# Water Science

(Bachelor of Science)

**Overview of the Program**

The UW-Green Bay Water Science program is an integrated program designed to provide students with the tools necessary to solve the water related challenges of today and tomorrow. Students may complete program requirements in four years. The curriculum is interdisciplinary, with a core set of courses drawn from geoscience, chemistry, environmental science, biology, physics, math, and statistics. In addition, a diverse set of elective courses allow students to focus on subdisciplines in water science that can meet their career needs and interests. The major requirements are comprised of 68 credits, which include 33 credits of supporting courses, 19 credits of upper level core courses, and 16 credits of upper level electives. The comprehensive major has a principal focus on water's role in natural processes in Earth's systems. These skills include a solid understanding of the chemistry, surface water hydrology, groundwater, and biology of freshwater systems. UW-Green Bay Water Science majors have opportunities to work as research assistants on faculty projects, develop internships, or to conduct their own independent projects. UW-Green Bay faculty members are very active in research on water and wastewater treatment, runoff pollution, stream hydrology, groundwater quantity and quality, soils, limnology, and aquatic ecology.

**Student Learning Outcomes and Program Objectives**

1. Students will be able to describe the role water plays in the lithosphere, hydrosphere, cryosphere, atmosphere, and biosphere, with emphasis on interactions between these reservoirs.
2. Students will apply the scientific method to investigations of hydrologic processes, Earth systems, and interactions among the various physical and biological realms utilizing standard scientific field and laboratory methods.
3. Students will demonstrate an understanding of the hydrology of streams and lake systems and the role water has in landscape#forming processes that act on the Earth's surface.
4. Students will be able to describe the processes of and importance of groundwater flow and aquifer systems.
5. Students will be able to compare chemical interactions that occur in various hydrologic settings and their importance to water resources, geological and biological systems, and water/wastewater treatment.
6. Students will be able to describe the role water plays in atmospheric systems and the climate system.
7. Students will be able to describe the interactions between water systems and ecosystems.
8. Students will be able to describe the challenges of maintaining surface and ground water quality.
9. Students will apply their knowledge base and research skills to current issues pertaining to water resources, management, and remediation, with emphasis on related economic, social, and public policy dimensions.
10. Students will analyze, interpret, and report on laboratory and field findings using appropriate statistical techniques and computer applications.

## Major*

| Code | Title | Credits |
|---|---|---|
| **Supporting Courses** | | **33** |
| BIOLOGY 203 | Principles of Biology: Organisms and Evolution | |
| BIOLOGY 204 | Principles of Biology Lab: Organisms and Evolution | |
| CHEM 211 | Principles of Chemistry I | |
| CHEM 212 | Principles of Chemistry II | |
| CHEM 213 | Principles of Chemistry I Laboratory | |
| CHEM 214 | Principles of Chemistry II Laboratory | |
| GEOSCI 202 | Physical Geology | |
| GEOSCI 222 | Introduction to Weather & Climate | |
| MATH 260 | Introductory Statistics | |
| WATER 201 | Introduction to Water Science | |
| **Physics (choose one option):** | | |
| PHYSICS 103<br>& PHYSICS 203 | Fundamentals of Physics I<br>and Introductory Physics Lab I | |
| PHYSICS 201<br>& PHYSICS 203 | Principles of Physics I<br>and Introductory Physics Lab I | |
| **Upper-Level Required Courses** | | **19** |
| ENV SCI 335 | Water and Waste Water Treatment | |
| ENV SCI/ET 330 | Hydrology | |

| | | |
|---|---|---|
| GEOSCI 432/632 | Hydrogeology [#] | |
| WATER 444/644 | Aqueous Geochemistry [#] | |
| **Lakes/Streams (choose one):** | | |
| ENV SCI 401/601 | Stream Ecology [#] | |
| ENV SCI 403/603 | Limnology [#] | |
| **Water Resources (choose one):** | | |
| ENV SCI 433/633 | Ground Water: Resources and Regulations [#] | |
| **Elective Courses (Choose 16 credits)** | | **16** |
| BIOLOGY 322 | Environmental Microbiology | |
| BIOLOGY 341 | Fish Biology and Ecology | |
| BIOLOGY 357 | Marine Biology | |
| CHEM 311 | Analytical Chemistry | |
| CHEM 413/613 | Instrumental Analysis [#] | |
| ECON 305 | Environmental Economics | |
| ENV SCI 305 | Environmental Fate and Transport | |
| ENV SCI 320/520 | The Soil Environment [#] | |
| ENV SCI 337 | Environmental GIS | |
| ENV SCI 338 | Environmental Modeling | |
| ENV SCI 401 | Stream Ecology | |
| ENV SCI 403 | Limnology | |
| ENV SCI 424/624/ET 424 | Hazardous and Toxic Materials [#] | |
| ENV SCI 425/625 | Global Climate Change [#] | |
| ENV SCI 433/633 | Ground Water: Resources and Regulations [#] | |
| ENV SCI 491 | Senior Thesis/Research in Environmental Science | |
| EPP 379 | Natural Resources Policy, Law, and Administration | |
| ET 430 | Sustainable Agricultural Management | |
| GEOSCI 325 | Regional Climatology | |
| POL SCI 378 | Environmental Law | |
| WATER 321 | Stable Isotopes in the Environment | |
| WATER 410 | Agriculture-Water Nexus in Wisconsin | |
| WATER 411 | Agriculture-Water Nexus Field Experience | |
| WATER 491 | Senior Thesis/Research in Water Science | |
| WATER 492 | Special Topics in Water Science | |
| WATER 497 | Internship | |
| WATER 498 | Independent Study | |
| Freshwater Collaborative of Wisconsin [1] | | |
| **Total Credits** | | **68** |

* includes an accelerated option - Integrated with graduate Environmental Science and Policy program

\# Students must be granted permission through the department to enroll in graduate level coursework. For more information, contact the graduate Management office or refer to the graduate catalog (http://catalog.uwgb.edu/graduate/general-information/academic-rules-regulations/undergrad-in-accelerated/).

1 May use up to 8 credits of Specialty and Field Immersion Courses offered by Freshwater Collaborative of Wisconsin

## Curriculum Guide

The following is an example of a four-year Water Science program and is a representation of one possible pathway. Students are encouraged to plan ahead and check with your advisor to ensure that they have the most accurate and up-to-date information available about a particular four-year degree option. Because some courses are fall/spring and even/odd year basis, timing of certain courses may vary. Students are encouraged to consider a minor that pairs well with Water Science. 120 credits necessary to graduate.

| Course | Title | Credits |
|---|---|---|
| **Freshman** | | |
| **Fall** | | |
| WATER 201 | Introduction to Water Science | 3 |

| | | |
|---|---|---|
| GEOSCI 202 | Physical Geology | 4 |
| First Year Seminar | | 3 |
| English Comp 100 or Gen Ed | | 3 |
| Gen Ed or Math Course | | 3 |
| | **Credits** | **16** |
| **Spring** | | |
| BIOLOGY 203 | Principles of Biology: Organisms and Evolution | 3 |
| BIOLOGY 204 | Principles of Biology Lab: Organisms and Evolution | 1 |
| GEOSCI 222 | Introduction to Weather & Climate | 3 |
| MATH 260 | Introductory Statistics | 4 |
| Gen Ed | | 4 |
| | **Credits** | **15** |
| **Sophomore** | | |
| **Fall** | | |
| CHEM 211 | Principles of Chemistry I | 4 |
| CHEM 213 | Principles of Chemistry I Laboratory | 1 |
| ENV SCI 330 | Hydrology | 3 |
| ENV SCI 401<br>or ENV SCI 403 | Stream Ecology<br>or Limnology | 4 |
| Gen Ed or Elective | | 4 |
| | **Credits** | **16** |
| **Spring** | | |
| CHEM 212 | Principles of Chemistry II | 4 |
| CHEM 214 | Principles of Chemistry II Laboratory | 1 |
| ENV SCI 335 | Water and Waste Water Treatment | 3 |
| ENV SCI 337 | Environmental GIS | 3 |
| Gen Ed or Elective | | 4 |
| | **Credits** | **15** |
| **Junior** | | |
| **Fall** | | |
| ENV SCI 433 | Ground Water: Resources and Regulations | 3 |
| PHYSICS 103<br>or PHYSICS 201 | Fundamentals of Physics I<br>or Principles of Physics I | 4 |
| PHYSICS 203 | Introductory Physics Lab I | 1 |
| WATER 444 | Aqueous Geochemistry | 3 |
| Elective | | 4 |
| | **Credits** | **15** |
| **Spring** | | |
| GEOSCI 432 | Hydrogeology | 3 |
| WATER 321 | Stable Isotopes in the Environment (Recommended) | 1 |
| Elective | | 6 |
| Gen Ed | | 3 |
| | **Credits** | **13** |
| **Senior** | | |
| **Fall** | | |
| WATER 498<br>or WATER 497 | Independent Study (Recommended)<br>or Internship | 1-4 |
| ENV SCI 403<br>or ENV SCI 401 | Limnology<br>or Stream Ecology | 4 |
| Elective | | 4 |
| Elective | | 4 |
| | **Credits** | **13-16** |
| **Spring** | | |
| Electives | | 8 |
| Gen Ed | | 6 |
| WATER 497<br>or WATER 498 | Internship (Recommended)<br>or Independent Study | 1-3 |
| | **Credits** | **15-17** |
| | **Total Credits** | **118-123** |

1 Choose one of these two courses; check periodicity closely.

## Faculty

**Rebecca Abler**; Professor; Ph.D., Virginia Polytechnic Institute and State University

**Patrick S Forsythe**; Professor; Ph.D., Michigan State University*

**Richard Hein**; Professor; Ph.D., University of Rhode Island

**John A Luczaj**; Professor; Ph.D., Johns Hopkins University, chair*

**Patricia A Terry**; Professor; Ph.D., University of Colorado*

**Michael E Zorn**; Professor; Ph.D., University of Wisconsin - Madison*

**Michael Holly**; Associate Professor; Ph.D., University of Wisconsin - Madison*

**Erin Berns-Herrboldt**; Assistant Professor; Ph.D., University of Texas

**Kpoti (Stefan) Gunn**; Assistant Professor; Ph.D., Ohio State University*

**Christopher Houghton**; Assistant Teaching Professor; Ph.D., University of Wisconsin - Milwaukee