
7. **American Institute of Hydrology - Educational Criteria:** This is an option for students interested in pursuing a Professional Hydrology certification with the American Institute of Hydrology after completing their B.S. and five years of experience. See American Institute of Hydrology Professional Hydrology Certification Application Process for specific requirements.

Basic Education Requirements:

Completion of a full course of study leading to a bachelor's or higher degree at an accredited college or university with a major in hydrology, physical or natural science or engineering. The study must have included a minimum of:

- 5 semester hours in Chemistry (e.g., CHEM 1035 and 1036)
- 5 semester hours in Physics (e.g., PHYS 2205 and 2206)
- 5 semester hours in Differential and Integral Calculus (e.g., MATH 1025 and 1026)
- One basic course in surface or groundwater hydrology (3 semester hours; e.g., FREC 3104)
- 25 semester hours in the specialty areas (Students may meet these requirements if they select the Hydrology or Water Quality specialization).

- Completion of 25 semester hours of which at least 10 semester hours must come from Category I listing of courses and the rest from a combination of Category II and Category III listing of courses. Twenty semester hours must be in the third or fourth year or graduate course studies.
- Category I. Courses in hydrology, hydrogeology, or water quality - minimum of 6 semester hours.
- Category II. Courses in allied subjects in which hydrology, hydrogeology or water quality constitutes more than 10 percent of the course work - minimum of 9 semester hours.
- Category III. Supplemental courses - minimum of 6 semester hours. These courses would include subjects such as economics, geology, geophysics, law, planning, remote sensing, statistics, land and water policy, resource management, water administration, and so forth.

8. US Office of Personnel Management: Hydrology Qualification Standards:

Basic Requirements:

Degree: physical or natural science, or engineering that included at least 30 semester hours in any combination of courses in hydrology, the physical sciences, geophysics, chemistry, engineering science, soils, mathematics, aquatic biology, atmospheric science, meteorology, geology, oceanography, or the management or conservation of water resources. The course work must have included at least 6 semester hours in calculus (including both differential and integral calculus, e.g., MATH 1025 and 1026), and at least 6 semester hours in physics (e.g., PHYS 2205 and 2206).

9. Acceptable Substitutions: The following requirements have acceptable substitutions.

- PHYS 2205/PHYS 2215 General Physics and General Physics Lab: PHYS 2305 Foundations of Physics
- CHEM 1035/CHEM 1045 General Chemistry and General Chemistry Lab: CHEM 1055 General Chemistry for Chemistry Majors

Water Science Specialization Courses

I. Aquatic Ecosystems

BIOL	4004	Freshwater Ecology* (4 credits)
BIOL/CSSES/ENSC	4164	Environmental Microbiology* (3 credits)
BIOL/ENT	4354	Aquatic Entomology* (4 credits)
BIOL	4454	Invertebrate Zoology* (4 credits)
ENT/BIOL/FIW	4484	Freshwater Biomonitoring* (4 credits)
FIW	4534	Ecology & Management of Wetland Systems* (3 credits)
FIW	4614	Fish Ecology* (3 credits)
FIW	4624	Marine Ecology* (3 credits)
FIW	4714	Fisheries Management* (4 credits)
FREC	4374	Forested Wetlands* (3 credits)

II. Hydrology

BSE	4224	Field Methods in Hydrology* (3 credits)
CEE	3314	Water Resources Engineering* (3 credits)
CEE	4304	Hydrology* (3 credits)

*Courses may have prerequisites, corequisites, or other restrictions. Consult Course Catalog for details.

CEE	4314	Groundwater Resources* (3 credits)
CEE	4324	Open Channel Flow* (3 credits)
CSES/GEOG/GEOS	3304	Geomorphology* (3 credits)
CSES/ENSC	3614	Soil Physical & Hydrological Properties* (3 credits)
FREC	4354	Forest Soil and Watershed Management* (3 credits)
GEOS	3014	Environmental Geosciences* (3 credits)
GEOS	4804	Groundwater Hydrology* (3 credits)

III. Water Quality

BSE	4394	Water Supply & Sanitation in Developing Countries* (3 credits)
CEE	3104	Introduction to Environmental Engineering* (3 credits)
CEE	4104	Water & Wastewater Treatment Design* (3 credits)
CEE	4114	Fundamentals of Public Health Engineering* (3 credits)
CEE	4174	Solid & Hazardous Waste Management* (3 credits)
CSES	4644	Land Based Systems for Waste Treatment (3 credits)
CSES/BIOL/ENSC	4164	Environmental Microbiology* (3 credits)
CSES/ENSC	3634	Physics of Pollution* (3 credits)
CSES/ENSC/CHEM	4734	Environmental Soil Chemistry* (3 credits)
ENSC/CSES	4314	Water Quality* (3 credits)
FREC	4354	Forest Soil and Watershed Management* (3 credits)
FREC	4374	Forested Wetlands* (3 credits)
FREC	4784	Wetland Hydrology and Biogeochemistry (3 credits)
GEOS	4634	Environmental Geochemistry* (3 credits)

Water Policy Specialization Courses

I. Water Planning, Policy, & Economics

AAEC	3004	Agricultural Production & Consumption Economics* (3 credits)
AAEC	3014	Analytical Methods in Applied Economics* (3 credits)
AAEC	3314	Environmental Law (3 credits)
AAEC	3324	Environment and Sustainable Development Economics* (3 credits)
AAEC	3604	Agricultural Law (3 credits)
AAEC	4314	Environmental Economic Analysis & Management* (3 credits)
AAEC	4344	Sustainable Development Economics* (3 credits)
CEE	4134	Environmental Sustainability – A Systems Approach* (3 credits)
CEE	4344	Water Resources Planning* (3 credits)
FREC/NR	4014	Natural Resources Economics* (3 credits)
FREC	4434	Natural Resource Policy* (3 credits)
GEOG	4204	Geography of Resources* (3 credits)
LAR	3154	Watershed Sensitive Site Design & Construction* (4 credits)
SPIA	2554	Collaborative Policy-Making and Planning (3 credits)
UAP	3224	Policy Implementation* (3 credits)
UAP	3354	Introduction to Environmental Policy & Planning (3 credits)
UAP	4344	Law of Critical Environmental Areas* (3 credits)
UAP	4374	Land Use & Environment: Planning & Policy* (3 credits)

II. Water, Climate, Energy, & Global Issues

ALS/HORT	4714	Global Seminar* (1 credit)
BIOL	4114	Global Change Ecology* (3 credits)
BSE	4394	Water Supply & Sanitation in Developing Countries* (3 credits)

*Courses may have prerequisites, corequisites, or other restrictions. Consult Course Catalog for details.

CEE	4134	Environmental Sustainability – A Systems Approach* (3 credits)
CEE	4264	Sustainable Land Development* (3 credits)
FREC	2004	Forest Ecosystems (3 credits)
FREC	2124	Forests, Society & Climate (3 credits)
FREC/SBIO	2784	Global Forest Sustainability (3 credits)
FREC	3604	Climate Science* (3 credits)
GEOG	1514	Introduction to Meteorology (3 credits)
GEOG	3104	Environmental Problems, Population, & Development (3 credits)
GEOG	4134	Interdisciplinary Issues and Ethics in Water Resources (3 credits)
IS	4014	International Development (3 credits)
ME/ESM	4194	Sustainable Energy Solutions for a Global Society* (3 credits)
NR	4444	Practicing Sustainability* (3 credits)
PSCI/UAP	3344	Global Environmental Issues: Interdisciplinary Perspectives* (3 credits)
UAP/GEOG/WGS	4214	Gender, Environment, and International Development* (3 credits)
UAP/GEOG/SOC	4764	International Development Policy & Planning* (3 credits)

Restricted Electives

ALS	2204	Introduction to Civic Agriculture (3 credits)
ALS	3404	Ecological Agriculture Theory & Practice* (3 credits)
BIOL	1105	Principles of Biology* (3 credits)
BIOL	1115	Principles of Biology Lab* (1 credit)
BIOL	2504	General Zoology* (3 credits)
BIOL	2604	General Microbiology* (3 credits)
BIOL	2704	Evolutionary Biology* (3 credits)
BIOL	2804	Ecology* (3 credits)
BIOL	3204	Plant Taxonomy* (3 credits)
BSE	2304	Landscape Measurements and Modeling* (3 credits)
BSE	3324	Small Watershed Hydrology (3 credits)
BSE	3334	Nonpoint Source Assessment & Control* (3 credits)
BSE	4304	Introduction to Watershed Modeling* (3 credits)
CEE	2814	Civil and Environmental Engineering Measurement* (4 credits)
CEE	3274	Introduction to Land Development Design* (3 credits)
CEE	3304	Fluid Mechanics for Civil and Environmental Engineering* (3 credits)
CEE	3514	Introduction to Geotechnical Engineering* (3 credits)
CEE	4264	Sustainable Land Development* (3 credits)
CHE	3114	Fluid Transport* (3 credits)
CHE	3144	Mass Transfer* (3 credits)
CHEM	1036	General Chemistry* (3 credits)
CHEM	1046	General Chemistry Lab* (1 credit)
CHEM	2114	Analytical Chemistry* (3 credits)
CHEM	2514	Survey of Organic Chemistry* (3 credits)
CHEM	2535	Organic Chemistry* (3 credits)
CSES/ENSC/GEOS	3114	Soils* (3 credits)
CSES/ENSC/GEOS	3124	Soils Lab* (1 credit)
CSES/ENSC	3134	Soils in the Landscape* (3 credit)
CSES/ENSC	4774	Reclamation of Drastically Disturbed Lands* (3 credits)
ECON	4014	Environmental Economics* (3 credits)
ENSC/CSES	4324	Water Quality Lab* (1 credit)
ENSC	4414	Monitoring and Analysis of the Environment* (2 credits)
ENSC/CSES	4854	Wetland Soils and Mitigation* (3 credits)
ESM	3024	Introduction to Fluid Mechanics* (3 credits)

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FIW	2114	Principles of Fisheries and Wildlife Management* (3 credits)
FIW	3514	Fisheries Techniques* (3 credits)
FIW	4424	Ichthyology (4 credits)
FREC	Any 2000 – 4000 level FREC course	
GEOG	1104	Introduction to Physical Geography (3 credits)
GEOG/NR	1115	Seeking Sustainability (3 credits)
GEOG/NR	1116	Seeking Sustainability (3 credits)
GEOG	Any 2000 – 4000 level GEOG course	
GEOS	1004	Earth Science: Our Past, Present, and Future (3 credits)
GEOS	1014	Evolution of the Earth-Life System (4 credits)
GEOS	1024	Earth Resources, Society, and Environment (3 credits)
GEOS	1034	Earth's Natural Hazards (3 credits)
GEOS	2104	Elements of Geology (3 credits)
GEOS	3034	Oceanography* (3 credits)
HIST	3144	American Environmental History (3 credits)
LAR	2164	Landform Function and Aesthetics* (4 credits)
MATH	2114	Introduction to Linear Algebra* (3 credits)
MATH	2214	Introduction to Differential Equations* (3 credits)
NR	4105	Leadership in Natural Resources* (3 credits)
NR	4106	Leadership in Natural Resources* (3 credits)
PHYS	2206	General Physics* (3 credits)
PHYS	2216	General Physics Lab* (1 credit)
PHYS	2305	Foundations of Physics* (4 credits)
PSCI/UAP	3444	Administrative Law and Policy* (3 credits)
PSCI/UAP	3714	The US Policy Process* (3 credits)
PSCI/UAP	3744	Public Policy Analysis* (3 credits)
STAT	3005	Statistical Methods* (3 credits)
STAT	3006	Statistical Methods* (3 credits)
STAT	3615	Biological Statistics (3 credits)
STAT	3616	Biological Statistics* (3 credits)
UAP	3014	Urban Policy and Planning* (3 credits)
UAP	3024	Urban and Regional Analysis* (3 credits)
UAP	4754	Legal Foundations of Planning* (3 credits)