

CIVIL ENGINEERING: BIO-RESOURCES OPTION

COLLEGE OF ENGINEERING | MONTANA STATE UNIVERSITY

WHAT IS THE BIO-RESOURCES OPTION IN CIVIL ENGINEERING?

Engineering and the world's biological systems go hand-in-hand in maintaining our delicate environment. Civil engineers have a critical role in managing our soil, plant, and water resources for sustainability. The Bio-Resources Option of Civil Engineering educates civil engineers to fulfill the infrastructure needs of our ever-expanding society while preserving the environment and protecting natural resources.

As our understanding of the interaction between engineering activities and the effect on the environment expands, the need for civil engineers with bio-resources training also grows. Following are particular areas of concern:

- soil and water conservation and reclamation
- modeling and analysis of hydrologic systems
- safe and adequate water supplies
- protection and enhancement of surface and groundwater quantity and quality
- waste and by-product management

IS THE BIO-RESOURCES OPTION FOR YOU?

If you like working with people and have solid math and science skills, engineering could be your perfect fit. As an engineer, you'll apply science to enhance people's lives and protect the environment.

As a student, you'll learn how to use modern materials, computational methods, and scientific developments. Upon graduating, you'll join teams that solve technical and social problems by designing physical systems that are efficient and sustainable.

Society's future will be closely tied to energy, the environment, and our ability to thrive in a global economy. As a CE, you'll fill a vital role in linking these themes. Whether you choose design, construction, research, teaching, or management, civil engineering offers a wide range of careers.

COURSEWORK

In the first two years, you'll study chemistry, physics, math, computer analysis, engineering mechanics, materials, graphics, and surveying. As a junior, you'll explore each subarea of CE, where you'll solve engineering problems and extend your scientific background and analytic abilities.

In your senior year, you'll choose professional electives in areas that interest you and you will engage in a senior capstone project. You'll be on a design team challenged to solve an open-ended, real-world problem. To find a workable solution, you and your classmates will synthesize knowledge from a broad range of subjects and follow professional engineering practices.

As an engineer, your job will include communicating your designs to those you work with, so you'll take classes to sharpen your oral and written communication skills. By taking courses in humanities and social sciences, you will gain awareness of and sensitivity to critical aspects of society.

The Bio-Resources option in the civil engineering degree program is accredited by the Engineering Accreditation Commission of ABET, www.abet.org.



1 Students participate in research projects, such as this constructed wetlands study, to better understand how plants contribute to water treatment in constructed wetlands. **2** Many Civil Engineering students support the MSU chapter of Engineers Without Borders' long-term commitment to helping residents bring clean water and improved sanitation to their 50+ schools in Khwisero, Kenya. **3** Soils are an important factor in Bio-Resources engineering. **4** Students work alongside faculty as they study applications of hydraulics and fluid mechanics in natural and man-made systems.

For additional information, contact:

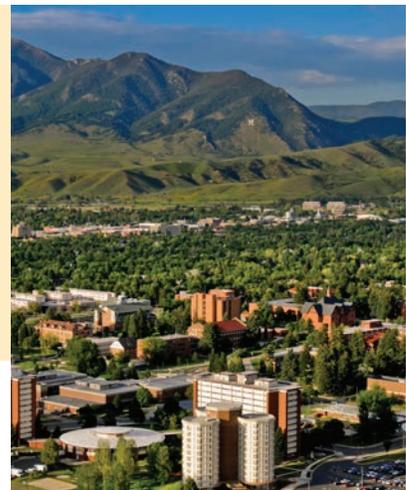
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Job Opportunities

Our graduates have been highly successful in beginning their engineering careers immediately after graduation. Graduates tend to find employment in

- consulting engineering companies
- mining and natural resources industries
- engineering sales and service
- federal, state, and local agencies.

We also have a high placement record in graduate engineering programs and have had students with ROTC coursework move on to military careers.

Facilities

The Civil Engineering Department has laboratories devoted to undergraduate education. These include hydraulics and water resources engineering, geotechnical engineering, structural engineering, and surveying. Our computer facilities are state-of-the-art and use current versions of engineering software and hardware. Many of our courses have strong computer components.

Length of Study and Preparation for Graduate Studies

The curriculum is designed to be completed in four years. Some lower division courses are available in the summer. The program adequately prepares students for licensing as professional engineers (PE) and is an excellent precursor for graduate studies in civil or environmental engineering.

5 Hydrologic processes weigh heavily on the design of natural systems and are studied in the classroom and through research projects as part of the Bio-Resources option.

COURSES

COLLEGE REQUIREMENTS	CREDITS	BIO-RESOURCES REQUIREMENTS	CREDITS
Calculus and Differential Equations	16	Engineering Hydrology	3
Biology/Microbiology/Soils	7	Environmental Engineering	3
Chemistry/Physics	12	Hydrology/Hydraulics	4
Humanities and Social Sciences	12	Natural Water Treatment Systems	3
Written & Oral Communications	9	Multidisciplinary/Senior Design	8
Economics and Statistics	5	Engineering Electives	15
CIVIL ENGINEERING REQUIREMENTS	CREDITS	TOTAL	128
Engineering Analysis	1		
Surveying	3		
Engineering Design Graphics	3		
Engineering Mechanics	12		
Structures	3		
Engineering Science	3		
Construction Engineering	3		
Geotechnical Engineering	3		

PROFESSIONAL ELECTIVES

The scope of the bio-resources option is demonstrated by a review of the professional elective courses available. These include the following:

- Advanced Geotechnical Engineering
- Air Pollution Control
- Building Information Modeling in Construction
- Cold Regions Engineering
- Ecology
- Environmental Biogeochemistry
- Geographic Information Systems
- Groundwater
- Hazardous Waste Treatment
- Internship
- Land Rehabilitation
- Open Channel and Pipeline Hydraulics
- Solid Waste Management
- Survey Data Collection/Analysis
- Undergraduate Research
- Water Chemistry
- Watershed Hydrology

