# FRESHWATER SCIENCES, BS

Freshwater scientists provide scientifically sound management of natural and constructed water systems for productive and equitable use while sustaining natural biota, diversity and freshwater availability. They also generate solutions to the problems facing freshwater through a complete understanding of water resources, the social systems in which they operate, and the application of technology, conservation, and sustainable management practices. Students take a broad curriculum within Freshwater Sciences and choose from the Water Policy or Aquatic Sciences option. Both options combine core classes in natural sciences, mathematics, economics and computer science with additional coursework in areas such as sustainability and environmental law.

Studies in Freshwater Sciences will help students prepare for careers in ecological and environmental sciences, natural resources, technology, and policy relevant to freshwater systems and resources. A degree in Freshwater Sciences also prepares students for professional careers in business and industry, government, non-profit organizations, as well as graduate studies in freshwater and environmental sciences.

## Requirements

Students must earn a minimum of 120 credits to complete the BS in Freshwater Sciences degree.

### General Education Requirements (GERs)

UW-Milwaukee has General Education Requirements (http://catalog.uwm.edu/policies/undergraduate-policies/#bachelorsdegreegeneraleducation) that must be met in order to earn a bachelor's degree. Some of the requirements of your program, including Foundation Courses, fulfill the campus GERs. Please review the requirements and consult with your academic advisor.

### Foundation Courses

| Code | Title | Credits |
|---|---|---|
| BIO SCI 150 | Foundations of Biological Sciences I (satisfies GER-NS+) | 4 |
| BIO SCI 152 | Foundations of Biological Sciences II (satisfies GER-NS+) | 4 |
| CHEM 102 | General Chemistry | 5 |
| CHEM 104 | General Chemistry and Qualitative Analysis | 5 |
| COMPSCI 250 | Introductory Computer Programming | 3 |
| ECON 103 | Principles of Microeconomics (satisfies GER-SS) | 3 |
| MTHSTAT 215 | Elementary Statistical Analysis (satisfies QL-B) | 3 |
| MATH 231 | Calculus and Analytic Geometry I | 4 |
| Total Credits | | 31 |

### Core Courses

| Code | Title | Credits |
|---|---|---|
| FRSHWTR 101 | Elements of Water | 3 |
| FRSHWTR 120 | Preparing for a Career in Freshwater Sciences | 1 |
| FRSHWTR 201 | The Water Environment | 3 |
| FRSHWTR 202 | Life in Water | 4 |
| FRSHWTR 391 | Water and Natural Resource Economics | 3 |
| FRSHWTR 392 | Water-Energy-Food-Climate | 3 |
| FRSHWTR 361 | Intro to Environmental Data Systems | 3 |
| Select one of the following: | | 3-4 |
| FRSHWTR 464 | Chemical Hydrogeology | |
| GEO SCI 400 | Water Quality | |
| GEO SCI 562 | Environmental Surface Hydrology | |
| FRSHWTR 660 | Professional and Capstone Planning | 1 |
| or FRSHWTR 662 | Thesis Research Planning and Proposal Development | |
| FRSHWTR 661 | Undergraduate Capstone | 3 |
| or FRSHWTR 663 | Undergraduate Research and Thesis | |
| GEOG 215 | Introduction to Geographic Information Science | 3 |
| Total Credits | | 30-31 |

### Aquatic Science Track Requirements

| Code | Title | Credits |
|---|---|---|
| **Required Courses** | | |
| PHYSICS 120 | General Physics I (Non-Calculus Treatment) | 4 |
| or PHYSICS 209 | Physics I (Calculus Treatment) | |
| **Electives** | | |
| Choose at least 9 credits from the following list, including at least 3 FRSHWTR credits: | | 9 |
| FRSHWTR 321 | Exploration of Inland Seas | |
| FRSHWTR 322 | Ecology and Evolution of Freshwater Organisms | |
| FRSHWTR 341 | Sanitation and Sustainability | |
| FRSHWTR 342 | Water Pollution, Technology and Management | |
| FRSHWTR 362 | Calculating Nature | |
| FRSHWTR 421 | Molecular Level Tools to Understand Larger Scale Change | |
| FRSHWTR 471 | Introduction to Sensing Networks | |
| FRSHWTR 511 | Ichthyology | |
| FRSHWTR 512 | Freshwater Sciences Practicum: (Topic: Brew City Aquaponics) | |
| FRSHWTR 513 | Field Experimentation and Analysis in Freshwater Sciences | |
| FRSHWTR 514 | Analytical Techniques in Freshwater Sciences | |
| FRSHWTR 522 | Biogeochemistry of Natural Organic Matter | |
| FRSHWTR 524 | Aquatic Isotope Biogeochemistry | |
| FRSHWTR 562 | Principles of Aquaculture Systems | |
| FRSHWTR 563 | Finfish Aquaculture and Nutrition Principles | |
| FRSHWTR 564 | Water Quality in Aquaculture | |
| FRSHWTR 567 | Fish Health | |
| FRSHWTR 621 | Benthic Ecology | |
| ATM SCI 240 | Introduction to Meteorology | |
| BIO SCI 310 | General Ecology | |
| BIO SCI 406 | Marine Biology | |

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|---|---|
| BIO SCI 505 | Conservation Biology |
| BIO SCI 512 | Limnology I |
| CES 651 | Principles of Stream Management and Restoration |
| CIV ENG 311 | Introduction to Energy, Environment and Sustainability |
| GEOG 403 | Remote Sensing: Environmental and Land Use Analysis |
| GEOG 415 | Hydrogeography |
| GEOG 455 | Applied Climatology |
| GEOG 515 | Watershed Analysis and Modeling |
| GEOG 525 | Geographic Information Science |
| GEO SCI 400 | Water Quality |
| GEO SCI 463 | Physical Hydrogeology |
| MATH 305 | Introduction to Mathematical and Computational Modeling |
| PH 303 | Climate Change, the Environment and Human Health |
| Total Credits | 13 |

## Water Policy Track Requirements

| Code | Title | Credits |
|---|---|---|
| **Required Courses** | | |
| FRSHWTR 393 | Water Law, Policy, and the Environment | 3 |
| **Electives** | | |
| Choose at least 9 credits from the following list, including at least 3 FRSHWTR credits: | | 9 |
| FRSHWTR 461 | Politics and Policy of Sustainability | |
| FRSHWTR 510 | Economics, Policy and Management of Water | |
| FRSHWTR 583 | Cost-Benefit Analysis for Environmental Resource Decisions | |
| FRSHWTR 584 | Aquatic Ecosystem Services Valuation | |
| FRSHWTR 585 | Applied Water Statistics and Data Manipulation | |
| POL SCI 216 | Environmental Politics | |
| GEOG 525 | Geographic Information Science | |
| GEOG 625 | Intermediate Geographic Information Science | |
| ECON 210 | Economic Statistics | |
| ECON 301 | Intermediate Microeconomics | |
| ECON 310 | Research Methods for Economics | |
| HIST 432 | North American Environmental History | |
| Total Credits | | 12 |

## Electives

With the help of their academic advisor, students will select electives to complete the 120 total credits required for the degree. Electives are tailored to each student's interests and career goals. Students may choose a related area of specialization outside of the Freshwater Sciences by completing any minor or interdisciplinary certificate offered by UWM, typically comprised of 18-22 credits. In some cases, students may choose to study two related areas, or they may complement a certificate or minor with other courses of interest.

# Aquatic Sciences Example Pathway

| | | |
|---|---|---|
| **Year 1** | | |
| **Semester 1** | | **Credits** |
| FRSHWTR 120 | Preparing for a Career in Freshwater Sciences | 1 |
| CHEM 100 | Chemical Science | 4 |
| MATH 105 | Introduction to College Algebra (QLA) | 3 |
| ENGLISH 101 | Introduction to College Writing | 3 |
| Humanities GER | | 3 |
| | Credits | 14 |
| **Semester 2** | | |
| FRSHWTR 101 | Elements of Water | 3 |
| CHEM 102 | General Chemistry | 5 |
| MATH 115 | Precalculus | 4 |
| ENGLISH 102 | College Writing and Research (OWC-A) | 3 |
| | Credits | 15 |
| **Year 2** | | |
| **Semester 3** | | |
| FRSHWTR 202 | Life in Water | 4 |
| CHEM 104 | General Chemistry and Qualitative Analysis | 5 |
| MATH 231 | Calculus and Analytic Geometry I | 4 |
| 1st semester World Language | | 4 |
| | Credits | 17 |
| **Semester 4** | | |
| FRSHWTR 201 | The Water Environment | 3 |
| BIO SCI 150 | Foundations of Biological Sciences I (NS+) | 4 |
| 2nd semester World Language | | 4 |
| MTHSTAT 215 | Elementary Statistical Analysis (QLB) | 3 |
| | Credits | 14 |
| **Year 3** | | |
| **Semester 5** | | |
| ECON 103 | Principles of Microeconomics (SS) | 3 |
| COMPSCI 250 | Introductory Computer Programming | 3 |
| BIO SCI 152 | Foundations of Biological Sciences II (NS+) | 4 |
| Humanities GER | | 3 |
| GER OWC-B | | 3 |
| | Credits | 16 |
| **Semester 6** | | |
| FRSHWTR 392 | Water-Energy-Food-Climate | 3 |
| FRSHWTR 391 | Water and Natural Resource Economics | 3 |
| PHYSICS 120 | General Physics I (Non-Calculus Treatment) | 4 |
| FRSHWTR 464 | Chemical Hydrogeology | 4 |
| | Credits | 14 |
| **Year 4** | | |
| **Semester 7** | | |
| FRSHWTR 361 | Intro to Environmental Data Systems | 3 |
| FRSHWTR 660 | Professional and Capstone Planning | 1 |
| GEOG 215 | Introduction to Geographic Information Science | 3 |
| Arts GER | | 3 |
| Additional Electives | | 5 |
| | Credits | 15 |
| **Semester 8** | | |
| FRSHWTR 661 | Undergraduate Capstone | 3 |
| Social Science & Cultural Diversity GER | | 3 |
| Aquatic Science Elective | | 3 |
| Aquatic Science Elective | | 3 |
| Aquatic Science Elective | | 3 |
| | Credits | 15 |
| | Total Credits | 120 |

# Water Policy Example Pathway

| | | |
|---|---|---|
| **Year 1** | | |
| **Semester 1** | | **Credits** |
| FRSHWTR 120 | Preparing for a Career in Freshwater Sciences | 1 |
| CHEM 100 | Chemical Science | 4 |
| MATH 105 | Introduction to College Algebra (QLA) | 3 |
| ENGLISH 101 | Introduction to College Writing | 3 |
| Humanities GER | | 3 |
| | Credits | 14 |
| **Semester 2** | | |
| FRSHWTR 101 | Elements of Water | 3 |
| CHEM 102 | General Chemistry | 5 |
| MATH 115 | Precalculus | 4 |
| ENGLISH 102 | College Writing and Research (OWC-A) | 3 |
| | Credits | 15 |
| **Year 2** | | |
| **Semester 3** | | |
| FRSHWTR 202 | Life in Water | 4 |
| CHEM 104 | General Chemistry and Qualitative Analysis | 5 |
| MATH 231 | Calculus and Analytic Geometry I | 4 |
| 1st semester World Language | | 4 |
| | Credits | 17 |
| **Semester 4** | | |
| FRSHWTR 201 | The Water Environment | 3 |
| BIO SCI 150 | Foundations of Biological Sciences I (NS+) | 4 |
| 2nd semester World Language | | 4 |
| MTHSTAT 215 | Elementary Statistical Analysis (QLB) | 3 |
| | Credits | 14 |
| **Year 3** | | |
| **Semester 5** | | |
| ECON 103 | Principles of Microeconomics (SS) | 3 |
| COMPSCI 250 | Introductory Computer Programming | 3 |
| BIO SCI 152 | Foundations of Biological Sciences II (NS+) | 4 |
| Humanities GER | | 3 |
| GER OWC-B | | 3 |
| | Credits | 16 |
| **Semester 6** | | |
| FRSHWTR 392 | Water-Energy-Food-Climate | 3 |
| FRSHWTR 391 | Water and Natural Resource Economics | 3 |
| Social Science & Cultural Diversity GER | | 4 |
| FRSHWTR 464 | Chemical Hydrogeology | 4 |
| | Credits | 14 |
| **Year 4** | | |
| **Semester 7** | | |
| FRSHWTR 361 | Intro to Environmental Data Systems | 3 |
| FRSHWTR 660 | Professional and Capstone Planning | 1 |
| FRSHWTR 393 | Water Law, Policy, and the Environment | 3 |
| GEOG 215 | Introduction to Geographic Information Science | 3 |
| Arts GER | | 3 |
| Water Policy Elective | | 3 |
| | Credits | 16 |
| **Semester 8** | | |
| FRSHWTR 661 | Undergraduate Capstone | 3 |
| Water Policy Elective | | 3 |
| Water Policy Elective | | 3 |
| Additional Elective | | 5 |
| | Credits | 14 |
| | Total Credits | 120 |

# Honors in the School of Freshwater Sciences

## Dean's Honor List

GPA of 3.500 or above, earned on a full-time student's GPA on 12 or more graded credits in a given semester.

## Honors College Degree and Honors College Degree with Distinction

Granted to graduating seniors who complete Honors College requirements, as listed in the Honors College (http://catalog.uwm.edu/opportunities-resources/honors-college/) section of this site.

## Commencement Honors

Students with a cumulative GPA of 3.500 or above, based on a minimum of 40 graded UWM credits earned prior to the final semester, will receive all-university commencement honors and be awarded the traditional gold cord at the December or May Honors Convocation. Please note that for honors calculation, the GPA is **not** rounded and is truncated at the third decimal (e.g., 3.499).

## Final Honors

Earned on a minimum of 60 graded UWM credits: Cum Laude - 3.500 or above; Magna Cum Laude - 3.650 or above; Summa Cum Laude - 3.800 or above.

## Contact Information

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http://uwm.edu/freshwater/