

## Descriptions of Water Resource Courses offered online:

### **ENSC105 Environmental Science**

Credits: 3

Prerequisites: none

This course is designed to introduce students to important science-related issues in the world around us. The class will examine environmental issues on global, regional, and local scales. Class discussions and activities will emphasize the basic scientific principles needed to evaluate scientific problems relevant to environmental issues.

### **ENSC242 Environmental Sampling I**

**Credits: 3**

**Prerequisites: EVSC215 and EVSC220 or consent of instructor**

Environmental Sampling I expands on the fundamental knowledge taught in Hydrologic Measurements, Surface Water Hydrology, and Groundwater Hydrology. Using the skills and methods required for measuring and analyzing surface water and groundwater, students will make predictions or decisions in water resource applications. The course will emphasize the practical application of knowledge learned in previous courses.

### **ENSC270 Water Quality**

**Credits: 3**

**Prerequisites: ENSC272, M121, CHMY121 and CHMY122 or consent of instructor**

This water quality course provides an understanding and an awareness of the basic principles of water quality. Course content will include water quality parameters, pollution sources, and water treatment. This will be related to water regulations, requirements, policies, understanding the basics of a water quality plan both locally and regionally, and testing procedures. The water quality course is designed to prepare students for future careers in applied water resource management

### **ENSC272 Water Resources**

**Credits: 3**

**Prerequisites: none**

This course provides a basic introduction to the fundamental concepts, techniques, and knowledge required to understand and manage water resources. The course will provide an introduction to a variety of water resource topics, including: water resources terminology, the principles of the hydrologic cycle, water balance techniques, hydrology, hydrogeology, basic computational techniques, historic water information, water law, and water rights overview. Through the use of professional sources, the students will develop a working knowledge of the hydrologic, water quality, legal, economic, political, and social factors that determine water availability, hazards, use, demand, and allocation.

### **EVSC135 Topographic Maps and Aerial Photo Interpretation**

**Credits: 3**

**Prerequisites: M121 or higher or consent of instructor**

The course will introduce basic principles, techniques, processes, and procedures for quantitative and qualitative interpretation of topographic maps and aerial photographs. The course will entail not only formal explanation of principles and concepts, but also hands-on exercises that focus on various practical applications for effective interpretation of maps and air photos in order to make quality assessments of physical objects or locations of interest. Each student is required to conduct an individual research project, which will consist of problem solving using the analytical skills learned during the semester.

### **EVSC140 Introduction to Geographic Information Systems (GIS)**

**Credits: 3**

**Prerequisite: CAPP131 or higher or consent of instructor**

This course teaches the basics of Geographic Information Systems (GIS) and the science and technology behind it. Students will be introduced to the fundamentals of geography and spatial relationships and the concepts and tools used to create, maintain, and display GIS data. The course will consist of online lessons and readings each with approximately 2-4 hours of material.

## **EVSC150 Hydrologic Measurements**

**Credits: 3**

**Prerequisite: M121 or higher and ENSC272 or consent of the instructor**

Increasing competition for water has led to the need for accurate water measurement in order to more efficiently manage the resource. This course is designed to teach the basics of surface and ground water measurement and provide a theoretical understanding of the science. Students will learn the most commonly used measurement and data collection techniques and how to properly analyze the data.

## **EVSC211 Environmental Policy and Laws**

**Credits: 3**

**Prerequisites: ENSC105 or consent of instructor**

This course is an introduction to the study of environmental politics, policy, and laws. It examines the development of environmental policy in the United States while exploring the opposing environmental relationships between science versus belief, rich versus poor, the powerful versus the disenfranchised, and idealism versus practice. Through analysis and case studies, this course provides an overview and assessment of key environmental policy issues, developmental framework of current laws, and their associated implications for environmental issues.

## **EVSC215 Ground Water Hydrology**

**Credits: 3**

**Prerequisites: M121 and EVSC150 or consent of instructor**

Ground Water Hydrology presents fundamental concepts and principles of the geology of ground-water occurrence, aquifer types and their hydraulic properties, ground-water flow, well drilling and design technology, aquifer testing analysis methods, and interpretation and assessment of aquifer-testing results and pumping impacts.

## **EVSC220 Surface Water Hydrology**

**Credits: 3**

**Prerequisites: EVSC 150 and M121 or consent of instructor**

Surface Water Hydrology is designed to provide students with an understanding of basic surface water hydrology and hydrological processes, beginning with conceptual principles to quantitative and qualitative standards and methods. This course involves an in-depth analysis of the hydrologic cycle and principles including precipitation, evapotranspiration, stream flow, and open channel hydraulics, rainfall, interception, infiltration, and groundwater hydrology. This class will prepare students for careers emphasizing surface water resource management.

## **EVSC233 Environment and the Economy**

**Credits: 3**

**Prerequisites: none**

This introductory course covers the economics of natural resources with an emphasis on economic tools used to analyze key economic aspects associated with water and natural resources. Topics covered include but are not limited to urban demand for water, water supply and economic growth, water benefit-cost analysis, water utility economics, irrigation demand, large water projects, economic impacts of surface water law and institutions; economics of salinity and drainage, economics of groundwater management.

## **EVSC235 Soils, Weather and Climate**

**Credits: 3**

**Prerequisites: ENSC272 and ENSC105 or consent of instructor**

This course provides an overview of regional hydrologic cycles in relationship to climatology, weather and soils. An examination of soil profiles, classification of soils, and water movement in soils in association with an introduction to the water balance, and its relationship to components including evapotranspiration, interception, soil moisture storage, land usage, groundwater storage, and overland flow will be examined.

## **EVSC240 Geographic Information Systems (GIS)**

**Credits: 3**

**Prerequisites: A "C-" or equivalent in EVSC140 or consent of instructor**

Geographic Information Systems (GIS) are used for the creation, storage, representation, research, and analysis of spatial information in a digital environment. This course expands on the fundamentals and principles of GIS and cartography learned in the Introduction to Geographic Information Systems course. Students will learn the processes, procedures, and the critical thinking involved with performing geospatial analysis. The course will entail a hands-on lab that focuses on GIS concepts and techniques utilized for data design, analysis, and map creation. Each student is required to conduct his or her own individual research project, which will consist of model building and design for spatial analysis.

## **EVSC260 Field Methods and Reporting**

**Credits: 3**

**Prerequisites: EVSC215 and EVSC220 or consent of instructor**

The Field Methods and Reporting course is designed to provide students with a working knowledge of the scientific principles and protocols used in water resource measurements and field methods. The course will emphasize equipment utilized in water resource measurements and experimental design for water resource studies. Measurement, sampling strategies, and safety practices in the field will be discussed along with field trips to demonstrate application of field methods.

## **NRSM280 Water Rights and Water Policy**

**Credits: 3**

**Prerequisites: none**

This course is designed to examine the laws and policies governing water resources along with the historical, social, environmental, and economic forces that shape them. The evolution of water laws and policy up to and through the transformative 1970s to the present will be explored by an examination of water resources and their allocation in several Montana watersheds and California's Mono Basin. The administration of water rights and water quality laws by state and federal agencies in Montana and the West will be studied utilizing recent legal and policy debates and decisions.

