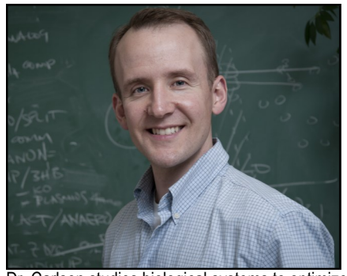
FACULTY

2014

Dr. Richards' research is focused on the study of microbial life in extreme environments, in particular those of high pH, high salinity, or dissolved solids.

Dr. Anderson's research focuses on heat transfer and fluid flow in sustainable energy systems.

Dr. McCalla studies purification of biomolecules, and transport analysis in microfluidic reactors

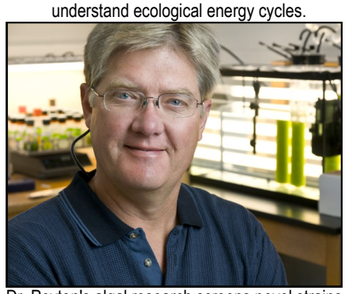


Dr. Carlson studies biological systems to optimize biofuels production, control medical infections, or understand ecological energy cycles.

Dr. Gerlach investigates the transport, growth, and reaction of microbes and solutes in biofilms and porous media.

Dr. Chang researches drop-based microfluidics—the creation and manipulation of tiny drops of fluid.

Dr. Wilking researches soft materials, microbial biofilms and colloidal and nanomaterials synthesis.

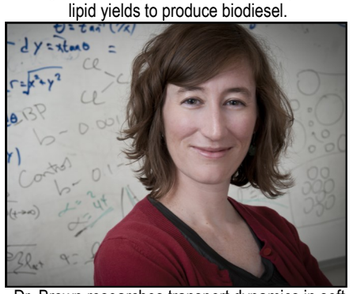


Dr. Peyton's algal research screens novel strains of algae from unique environments to optimize lipid yields to produce biodiesel.

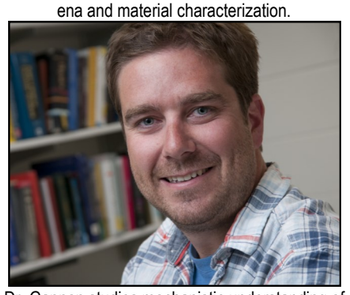
Dr. Seymour's studies further application of MRM methods in the study of transport phenomena and material characterization.

Dr. Heys applies fundamental conservation laws to understand transport in biological systems.

Dr. Foreman researches microbial communities in relation to their environment and the processing of nutrients.



Dr. Brown researches transport dynamics in soft matter systems using Magnetic Resonance (MR) techniques and rheological characterization.



Dr. Gannon studies mechanistic understanding of materials used in extreme environments relevant to energy conversion systems.

Dr. Wettstein researches the synthesis of platform chemicals, specialty chemicals, and biofuels from lignocellulosic biomass using catalytic and separation processes.

CHBE

2014 STUDENT INFORMATION

CHEMICAL AND BIOLOGICAL ENGINEERING

www.chbe.montana.edu

WELCOME TO CHEMICAL AND BIOLOGICAL ENGINEERING!

Our goal is to prepare students to use their knowledge and skills to contribute to society and their profession. We offer undergraduate degrees in both chemical engineering and bioengineering.

The basis of both chemical and biological engineering is the useful transformation of matter from one form to another. That transformation can be brought about by direct chemical reactions, or chemical reactions mediated by living organisms.

Right now, chemical and biological engineers can work in many of the same areas. That may change as bioengineering develops as a profession, but bioengineers are likely to work closely with chemical engineers for the foreseeable future.

CHEMICAL ENGINEERING

chemical manufacturing, petroleum refining, biomedicine, pharmaceuticals, nanotechnology, materials science, environmental engineering

BIOLOGICAL ENGINEERING

biomedicine, pharmaceuticals, nanotechnology, materials science, environmental engineering

The list is expanding all the time—tomorrow's graduates may find careers in fields that do not even exist today as chemical and biological engineering research continually expands the opportunities.

If you haven't decided whether you want a career in chemical or biological engineering, take heart—the curricula for chemical engineering and bioengineering are identical for the first three semesters.

In the first three semesters the focus is on basic math and science courses, and both bioengineers and chemical engineers need chemistry, calculus, and physics. The curricula start diverging in the junior year when bioengineering majors take more bio-based science courses while chemical engineering majors take more engineering courses.

Focus Areas

Both the chemical engineering curriculum and the bioengineering curriculum include 11 credits (about four courses) of technical electives. The bioengineering program adds another nine credits of bioengineering electives. Students in either major can use these elective credits to focus on an area of interest. Lists of suggested courses are available for a variety of focus areas:

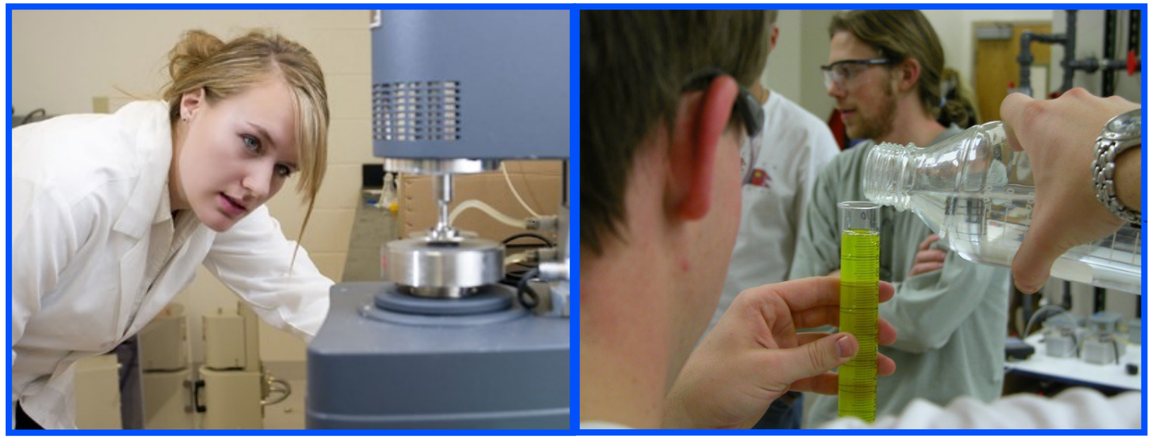
Chemical Engineering Focus Areas:

- process and product engineering (classic chemical engineering)
- materials engineering
- environmental engineering
- bioengineering

Bioengineering Focus Areas:

- biomedical engineering
- environmental engineering
- bioprocess engineering
- food engineering

Technical elective courses are typically taken in the junior and senior years; you have time to consider on which area you might like to focus.



Academic Advising

The academic advisor and departmental certifying officer is Shelley Thomas. For most academic advice she will be your first contact, and you are encouraged to meet with her for advising before registering each semester. She is available to assist students with registration questions and processes. Shelley's office is located in 309 Cobleigh Hall. For additional information regarding career focus advice, each CHBE student is assigned two academic advisors, according to the first letter of his or her last name:

A-D Ryan Anderson, Jennifer Brown
E-J Ross Carlson, Paul Gannon
K-N Jeff Heys, Brent Peyton
O-S Abbie Richards, Joe Seymour
T-Z Stephanie Wettstein, Jim Wilking
Additionally, Dr. Jeffrey Heys serves as back-up advisor

Entering Freshmen

Your advising contact is Shelley Thomas. The department head is also available to advise new students. After admission, students are encouraged to become acquainted with their career advisors, following designations above.

Department Contact Information

306 Cobleigh Hall
PO Box 173920
Bozeman, MT 59717-3920
chbe@coe.montana.edu
406-994-2221

Transfer Students

The evaluation of credits transferred from a previous institution requires two parts:

1. The university evaluates transfer courses for equivalencies.
2. The department evaluates your transfer credits for allowable substitutions.

Transfer students will meet with an advisor until they are track with the curriculum flowchart.

Degree Requirements

Credit Requirements

The department requires 128 credits for graduation, 43 of which must be in courses numbered 300 or higher.

Performance Requirements

Students starting their academic program in the fall of 2005 or later are required by Board of Regents policy to achieve a C- or better grade in each class used to satisfy the Bachelor of Science degree requirements.

Specific Course Requirements

Specific course requirements are listed in several places; however, the MSU undergraduate catalog is the official source of degree requirements. Also, degree requirements are available as a flowchart (showing course prerequisites). These documents are available online at the web addresses listed to the right.

Useful Websites

MSU Catalog: www.montana.edu/wwwcat

CHBE Homepage: www.chbe.montana.edu

CHBE Academic Information (electives , pre-requisite flow sheets, and co-op schedules):

http://www.chbe.montana.edu/Students/AcademicInformationUndergraduate.htm

MSU CORE 2.0 Requirements

MSU's general education requirements are CORE courses. In 2004 MSU adopted a new set of CORE requirements called CORE 2.0. These requirements, as they apply to CHBE majors include 12 credits of CORE 2.0 electives in: **IA** Inquiry Arts (3 cr), **IH** Inquiry Humanities (3 cr), **IS** Inquiry Social Sciences, **D** Diversity (3 cr). There are several other CORE 2.0 areas that are automatically met by courses required by the chemical and biological engineering curricula:

US	University Seminar (3 cr)
W	Writing (3 cr)
IN	Inquiry Natural Science
CS	Contemporary Issues in Science
Q	Quantitative Reasoning
R	Research and Creative Experience

Internship & Research

Industrial internship and co-operative education opportunities are often available after junior year. Companies interview students through on-campus recruiting. More information can be found at http://www.montana.edu/careers/jobs/

Students may seek research internships after sophomore year by searching for REU (Research Experiences for Undergraduates) Programs. The department publicizes these programs on bulletin boards and via e-mail messages to students.

About 20% of our undergraduates participate in research experiences as undergraduates. Students interested in this opportunity should speak with individual faculty members.

U.S. Bureau of Labor Statistics

www.bls.gov/oco/ocos027.htm

Chemical engineers apply the principles of chemistry to solve problems involving the production or use of chemicals and biochemicals. They design equipment and processes for large-scale chemical manufacturing, plan and test methods of manufacturing products and treating byproducts, and supervise production. Chemical engineers also work in a variety of manufacturing industries other than chemical manufacturing, such as those producing energy, electronics, food, clothing, and paper. They also work in health care, biotechnology, and business services. Chemical engineers apply principles of physics, mathematics, and mechanical and electrical engineering, as well as chemistry. Some may specialize in a particular chemical process, such as oxidation or polymerization. Others specialize in a particular field, such as nanomaterials, or in the development of specific products. They must be aware of all aspects of chemicals manufacturing and how the manufacturing process affects the environment and the safety of workers and consumers.

Related Areas Described at the USBLS site: Biomedical Engineers, Environmental Engineers, Materials Engineers

Chemical engineers are expected to have employment growth of 8 percent over the projections decade, about as fast as the average for all occupations. Although overall employment in the chemical manufacturing industry is expected to decline, chemical companies will continue to research and develop new chemicals and more efficient processes to increase output of existing chemicals. Among manufacturing industries, pharmaceuticals may provide the best opportunities for jobseekers. However, most employment growth for chemical engineers will be in service-providing industries such as professional, scientific, and technical services, particularly for research in energy and the developing fields of biotechnology and nanotechnology.

More questions? Check out http://www.chbe.montana.edu/Students/faqs.html