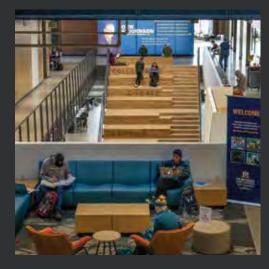
NORM ASBJORNSON COLLEGE of ENGINEERING MONTANA STATE UNIVERSITY

UNDERGRADUATE ACADEMIC PROGRAMS

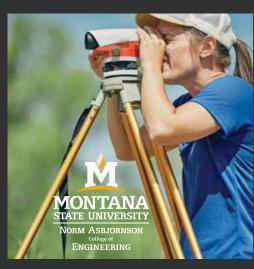












The Norm Asbjornson College of Engineering is at the core of MSU's land-grant mission, providing an inclusive, hands-on learning environment that supports academic excellence, strives for innovation in research and serves the community in Montana and beyond.

I'm thrilled to share with you the exciting opportunities available to our students. In the pages that follow, you'll get a glimpse of how our engineering and computer science undergraduates are reaching their goals at MSU and in their fields. With a variety of student support services, handson research opportunities, and courses designed to meet the need for capable and creative professionals, we set our students up for success. I invite you to learn what awaits you at the Norm Asbjornson College of Engineering and how you can be part of our legacy of excellence.

Brett Gunnink, Ph.D., P.E. Dean



UNDERGRADUATE AREAS OF STUDY

- **Biological Engineering**
- Biomedical Engineering
- **Chemical Engineering**
- **Civil Engineering**
- **Land Surveying**
- **Computer Engineering**
- **Computer Science** (STEM interest)
- **Interdisciplinary Option**
- **Professional Option**
- **Computer Science** (Arts, Humanities or ness interest)
- **Construction Engineering Technology**
- **Electrical Engineering**
- **Environmental Engineering**
- **Financial Engineering**
- Industrial & Mgmt. Systems Engineering¹
- **Engineering Management**
- **Mechanical Engineering**
- Aerospace
- **Building Energy Systems**
- Materials
- Mechatronics
- **Mechanical Engineering Technology**
- Military Air and Space Studies-Air Force ROTC
- Military Science-Army ROTC
- Military Studies
- ¹ Master of Science in Industrial & Management Engineering
- Major Option within a major
- Minor ▲ Special program

GRADUATE DEGREES

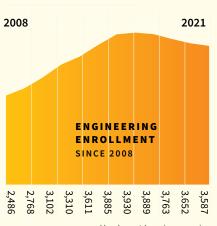
- M.Eng. Bioengineering
- M.Eng. Chemical Engineering
- M.Eng. Electrical Engineering
- M.Eng. Mechanical Engineering
- Bioengineering
- M.S. Chemical Engineering
- M.S. Civil Engineering
- M.S. Computer Science
- M.S. Electrical Engineering, Plan A (thesis)
- Electrical Engineering, Plan B (professional paper)
- M.S. Environmental Engineering
- M.S. Industrial and Management Engineering
- M.S. Mechanical Engineering
- M.S. Optics and Photonics Plan A (thesis)
- M.S. Optics and Photonics, Plan B (professional paper)
- Ph.D. Chemical Engineering
- Ph.D. Computer Science
- Ph.D. Electrical Engineering
- Ph.D. Engineering—Options in Applied Mechanics, Civil, **Environmental, Industrial, and Mechanical**
- Ph.D. Materials Science

FACTS & STATS

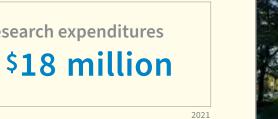


Top producer of **Goldwater Scholars:**

The Goldwater Scholarship is a competitive national award given to math, science and engineering students. MSU has produced a total of 84 Goldwater Scholars, and eight engineering students have won the award in the last five years.—2022

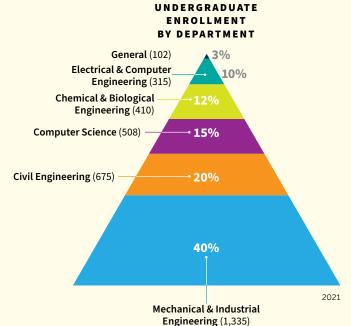


Headcount by primary major





Norm Asbjornson Hall A \$50 million gift from Norm Asbjornson made possible the 110,000-square-foot building, which opened in 2019. Its 17 labs and nine classrooms foster dynamic interdisciplinary engagement and meaningful student-faculty interaction.



• Number of faculty

Research expenditures

NON-TENURE

TRACK

51

TENURE

TRACK



Cutting edge building technologies helped Norm Asbjornson Hall become one of only 10 buildings in Montana to be certified as **LEED Platinum**, the U.S. Green Building Council's highest certification.



Named for a generous donor and 1959 MSU electrical engineering alumnus, the Bill Wurst Makerspace includes specialty tools such as 3-D printers for students and faculty to build, test and prototype their big ideas.



pup_info->ngroups = gidsetsize; up_info->nblocks = nblocks; nic_set(&group_info->usage, 1) ;idsetsize <= NGROUPS_SMALL)</pre> roup_info->blocks[0] = group_info->small_block; or (i = 0; i < nblocks; i++) {

STUDENT SUCCESS

Student support

ePALS

The student mentoring program pairs freshmen and sophomores with juniors and seniors who provide guidance about classes, activities, internships and more.

The Empower program supports historically underrepresented students in STEM fields. The Empower Student Center provides a study space and services that support inclusive community and academic success.

Women in Engineering

Offering professional development and networking opportunities, the Women in Engineering program works to build a community of successful women engineers and computer scientists.

Walk-in help centers

The engineering college offers walk-in help centers where students can get one-on-one help with challenging core courses.

Global horizons

The International Engineering Certificate is a step towards becoming a global computer scientist or engineer – someone who can live, work and perform anywhere. Students work closely with their advisors to turn their engineering study abroad experience or service trip into credit toward the certificate.

Dedicated faculty

One-on-one faculty advising is available to all students for discussing course load, degree planning and career preparation.

Online Advising Center

We provide easy access for current and prospective students to connect with academic pathways, support resources and engagement opportunities.



Visit coe.montana.edu/advising to learn more

ENGINEERING EXCELLENCE

Engagement opportunities

Community and connections

Engineering and computer science students can join any of 38 clubs and organizations within the college, including the Bridger Solar Team and Association for Women in Computing.

Engineers Without Borders

MSU students have completed more than 30 projects in the Khwisero region of Kenya, including water well projects, sanitation projects, a water pipeline and rainwater catchment systems.

Construction competition

MSU civil engineering students regularly place among the top teams at a regional competition where they create mock construction bids on real-world projects such as bridges.



Engineers Without Borders

Opposite, clockwise: A computer science graduate student collaborates with MSU researcher Laura Stanley on a project to improve human-robot interactions in manufacturing · A mechanical engineering student makes final adjustments to a robot excavator to compete in the annual NASA robotic mining competition at Kennedy Space Center · Students in the Gianforte School of Computing collaborate on a coding challenge.



An inclusive college

We remain committed to providing a place for all to realize their potential in engineering and computer science.

The Empower program aims to advance our population of students from diverse backgrounds by fostering a supportive learning environment that encourages their academic, professional and leadership development.



Fall 2021 class: 677 female students

Women faculty on tenure track 25% of total Fall 2021: 22 tenure-track female faculty

EMPOWERING STUDENTS



The Empower Student Center offers a study area, as well as access to resources, staff, and supportive learning environment.

Opposite, clockwise:

Civil engineering and ecology graduate students team up to improve native fish habitat on the Big Hole River in southwest

Engineering students showcase their capstone projects during the engineering Design Fair.

An electrical engineering doctoral student won a prestigious NSF Graduate Research Fellowship for a project to advance an optics technology for measuring the composition of clouds.





DEPARTMENT OF CHEMICAL & BIOLOGICAL ENGINEERING



Undergraduate students in environmental biology prepare test tubes to begin researching and incubating single-cell microbes and bacteria collected from geyser basins in Yellowstone National Park that have potential qualities to break down plastics.



Undergraduate student researching new, low-cost method to detect medically significant genetic material.

Research Highlight:

In an effort to improve the feasibility of a renewable energy source, a team of MSU researchers is exploring a potential breakthrough in producing biofuel from algae with the help of a \$3 million grant from the U.S. Department of Energy.

Building a sustainable future

Chemical and biological engineering students plan and host an annual conference on climate change that brings together guest speakers and more than other 100 participants to explore ways that chemical and biological engineers can help society while protecting the environment.

Get Involved

- American Institute of Chemical Engineers
- Electrochemical Society
- Society for Biological Engineers

YOUR FIRST-YEAR COURSES:

BIOLOGICAL ENGINEERING

Biological engineers integrate life sciences with engineering to transform natural materials into products such as medicines, biofuels and foods.

EBIO 100 · Intro to Biolo	ogical Engineering	2
CHMY 141-142 · College	Chemistry I	4
University Core Elective	es	6
M 171Q · Calculus I		4
University Core Elective	es or W Core	6
EGEN 102 · Intro to Engi	ineer Computer Apps	3
CHMY 143 · College Che	mistry II	4
M 172Q · Calculus II		4

BIOMEDICAL ENGINEERING

Combines engineering with courses like anatomy and cell biology to fulfill pre-med requirements while opening doors to careers in medical research and technology.

EBIO 100 · Intro to Biological Engineering	2
ECHM 100 · Intro to Chemical Engineering	2
CHMY 141-142 · College Chemistry I & Chem I Lab	4
University Core Electives or W Core	9
BIOB 160 · Principles of Living Systems	4
BIOB 260 · Cellular & Molecular Biology	4
M 171Q · Calculus I	4
CHMY 143 & 144 · College Chemistry II & Chem II Lab	4
EGEN 102 · Intro to Engineer Computer Apps	3
CHMY 143 · College Chemistry II	4
M 172Q · Calculus II	
EBIO 461 Principles of Biomedical Engineering	3

MINOR

Biomedical Engineering

Career Opportunities

- Biofuels
- Biomedicine
- Environmental restoration
- Pharmaceuticals

Top Employers

- BP
- Exxon
- Micron
- Intel
- DuPontPfizer

CHEMICAL ENGINEERING

Chemical engineering graduates create valuable products using chemical processes that are cost-effective, energy efficient and sustainable.

ECHM 100	· Intro to Chemical Engineering	2
M 171Q	Calculus I	4
University	Core Electives	6
CHMY 141	College Chemistry I	4
University Studies or W Core		6
M 172Q	Calculus II	4
CHMY 143	College Chemistry II	4
EGEN 102	Intro to Engineer Computer Apps	3





Top to bottom: 3-D printing creates new ways of studying the interactions of microbes · The Magnetic Resonance Laboratory is used to explore the unique properties of liquids and gels.

Visit coe.montana.edu/courses/cbe for more course information.





Civil engineering students tour the construction site of the new Hyalite Hall on campus during a structural engineering class to gain an understanding of real-world applications structural elements and systems.



 $Students\ in\ the\ structures\ laboratory\ perform\ concrete\ beam$ dynamics testing.

Research Highlight:

In partnership with the Montana Department of Transportation, MSU undergraduates have helped develop an exceptionally strong and durable concrete that's now being used for bridge decks in the state.

Education for the real world

With a \$1 million grant from the National Science Foundation, MSU is transforming its Environmental Engineering degree to better position graduates to excel in professional practice and serve communities. Courses are structured around real-world, multifaceted projects that incorporate technical subjects as well as community engagement, economics and writing for general audiences.

YOUR FIRST-YEAR COURSES:

CIVIL ENGINEERING

Civil engineers provide society with vital infrastructure including roads, buildings, bridges, transit systems and water treatment systems while tackling challenges such as pollution and community planning.

	CHMY 141	College Chemistry I	4
	M 171Q	Calculus I	4
	WRIT 101W	College Writing I	3
	University S	eminar	3
University Core		3	
	CHMY 143	College Chemistry II	4
	M 172Q	Calculus II	4
	PHSX 220	Physics I (with Calculus)	4
	ECIV 202	Applied Analysis	1

CONSTRUCTION ENGINEERING **TECHNOLOGY**

Construction engineering technology graduates plan and supervise construction for major projects such as highways, buildings and industrial plants.

CHMY 121N	Introduction to General Chemistry	4
DDSN 131	Introduction to Drafting and Design	3
ECNS 101IS	Economic Way of Thinking	3
M 165Q	Calculus for Technology I	3
University S	eminar	3
MECNS 202	Principles of Macroeconomics	3
EMAT 251	Materials Structures & Properties	3
PHSX 205	College Physics I	4
M 166Q	Calculus for Technology II	3
WRIT 101W	College Writing I	3

ENVIRONMENTAL ENGINEERING

Environmental engineers provide society with solutions that protect public health and natural systems.

CHMY 141	College Chemistry I	4
M 171Q	Calculus I	4
WRIT 101W	College Writing I	3
US 101US	First Year Seminar	3
or CLS 10	1US Knowledge and Community	3
or CLS 11	.1US Introduction to Public Speaking	3
or HONR	201US Texts and Critics: Knowledge & Imagination I	3
University	Core	6
CHMY 143	College Chemistry II	4
M 172Q	Calculus II	4
PHSX 220	Physics I (with Calculus)	4
ECIV 202	Applied Analysis	1

MINORS

Land surveying **Business administration**

Career Opportunities

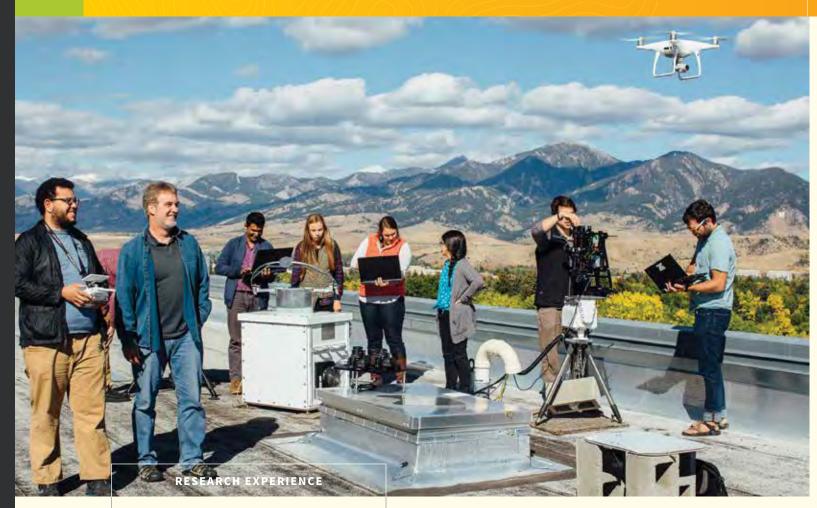
- Construction
- Project management
- Transportation
- Water resources
- Geotechnical
- Structural Environmental

Get Involved

- American Society of Civil Engineers
- Associated General Contractors of America
- Chi Epsilon
- MSU Institute of Transportation Engineers
- · Sigma Lambda Chi

Visit coe.montana.edu/courses/civil for more course information.





Students who study sky polarization and a variety of other optical phenomena go on to work at NASA and local high-tech companies.



Students working on research projects have the opportunity to use the state-of-the-art cleanrooms in MSU's Montana Microfabrication Facility.

Research Highlight:

More than 70 undergraduates have been involved in developing RadPC, a spacecraft computing technology that can recover from radiation interference in outer space. A prototype is scheduled to journey to the moon for testing aboard a NASA mission in 2023.

Inform and inspire

Service learning is key to the MSU experience. That's why you'll find computer and electrical engineering students and faculty active with local, regional and international activities including FIRST Robotics, outreach to K-12 education, engineering competitions and summer research programs for underrepresented groups in engineering.

YOUR FIRST-YEAR COURSES:

COMPUTER ENGINEERING

Computer engineers use their understanding of software, electronic circuits, innovation and design to work with modern embedded computer processors that provide the electronic brains for phones, autonomous vehicles, biomedical devices, computer networks and more.

M 171Q	Calculus I	4
EELE 101	Intro to Electrical Fundamentals	3
CLS 101US	Knowledge and Community	3
or COMX 1	111US Introduction to Public Speaking	3
CSCI 127	Joy and Beauty of Data	4
M 172Q	Calculus II	4
PHSX 220	Physics I (with Calculus)	4
CSCI 112	Programming with C I	4
CSCI 132	Basic Data Structures and Algorithms	4

ELECTRIC ENGINEERING

Electrical engineers are key contributors at the frontier of science and engineering, using physics, electronics and electromagnetism to work with everything from nanotechnology to smart grids, inside human bodies to deep outer space.

EELE 101	Intro to Electrical Fundamentals	3
M 171Q	Calculus I	4
CLS 101US	Knowledge and Community	3
or COMX 1	.11US Introduction to Public Speaking	3
PHSX 220	Physics I (with Calculus)	4
WRIT 101W	College Writing I	3
M 172Q	Calculus II	4
PHSX 222	Physics II (with Calculus)	4
CSCI 112	Programming with C I	3

MINORS

Electrical Engineering · Computer Engineering · Optics · Mechatronics

Career Opportunities

- Aerospace
- Optics
- Robotics Digital design
- Audio engineering
- Power systems

Top Employers

- Hewlett-Packard
- Micron
- Fluke

Get Involved

- Bridger Solar Team
- Institute of Electrical & Electronics Engineers
- MSU student section
- Robocats
- RoboSub Club
- Space Science and Engineering Lab



MSU engineering students designed a system used by 55 teams across the country to livestream the 2017 total solar eclipse from specialized balloons that reached the edge of outer space.

Visit coe.montana.edu/courses/ece for more course information





A mechanical engineering student helps run crash tests of small drone aircraft near Bozeman as part of a research project that could help shape new safety regulations.

Research Highlight:

For their senior capstone project, a team of MSU undergraduates designed and build a device that simulates how water lines on the International Space Station experience the microgravity of low Earth orbit. MSU researchers are working with NASA to fine-tune the tool for studying how to prevent bacterial biofilm from clogging the pipes.

Hands-on learning

As a requirement of graduation, every engineering college senior completes and presents a hands-on project to the public during the biannual Design Fair. In many cases, students design and build practical solutions for businesses, MSU researchers or government labs.

Career Opportunities

- Aerospace
- Automation and robotics
- Automotive
- Biomedical
- Building systems
- Energy
- Finance
- Manufacturing
- Material science
- National laboratories

Get Involved

- American Society of Engineering Management
- American Society of Mechanical Engineers
- Battlebots
- Bobcat Motorsports
- Bridger Solar Team
- Institute of Electrical & Electronics Engineers— MSU student section
- Institute of Industrial and Systems Engineering
- Robocats
- RoboSub Club

YOUR FIRST-YEAR COURSES:

FINANCIAL ENGINEERING

Financial engineers work at the intersection of business, economics and engineering to manage market risk, create strategic business opportunities and lower costs for goods and services.

CSCI 127	Joy and Beauty of Data	4
CLS 101US	Knowledge and Community	3
or COMX 1	.11US Introduction to Public Speaking	3
M 171Q	Calculus I	4
University C	ore Electives	6
ECNS 251IS	Honors Economics	4
EFIN 101	Introduction to Financial Engineering	1
M 172Q	Calculus II	4
PHSX 220	Physics I (with Calculus)	4
WRIT 101W	College Writing I	3

INDUSTRIAL & MANAGEMENT SYSTEMS ENGINEERING

IMSEs optimize the ways in which organizations deliver goods and services across a number of fields, including health care, manufacturing, energy and transportation.

EIND 101	Introduction to Industrial & Management Systems Engineering	1
CHMY 141	College Chemistry I	4
M 171Q	Calculus I	4
WRIT 101W	College Writing I	3
University C	ore Electives	6
COMX 111US	S Introduction to Public Speaking	3
EIND 142	Introduction to Systems Engineering	2
M 172Q	Calculus II	4
PHSX 222	Physics II (with Calculus)	4

MECHANICAL ENGINEERING

Mechanical engineers transform materials into products that you use every day, creating the machines that we use, developing the energy sources we rely on, and designing environmentallyfriendly buildings where we live and work.

COMX 111US	Introduction to Public Speaking	3
or COMX 1	11US Knowledge and Community	3
M 171Q	Calculus I	4
EMEC 100	Introduction to Mechanical Engineering	1
EMEC 100-C	AEI Engineering Graphics Communications	2
PHSX 220	Physics I (with Calculus)	4
University C	ore Electives	6
CHMY 141	College Chemistry I	4
WRIT 101W	College Writing I	3
M 172Q	Calculus II	4
PHSX 222	Physics II (with Calculus)	4

MECHANICAL ENGINEERING TECHNOLOGY

Mechanical engineering technology graduates solve design problems big and small in order to improve the operation and performance of mechanical systems.

CHMY 121N	Introduction to General Chemistry	4
or COMX 1	.11US Knowledge and Community	3
M 171Q	Calculus I	4
EMEC 100	Introduction to Mechanical Engineering	1
EMEC 100-C	AEI Engineering Graphics Communications	2
PHSX 220	Physics I (with Calculus)	4
University C	ore Electives	6
CHMY 141	College Chemistry I	4
WRIT 101W	College Writing I	3
M 172Q	Calculus II	4
PHSX 222	Physics II (with Calculus)	4

MINORS

Aerospace · Biomedical · Building Energy Systems · Financial Engineering Materials · Engineering Management · Mechatronics

Visit coe.montana.edu/courses/mie for more course information



GIANFORTE SCHOOL OF COMPUTING



Career Opportunities

- Artificial intelligence
- Mobile app development
- Robotics
- Special effects artist
- Web design

Top Employers

- SoFi
- Oracle
- Google
- Microsoft
- Boeing

Get Involved

- Association for Computing Machinery
- Association for Women in Computing
- Robocats
- Upsilon Pi Epsilon
- Computational Topology & Geometry

The Gianforte School of Computing provides a community atmosphere where students interact in classes and student clubs and on trips to conferences like the Grace Hopper Celebration of Women in Computing.

Research Highlight:

MSU researcher Brittany Terese Fasy recently won a \$600,000 CAREER grant from the National Science Foundation to advance topological data analysis, a powerful computing technique that can be used to map and compare road networks from GPS data, diagnose prostate cancer from medical imaging, and classify galaxies based on telescope images.

Invest in your future

Computer science students are encouraged to take advantage of professional development opportunities such as all expenses-paid trips to the oSTEM or Grace Hopper conferences or taking part in the annual Spring Break Tech Road Trip.

YOUR FIRST-YEAR COURSES:

COMPUTER SCIENCE

Because computing is pervasive in today's world, the variety of computing-based careers is limitless. Computer scientists and software engineers use their expertise in computational thinking to advance knowledge and make the world a better place.

Students can choose from a Bachelor of Arts or a Bachelor of Science degree. The B.A. in Computer Science empowers students to pair knowledge of computer science with social sciences, the humanities or business, while the B.S. allows students to master the fundamentals of computing while diving into topics such as artificial intelligence, multimedia and computational biology through professional or interdisciplinary options.

PROFESSIONAL OPTION-B.S.

M 171Q	Calculus I	4
CSCI 127	Joy and Beauty of Data	3
WRIT 101W	College Writing I	3
University Core and Electives		
University Seminar Core		
M 172Q	Calculus II	4
CSCI 132	Basic Data Structures and Algorithms	4

INTERDISCIPLINARY OPTION—B.S.

M 171Q	Calculus I	4
CSCI 127	Joy and Beauty of Data	4
WRIT 101W	College Writing I	3
University Core and Electives		
CSCI 132	Basic Data Structures and Algorithms	4
M 172Q	Calculus II	4
University Seminar Core		3

B.A. IN COMPUTER SCIENCE

CSCI 107	Joy and Beauty of Computing	3
STAT 216Q	Introduction to Statistics	3
WRIT 101W	College Writing I	3
University Core		6
Broadening	Broadening Coursework	
CSCI 127	Joy and Beauty of Data	3
STAT 217Q	Intermediate Statistical Concepts	3
University Seminar Core		

MINORS

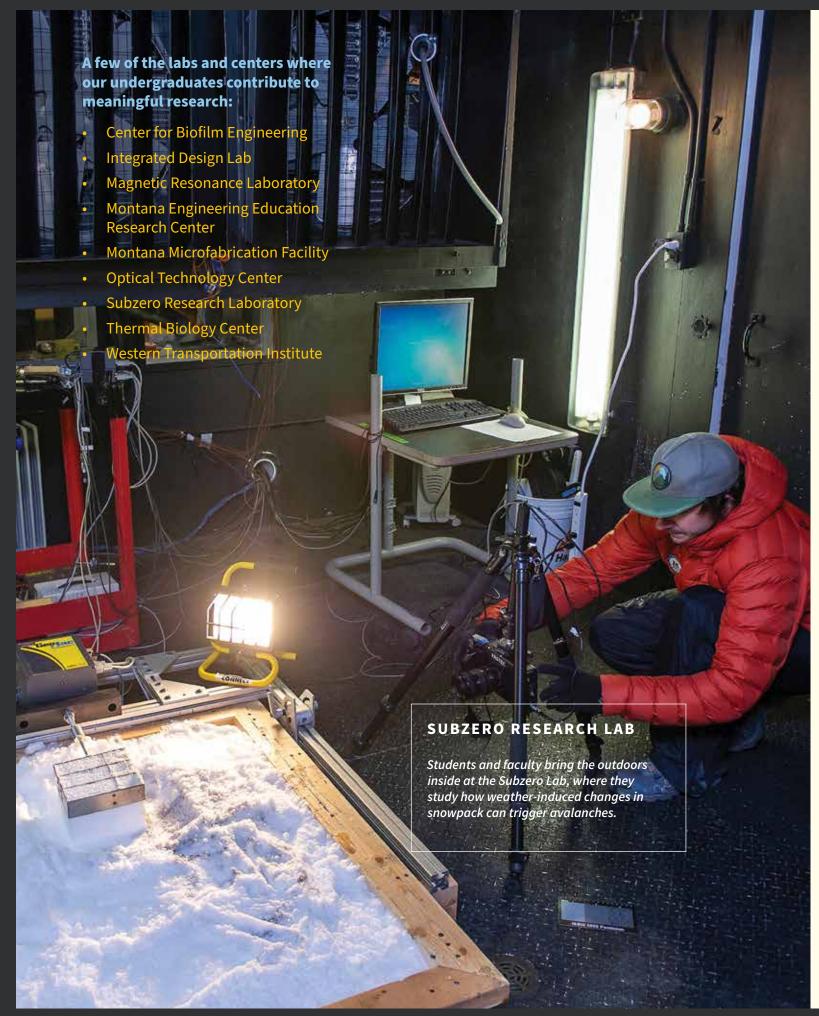
Data Science Teaching



As part of a project to \$3.1 million cybersecurity research project in partnership with Idaho National Laboratory, MSU undergraduates apply the latest computing technologies to monitor new cyberattacks and help maintain a database that software companies use to fix vulnerabilities.

Visit coe.montana.edu/courses/cs for more course information.





NEXT STEPS

Apply to MSU and get started at the Norm Asbjornson College of Engineering with these next steps. To apply to Montana State University, go to montana.edu/apply.

1 Apply for housing

MSU's housing application opens Oct. 1, priority deadline is March 1. Apply as early as you can so we can accommodate your request. Learn more or apply online at: montana.edu/reslife.

Register for Orientation

You can register for a summer orientation session/class registration beginning early spring. Sign up at montana.edu/ orientation.

Send your transcripts

Your final high school transcripts, and graduation date, should be sent directly from your high school electronically or to: MSU Office of Admissions 201 Strand Union P.O. Box 172190 Bozeman, MT 59717-2190

Engineering scholarships

MSU's Norm Asbjornson College of Engineering is lucky to have very supportive donors, which allows for the awarding of substantial amounts of scholarship money to students seeking an engineering or computer science degree. In 2021, the NACOE was pleased to award almost \$924,000 in scholarships.

Eligibility for need-based scholarships is determined by the MSU Office of Financial Aid. Students who wish to be considered for need-based scholarships must complete the FAFSA student aid application. MSU's priority deadline to file a FAFSA is December 1.

• Financial aid questions

Financial Aid Questions?

Contact the MSU Office of Financial Aid Services: 406-994-2845 finaid@montana.edu montana.edu/financialaid

Important date for financial aid

The priority date for filing your FAFSA is December 1 (for the following fall semester) to be considered for the widest range of financial aid. Apply as early as possible for both financial aid and admission. Fill out the Free Application for Federal Student Aid available at: fafsa.ed.gov. MSU's school code is 002532.

• Schedule a campus visit

We invite you and your family to experience MSU firsthand and have conversations with students, staff and faculty while you explore the campus. Come see all that Montana State University has to offer by scheduling a personalized visit or attending one of our MSU Friday programs. The Office of Admissions offers campus tours and meetings with admissions counselors any weekday (except holidays) year-round.

For the best experience, we recommend you schedule your visit two weeks in advance. This will allow us time to schedule requested appointments and send you a confirmation with details about your visit. Register for a campus visit by calling 888-MSU-CATS or online at **montana.edu/visit**.

MSU Friday

At these day long MSU preview events, you can meet with faculty, hear from current students, explore the campus and learn more about financial aid and scholarships. Find dates, lodging options and registration information at montana.edu/msufriday.

MSU social media:

f facebook.com/montanastate

(O) instagram.com/montanastateuniversity

Engineering college social media:

f facebook.com/MontanaStateNACOE

instagram.com/msu_nacoe/













NORM ASBJORNSON

College of
ENGINEERING

P.O. Box 173820 Bozeman, MT 59717-3820 406-994-2272 engrinfo@coe.montana.edu montana.edu/engineering