

Water Science (WATER)

Courses

WATER 201. Introduction to Water Science. 3 Credits.

Water Science is the interdisciplinary study of water and its interaction with solids, liquids, gases, and organisms in various Earth systems. Water is essential to life, and it plays a critical role in nearly every natural process in Earth's lithosphere, atmosphere, hydrosphere, biosphere, and cryosphere. The world faces significant challenges regarding water quantity, quality, and ecological function that are expected to worsen during the 21st century. It is rare to find a real-world system in which water does not play a significant role.

Fall and Spring.

WATER 202. Introduction to Water Science Laboratory. 1 Credit.

Laboratory course to accompany WATER 201 Introduction to Water Science.

WATER 321. Stable Isotopes in the Environment. 1 Credit.

Stable isotope analysis has become a standard tool in modern science. The natural variability in non-radioactive (stable) isotopes corresponds to specific physical and biological processes throughout the global Earth System. This course explores the basics of stable isotope chemistry, with most of the course dedicated to examples of their application across several scientific fields.

P: CHEM 211 or consent of instructor

Spring Odd.

WATER 410. Agriculture-Water Nexus in Wisconsin. 3 Credits.

This course uses different forms of agriculture in the context of variable geomorphology, climatology, and hydrology to provide students with a greater understanding of the interconnected processes relevant to agriculture and water management (both quantity and quality) across Wisconsin. Students will be introduced to the nexus of agriculture and water broadly through examples and case studies in Wisconsin. The topics covered will leverage ongoing ag-water quality monitoring and research projects and will engage students with agricultural and water resource management practices used to mitigate the impacts of agriculture on water quality and quantity.

Spring.

WATER 411. Agriculture-Water Nexus Field Experience. 1 Credit.

This course uses different forms of agriculture, variations in physiography, and differences in water resource systems to provide students with a greater understanding of the relationships between agriculture and water. Students and faculty will explore the nexus of agriculture and water through case studies of the water/agriculture connection across Wisconsin. The field course stops will leverage ongoing quality monitoring and research projects and will engage students with agricultural and resource management professionals and producers working to mitigate the impacts of agriculture on water quality/quantity Wisconsin. Course is repeatable for credit; may be taken 3 times for a total of 3 earned credits.

Fall and Spring.

WATER 444. Aqueous Geochemistry. 3 Credits.

This class will explore the theory and application of aqueous geochemistry principles to the study of surface and groundwater systems at low to moderate temperatures. The class will focus on inorganic processes including the hydrologic cycle, chemical weathering, chemical activities in natural waters, thermodynamics, kinetics, acid/base equilibria, carbonate chemistry, acid water systems, heavy metals, and redox reactions.

P: GEOSCI 202, CHEM 211 & CHEM 212

Fall Even.

WATER 491. Senior Thesis/Research in Water Science. 3 Credits.

A project-based capstone experience where individual students address a specific aspect of water science through the use of scientific and mathematical skills.

P: Senior standing, Math 260 with C or better, instructor consent. REC: Geoscience/Env Sci 432, Water 330, or other appropriate course depending upon focus of thesis project

Fall and Spring.

WATER 492. Special Topics in Water Science. 1-4 Credits.

Topics not covered by regular courses, such as geochemistry of natural waters, stream ecology, hydrology, hydrogeology, and others. Offerings of different topics can be repeated for credit.

WATER 495. Teaching Assistantship. 1-6 Credits.

The student and supervising teacher must prepare a statement that identifies the course with which the assistantship will happen, objectives for the assistantship, and expectations in order to fulfill the course objectives. Students are not eligible to receive credit in both the course they assist the instructor with and the teaching assistantship in the same semester. Typically student has previously taken the course prior to enrollment in the assistantship. Course is repeatable for credit.

Fall and Spring.

WATER 496. Project/Research Assistantship. 1-6 Credits.

The student must prepare a research proposal, and both parties should identify the research arrangement and how the student will complete the work to fulfill the course objectives within the assigned term.

WATER 497. Internship. 1-12 Credits.

Supervised practical experience in an organization or activity appropriate to a student's career and educational interests. Internships are supervised by faculty members and require periodic student/faculty meetings. All internships must be taken P-NC. Course is repeatable for credit.

WATER 498. Independent Study. 1-4 Credits.

Independent study is offered on an individual basis at the student's request and consists of a program of learning activities planned in consultation with a faculty member. A student wishing to study or conduct research in an area not represented in available scheduled courses should develop a preliminary proposal and seek the sponsorship of a faculty member. The student's advisor can direct him or her to instructors with appropriate interests. A written report or equivalent is required for evaluation, and a short title describing the program must be sent early in the semester to the registrar for entry on the student's transcript. Course is repeatable for credit.

P: fr or so st with cum gpa $\geq$ 2.50; or jr or sr st with cum gpa $\geq$ 2.00.

Fall and Spring.