

COLLEGE OF
Science & Engineering

COME
CURIIOUS

CSE.UMN.EDU

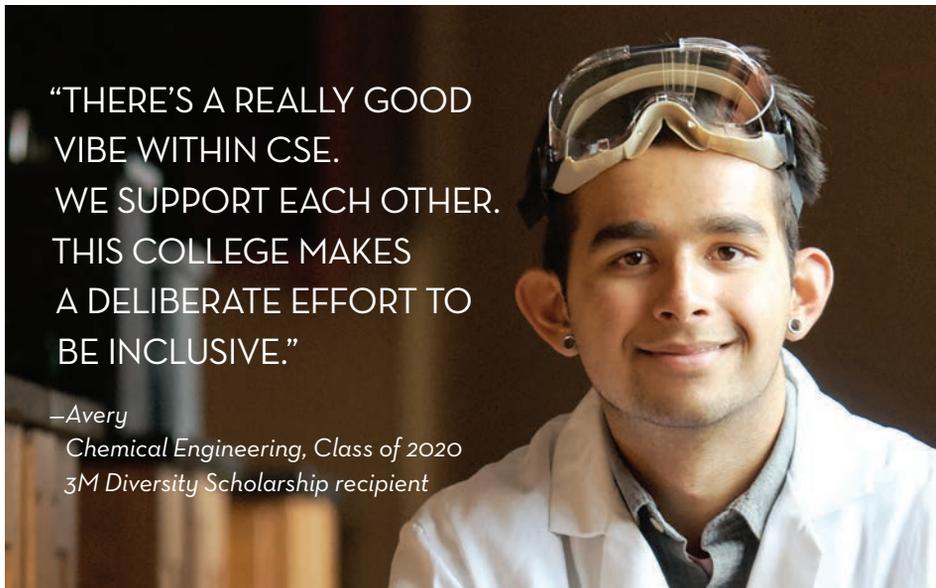
DRIVEN BY
CURIOSITY.

INSPIRED BY
OPPORTUNITY.



UNIVERSITY OF MINNESOTA

Driven to DiscoverSM



“THERE’S A REALLY GOOD VIBE WITHIN CSE. WE SUPPORT EACH OTHER. THIS COLLEGE MAKES A DELIBERATE EFFORT TO BE INCLUSIVE.”

—Avery
Chemical Engineering, Class of 2020
3M Diversity Scholarship recipient



WELCOME to the College of Science and Engineering (CSE). We’re often asked what makes CSE so remarkable and the short answer is—the people. Here, you will find a community of trailblazers, problem solvers, and risk takers.

Our professors are National Academy of Sciences and National Academy of Engineering inductees. We’ve even got an Emmy Award winner! Students partner with faculty—in labs and fieldwork—turning research into conference presentations, journal publications, and entrepreneurial ventures. CSE alumni are role models. They’ve invented life-saving medical devices, developed cereals you eat every morning, and made computer storage more efficient.



IF YOU WANT A
COMMUNITY THAT
INSPIRES AND
CARES, YOU'VE
COME TO THE
RIGHT PLACE.

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WHAT'S IT LIKE IN CSE?

IT'S BUSY. Faculty and students across our 12 departments and dozens of research centers are exploring everything from the outer reaches of space to the inner workings of cells.

- In biomedical engineering, professors are creating a mathematical simulator to track the way cancer moves in our bodies.
- In Earth sciences, researchers are using wild rice to predict the health of Minnesota lakes and streams.
- In computer science and engineering, a team is developing technology for drones and self-driving vehicles to withstand cyber attacks.

IT'S HANDS-ON. You will get your hands dirty, create things, and learn through active participation.

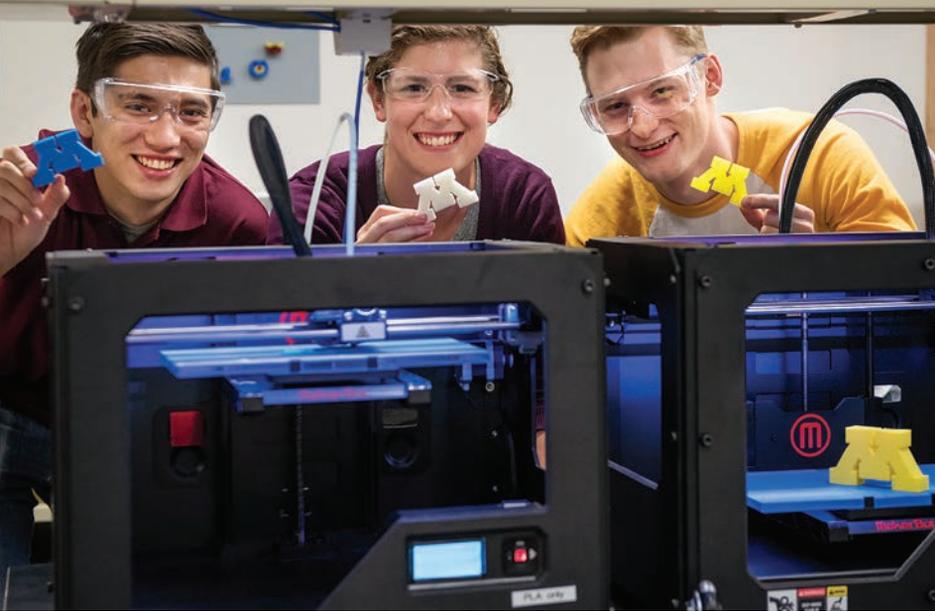
- In the CSE 1012 course, freshmen learn computer-aided design and 3D-printing skills, then work in teams on a design project like creating a 3D model of the internal organs of a raptor.
- The University of Minnesota Rocket Team set a Guinness World Record with a rocket—fueled only by water and Alka-Seltzer—that soared 430 feet in the air!
- Solar Vehicle Project members build a car from scratch that runs on the power of the sun and races in the Australian Outback.

IT'S UNIQUE. We're the only college at a major research university in the United States that combines engineering, computer science, mathematics, and the physical sciences under one roof.

- We offer 18 undergraduate majors.
- Faculty with the highest degree in their field teach 93 percent of our classes.
- *U.S. News & World Report*, *The Princeton Review*, and the *National Research Council* consistently rank our programs in the Top 20.
- The University of Minnesota ranks fourth among U.S. research universities for patents earned in *The Scientist* magazine's list of "Patent Powerhouses."



Professor James Kakalios teaches physics with comic books. He won a regional Emmy for starring in the "Science of Watchmen"—one of the most widely viewed YouTube videos in higher education.



If you can imagine it,
you can bring it to life.
The Anderson Student
Innovation Labs have:

OVER
10,000
SQ. FT.
In three locations

25

Types of machines,
including a waterjet
cutter

Number of
3D printers: **40**

30 meters

Length of free 3D-printing
material each CSE student
can use per semester

Diameter of
the smallest
CNC cutting
tool available

1/100
inch

Time it took for the
solar car team to make
dashboard molds using
a computer-
controlled
cutting
machine

48
HOURS

WHAT'S YOUR 20?

OUR RULE OF 32/20 encourages you to spend 32 weeks in classes and the rest of the year immersed in unique opportunities. It's what you do in those remaining 20 weeks that defines you and enhances your personal student experience.

- **Learn Abroad:** From Tanzania to Scandinavia to Hong Kong, your international options include technical exchange programs and custom global seminars in 80+ countries.
- **Student Groups:** Follow your passions and develop leadership skills in the 1,000+ student groups on campus. CSE has more than 75, including academic clubs and professional organizations, such as the Society of Women Engineers, Science and Engineering Student Board, oSTEM, and Engineers Without Borders.
- **Research:** The College of Science and Engineering is a research powerhouse in Minnesota! Strengthen your résumé or give yourself an edge to grad school by partnering with world-class faculty through the Undergraduate Research Opportunities Program or becoming a STEM Research Ambassador.
- **Co-ops and Internships:** Earn an average hourly pay of \$18 in our engineering co-op program. You may also pursue paid internships at public and private corporations, and government agencies.



HEAR FROM STUDENTS
about learning abroad
and undergrad research:
cse.umn.edu/viewbook

HOW DO I CHOOSE A MAJOR?



THROUGH EXPLORATION. For now, think about what you enjoy doing. In CSE 1001, the First-Year Experience course taught by staff, faculty, and undergraduate peers, you'll meet students across our 18 majors and participate in activities that will make your final choice clear.

All College of Science and Engineering programs can be completed in four years, and the vast majority of our students do this. However, some take longer for different reasons, including adding a second major or completing a co-op experience.

See sample course plans for each major at cse.umn.edu/fouryearplans.

WHERE DO I GO IF I HAVE MORE QUESTIONS?

LIND HALL. The transition from high school to college can be difficult for some, but we're here for you every step of the way! Lind Hall—the hub of CSE undergraduate activity—is home to our friendly Collegiate Life professionals, academic advisors, and career counselors. They will help you make important decisions, like choosing classes and staying on track for graduation. Plus, answer your questions about course registration, opportunities beyond the classroom, student life, and career preparation.



CSE engineering students are working with SEALIFE at the Mall of America to develop a 3D-printed exoshell for an injured turtle.



CSE offers a variety of mentor programs for you to connect with industry professionals and other students.

The CSE Mentor Program matched

224

students with

209

alumni/professionals.



The WISE-Medtronic Mentor program paired

48

first-year students with professional scientists and engineers.

In the Society of Women Engineers (SWE):

30 Academic and industry experts mentored 45 students

Peer mentor/freshman pairs in the Big Sis/Lil Sis program **50**

132 CSE Ambassadors/upperclassmen help freshmen transition to college



Student leaders who are North Star STEM Alliance Peer Mentors **9**

**2017-18 statistics*

CAN I LIVE ON CAMPUS?

YES. Ninety percent of first-year students live on campus, plus the U of M offers a freshman housing guarantee. CSE-specific Living and Learning Communities include:

- **Taylor House for Science and Engineering**—co-ed community with 200 students and a tutoring center for calculus, physics, and chemistry
- **Women in Science and Engineering (WISE) House**—residents are paired with mentors from Medtronic
- **STEM Diversity House**—co-ed community for 20 CSE students of color and underrepresented students
- **University Honors Housing**—for students admitted to the University of Minnesota Honors Program
- **Transfer House**—co-ed community for 20 CSE transfer students new to the Twin Cities campus

If you choose to live at home or commute instead, you can still access all CSE campus resources and program opportunities. We encourage commuters to spend as much time as possible on campus to enhance their college experience.

HEAR FROM STUDENTS about living on campus: cse.umn.edu/viewbook





AEM.UMN.EDU

AEROSPACE ENGINEERING AND MECHANICS



Graduates of aerospace engineering and mechanics design the next generation of aircraft, spacecraft, and launch vehicles. They are also involved in developing other state-of-the-art systems and new technologies used in the biomedical, computer, and automotive industries. They make it possible for us to explore space and oceans, to carry people and products around the world, and to communicate globally.

Our program was among the first of its kind to be accredited nationwide. Notable alumni include astronauts, as well as leaders at NASA and a multitude of aerospace engineering companies.

WHAT WILL I STUDY?

- Fluid mechanics and aerodynamics
- Propulsion
- Structures and materials
- Flight mechanics and control
- Orbital mechanics
- Instrumentation and experiments
- Aerospace system design

CAREERS

- Spacecraft design engineer
- Wind tunnel engineer
- Flight test engineer
- Aircraft design engineer
- Project engineer
- Research scientist
- Propulsion engineer
- Structural test and stress analyst
- Sales engineer
- Professor



“ I love this major for the variety of subjects we take. It ends up making you a very academically well-rounded student. ”

—Lincoln,
Class of 2019



ASTRO.UMN.EDU

ASTROPHYSICS

Using data from powerful advanced technologies, astrophysicists make discoveries that raise new questions about our universe. They study the physics of the universe. They interpret observational data through mathematics and physical laws. Astrophysicists apply disciplines of physics, including mechanics, electromagnetism, statistical mechanics, thermodynamics, quantum mechanics, relativity, nuclear and particle physics, and atomic and molecular physics.

WHAT WILL I STUDY?

You will complete core courses in math, physics, and astrophysics and then choose an area of emphasis: professional astronomy, computational astrophysics, secondary education, data-analysis specialist/laboratory scientists, or military reserve officer.

Many students major in both astrophysics and physics, which includes a supervised observation or theoretical research project in their senior year.

You also have access to local and world-class research facilities, including the 30-inch reflector near Minneapolis; 60-inch reflector on Mt. Lemmon near Tucson, Ariz.; Arecibo Radio Observatory; Kitt Peak National Observatory; Mauna Kea Observatory; and the National Radio Astronomy Observatory.

CAREERS

- University researcher
- Research equipment designer
- Planetarium technician
- Computational astrophysicist
- Solar astronomer
- Cosmologist
- Planetary scientist
- Telescope engineer
- Support astronomer



“ Best decision I’ve made! This program really encourages you to get involved in research, which is crucial to a career in astrophysics. ”

—Aliza,
Class of 2019

BIOMEDICAL ENGINEERING

Biomedical engineers help to solve medical and scientific health problems. They are involved in medical design fabrication and testing, prosthesis fabrication, ergonomics, monitoring physiological function, developing home health care technology, biomedical informatics, and functional imaging and tomography. They also conduct research in biomaterials and biocompatibility, artificial tissue and organ fabrication, cell- and biomolecule-based sensors and therapeutics, gene therapy, and biomedical microsystems.



WHAT WILL I STUDY?

This field is constantly changing with advances in biology, medicine, and technology. Our program gives you a broad, deep foundation so you can adapt to new opportunities and applications throughout your career. The curriculum features:

- Freshman seminars led by professors and industry professionals
- Biology and physiology courses as well as math, physics, and chemistry
- Core courses in biomedical engineering with integrated labs
- Custom elective tracks, allowing you to tailor studies based on career interests
- A senior design sequence advised by a practicing biomedical engineer



“ I chose this major because I’ve seen people impacted by medical devices and I want to help design products that can save lives. ”

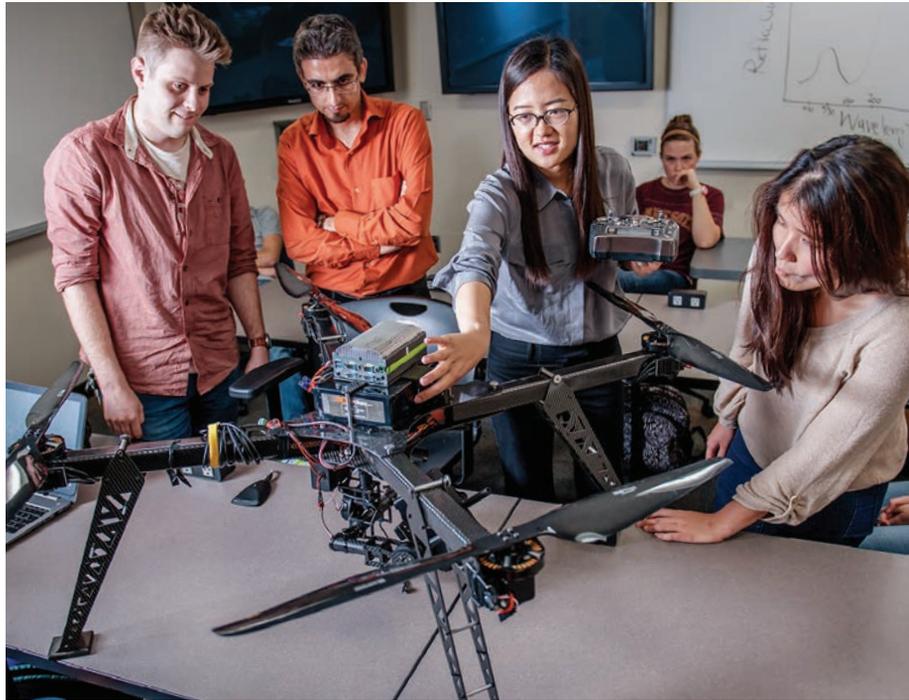
—Ben,
Class of 2020

CAREERS

- Biomedical engineer
- Research and development engineer
- Quality control/assurance engineer
- Medical device designer
- Manufacturing engineer
- Prosthesis designer
- Medical diagnostics
- Rehabilitation engineer
- Physiological systems engineer

BIOPRODUCTS AND BIOSYSTEMS ENGINEERING

This major prepares you to create sustainable solutions that address societal needs while protecting the environment. You will focus on biological, renewable, natural resources, and systems to address our growing global need for clean energy, water, air, green materials, and safe and secure food. Closely aligned with employer demand, this accredited program offers excellent career opportunities in industry, government agencies, corporations, and consulting firms.



BBE.UMN.EDU

WHAT WILL I STUDY?

The curriculum integrates engineering, biology, and chemistry in a variety of applications. You may specialize in one of three areas:

- Bioproducts engineering—Design and develop sustainable processes and products, including renewable and clean energy, renewable materials, and biochemicals
- Environmental and ecological engineering—Explore, develop, and implement effective systems and sound solutions to address human impact on our natural environment
- Food engineering—Create processes and systems to address the world’s growing need for food security, food safety, and healthy lives

CAREERS

- Process or project engineer
- Environmental engineer
- Food engineer
- Ecological engineer
- Bioprocessing engineer
- Product development engineer
- Research engineer
- Water resources engineer
- Consulting engineer



“ I love the sustainable engineering mission of this program, the wonderful professors, and my supportive classmates. ”

—Noah,
Class of 2020

CHEMICAL ENGINEERING



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Chemical engineers are undertaking some of the planet's greatest challenges in energy resources, pollution control, and new medical therapies. They work on a wide variety of projects to chemically and physically transform matter. With a degree in chemical engineering, you will be prepared to work in a wide range of industries or may go on for graduate study in different fields of engineering (chemical engineering, biomedical engineering, materials science and engineering), medical school, or patent and environmental law.

WHAT WILL I STUDY?

The curriculum includes:

- Courses on the fundamentals of chemical engineering science (thermodynamics, fluid mechanics, heat and mass transfer, kinetics and reactor design) and more application-focused courses (process design, process control, economic analysis, numerical methods, biochemical engineering)
- Hands-on lab courses using pilot-scale chemical engineering equipment

You may add a second major in chemistry or materials science.

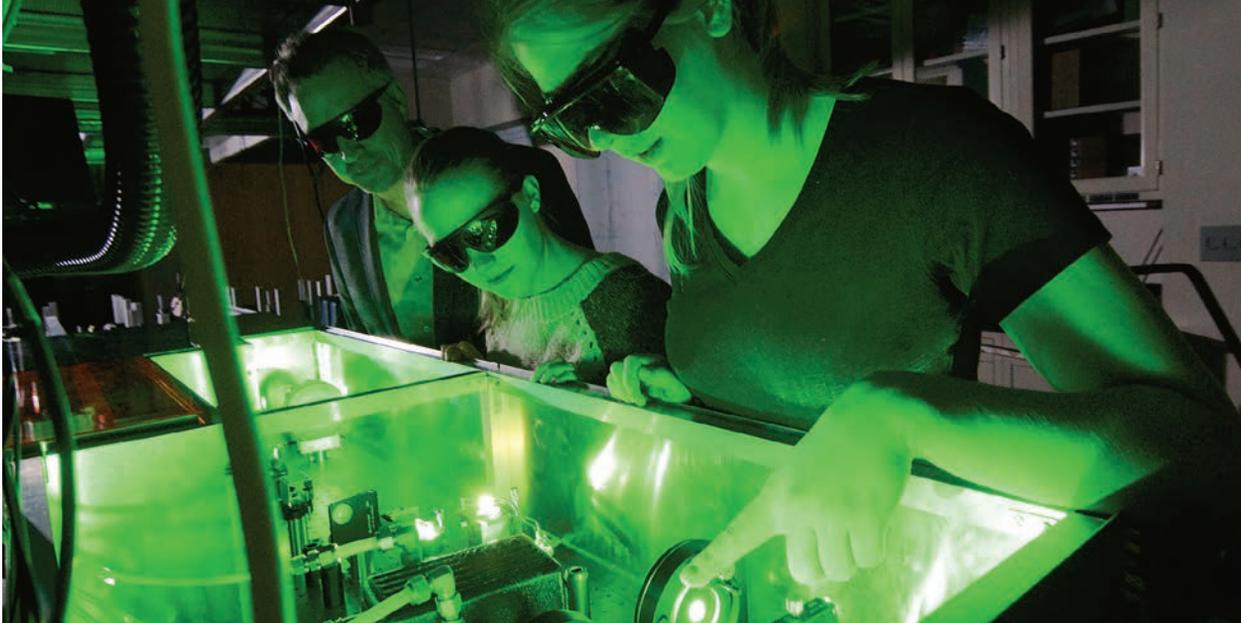
CAREERS

- Biotechnology engineer
- Polymer manufacturing engineer
- Pharmaceutical manufacturing engineer
- Research and development engineer
- Quality control engineer
- Regulatory affairs engineer
- Manufacturing production engineer
- Food processing engineer
- Petrochemicals engineer
- Consultant



“ In high school, I really enjoyed math, chemistry, and physics. This major gives me simultaneous exposure to all three in depth. ”

—Blake,
Class of 2019



CHEM.UMN.EDU

CHEMISTRY

Chemists interact with nature at a fundamental, molecular level—its composition, properties, and transformation into new substances.

They are interested in molecular structure, the properties of materials, and in reactions that convert one material into another. Chemistry significantly impacts many fields, including medicine, materials science, genetics, biology, pharmacy, food science, and environmental science.



“It’s great to study in a department with so many groundbreaking accomplishments and supportive professors who are really easy to talk to.”

—Kathleen,
Class of 2019

WHAT WILL I STUDY?

The curriculum encompasses the major subfields of chemistry—the theories, techniques, and tools. It includes physics, mathematics, and the liberal arts.

You may select an area of emphasis:

- Bioscience/Bioproducts
- Chemical physics
- Chemistry education
- Environmental chemistry
- Materials chemistry

Or choose a dual track:

- Chemistry and biochemistry
- Chemistry and biology
- Chemistry and food science

You may also pursue individual research projects with chemistry faculty.

CAREERS

- Research scientist
- Chemical safety program manager
- Intellectual property or instrumentation specialist
- Chemistry professor/teacher
- Chemical engineer
- Pharmacist
- Geochemist
- Forensic science technician
- Communication writer/editor
- Toxicologist

CIVIL ENGINEERING

Civil engineers work for society. They analyze, design, and supervise the construction of roads, buildings, water supply systems, airports, tunnels, dams, bridges, and wastewater treatment systems. They must consider many factors in the design process including regulations and policy issues, sustainability, fabrication costs and constructability, expected lifetime of a project, and risk assessment of natural events and potential hazards.

Civil engineering is one of the broadest area of engineering and has tangible impact on quality of life, human health, and safety.



CEGE.UMN.EDU

WHAT WILL I STUDY?

Our comprehensive curriculum prepares you for a professional career or advanced study. You'll learn to solve problems by applying mathematics, chemistry, and physics, as well as using high-tech equipment and sophisticated procedures. Opportunities to develop your technical skills abound, and you can join student groups like the concrete canoe team (pictured above).

Emphasis areas include:

- Environmental engineering
- Geomechanics
- Structural engineering
- Transportation engineering
- Water resources engineering
- Municipal engineering



“ I chose the University of Minnesota because it has a great engineering school and lots of different resources for students. ”

—Abby,
Class of 2019



CAREERS

- Civil engineer
- Environmental engineer
- Field engineer
- Geotechnical engineer
- Municipal engineer
- Project engineer/manager
- Structural engineer
- Transportation engineer
- Wastewater engineer
- Water resources engineer

COMPUTER ENGINEERING

Computer engineers design, build, test, and install high-tech computing devices for everything from the most powerful supercomputers to the tiniest, most energy-efficient microprocessors used in virtually all components of modern technology. They research, design, and develop hardware and software used in systems that deliver power, performance, safety, security, and reliability but also leverage these systems to create and enhance meaningful devices and applications used in our everyday world.



ECE.UMN.EDU

WHAT WILL I STUDY?



Our program provides a strong foundation in both electrical engineering and computer science. The curriculum, which is built on mathematics and sciences, combines closely related courses from both disciplines to help you understand, design, and apply knowledge in fields underpinning technology, instrumentation, and communications.

Emphasis areas include:

- Computer architecture and parallel programming
- Microprocessor and microcontroller systems
- Computer-aided circuit design
- Security and computing networks
- Software engineering
- Robotics, artificial intelligence, and machine learning
- Data analysis, processing, and bioinformatics

CAREERS

- Circuit designer
- Computer architect specialist
- Computer network engineer
- Electronic systems designer
- Machine learning and algorithms engineer
- Logic design test and verification engineer
- Systems or software development engineer
- Computer security test and operations engineer



“ A CSE education will teach you a lot. I wouldn't be the person I am today without the rigorous classes and great professors here. ”

—Ian,
Class of 2019



Computer scientists are architects of the information society.

They develop programming languages and operating systems, design computer software and hardware, apply computational techniques to other sciences, investigate social uses of computing, determine what programming language to use for a given problem, and advance new technologies like artificial intelligence and robotics.

COMPUTER SCIENCE

WHAT WILL I STUDY?

Reflecting the latest technological advances, our curriculum is taught by renowned faculty, including experts on many software specializations. You will learn to design and analyze computer systems, use them to solve practical problems, and assess their limitations.

You will have access to special research facilities like the Artificial Intelligence, Robotics and Vision Laboratories, which includes lab space for undergraduate projects. You will also use state-of-the-art computing platforms and instructional facilities that include Sun, Windows, Linux, and PCs.

Our faculty conduct many interdisciplinary research projects and play a vital role in major studies across campus, including at the Digital Technology Center and Minnesota Supercomputing Institute.

CAREERS

- Computer support specialist
- Computer programmer or engineer
- Network manager
- Solar astronomer
- Robotic engineer
- Software or hardware developer
- Systems and security administrator
- Web designer
- Researcher or professor



“The opportunities in CSE are endless. It’s up to you to take the initiative and go for them.”

—Hannah,
Class of 2019

EARTH SCIENCES

Earth scientists study natural hazards, climate and environmental change, groundwater, lakes, oceans, earthquakes, volcanoes, tectonics, minerals, fossils, soils, sediments, rocks—the Earth itself.

Evolved from the field of geology, Earth scientists explore the natural processes that have been active on our planet from its origin to today. They use a variety of tools to build quantitative knowledge of how the Earth system works, how it evolved into its current state, and why natural and anthropogenic changes constantly occur. Understanding these processes is often the most important step in creating environmentally sustainable communities.



WHAT WILL I STUDY?

This interdisciplinary program provides you with a strong foundation in mathematics, physics, chemistry, geology, and geophysics. You are encouraged to choose from several elective courses to meet your interests, match your talents and prepare for a successful career. You may also choose a broad-based curriculum or focus on one specialty area.

Our research labs and teaching facilities are new and equipped with state-of-the-art instrumentation—and are among the best in the world.



CAREERS

- Environmental scientist
- Geologist
- Hydrologist
- Geomicrobiologist
- Water resources manager
- Exploration geophysicist
- Research scientist
- University or college professor
- Mining geologist
- Oil field services



“ The Earth sciences department is a pretty close-knit group. You get to know your professors and they get to know you. ”

—Trey,
Class of 2020

ELECTRICAL ENGINEERING

Electrical engineers explore and generate technological advances that impact virtually every aspect of modern life. They deal with the study, research, design, and application of electricity, electronics, circuitry, and electromagnetism. They design, develop, and enhance components, software and systems for biomedical devices, energy and power applications, nanotechnology and material uses, computers, cellphones, and associated personal electronics as well as many other products.

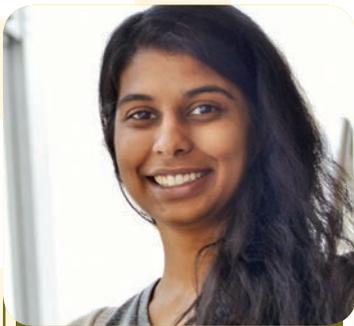


WHAT WILL I STUDY?

This program provides a strong foundation in science, physics, mathematics, and computer science. You will develop electrical knowledge and skills in practical experimentation, as well as learn how to analyze and interpret data applicable in areas across electrical engineering.

Emphasis areas include:

- Biomedical engineering
- Telecommunications and signal processing
- Control systems
- Electric energy systems and power electronics
- Microelectronic devices and circuit design
- Modern optics and photonics
- Magnetics



I chose EE because of its diverse applications to the real world. Also, there are so many opportunities to work on technical projects.

—Sruti,
Class of 2019



CAREERS

- Embedded systems engineer
- Acoustic test engineer
- Magnetic recording engineer
- Automation and process technologies engineer
- Electric machine design engineer
- Telecommunications and substation field engineer
- Computer modeling engineer
- CAD and product development engineer
- Electrical control systems engineer



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ENVIRONMENTAL ENGINEERING

Environmental engineers design and apply technologies to resolve issues of environmental concern. They design systems that produce safe drinking water, treat wastewater so that it can be reused and/or safely returned to the environment, accommodate municipal and hazardous waste, mitigate air pollution, and protect public health.

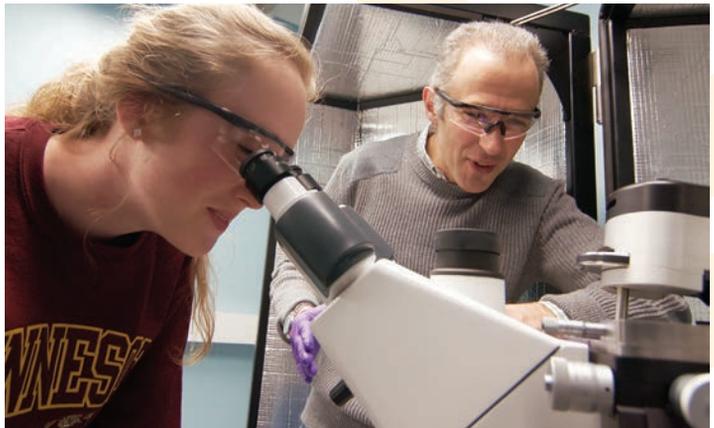
WHAT WILL I STUDY?

Our program provides you with a strong foundation in chemistry, biology, environmental engineering, fluid mechanics, hydrology, and the design of drinking water and municipal wastewater treatment systems. There are a number of required design courses, but you may still tailor your learning to fit your interests.



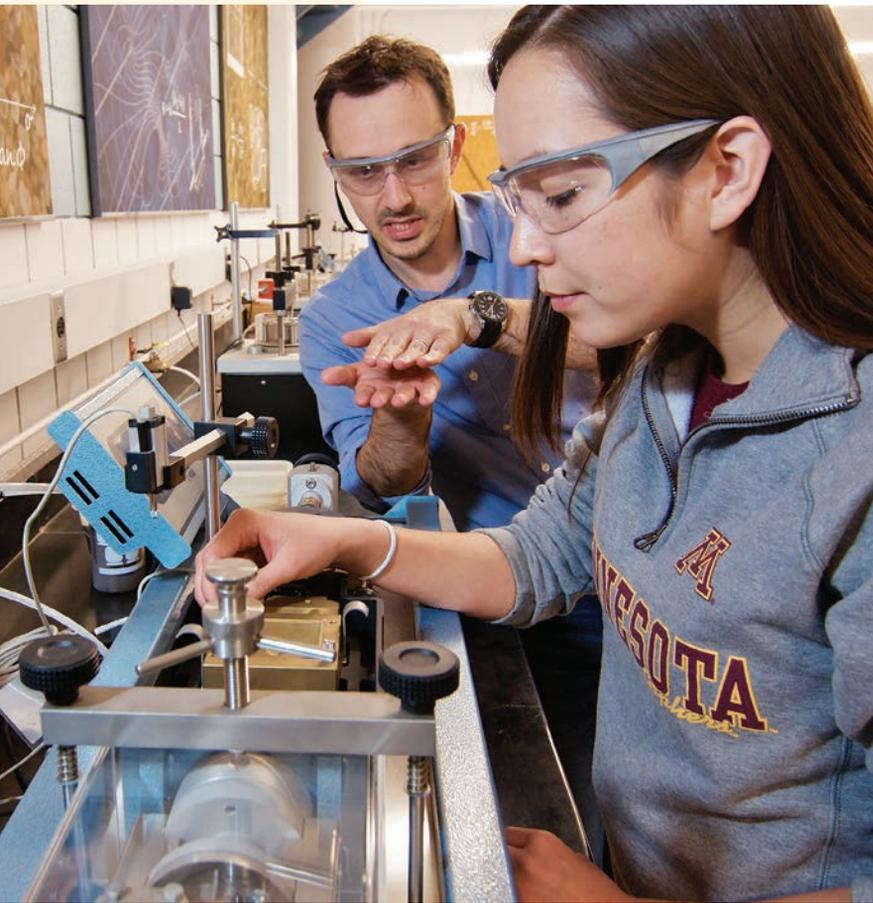
“The coursework has a lot of breadth to it and all of the classes emphasize the role of policy and lawmaking, and ethics.”

—Samantha,
Class of 2019



CAREERS

- Process engineer
- Regulator
- Consultant
- Water/Wastewater engineer
- Hydrologist
- Hydraulic engineer
- Air quality engineer
- Environmental health research scientist



A geoenvironmental engineer applies the principles of engineering and science to the problems of planning, analysis, design, construction, and operation of facilities on and under the surface of the earth. Aspects of geoenvironmental engineering appear in infrastructure projects, mining activity, and petroleum production. For example, a student graduating with a degree in geoenvironmental engineering may work on underground transportation systems; exploration for resources such as oil and gas; geologic storage of CO₂; supply of drinking water from groundwater; isolation of nuclear and other hazardous wastes; land reclamation associated with surface and subsurface mining.

GEOENGINEERING

WHAT WILL I STUDY?

The curriculum includes courses in:

- Geology
- Civil engineering
- Environmental engineering
- Geomechanics
- Numerical methods
- Water resources

You can earn a double major in geoenvironmental engineering and Earth sciences in four years—eight regular semesters plus two summer sessions of geology field camp.

CAREERS

- Earth resources engineer
- Engineering geologist
- Geoenvironmental engineer
- Geohydrologist
- Geotechnical engineer
- Mining engineer
- Reservoir engineer
- Tunneling engineer



“If you want to get the most out of your college experience in terms of growth and experience, CSE is the way to go.”

—Twain,
Class of 2019



ISYE.UMN.EDU

INDUSTRIAL AND SYSTEMS ENGINEERING

Industrial and systems engineers design, plan, and manage large-scale and complex systems ranging from global supply chains, healthcare delivery systems, and business and financial services to critical infrastructures. Employed in a wide range of industries, they figure out how to do things better and engineer processes to improve quality, productivity, and efficiency. They are in high demand as systems thinkers with unique backgrounds that integrate science, engineering, mathematics, and management.

WHAT WILL I STUDY?

The curriculum combines courses in analytics (optimization, simulation, probability, statistics) and classes in management (project management, economics, marketing, quality control) to support systems modeling, design, and optimization across a wide range of applications and domains.

After completing core courses, you may tailor your electives to focus on an application area such as supply chain management, manufacturing and service operations, healthcare, design, analytics, or business.

CAREERS

- Systems engineer
- Industrial engineer
- Operations engineer
- Supply chain analyst
- Consultant
- Quality engineer
- Financial engineer
- Logistics specialist
- Healthcare systems analyst
- Business software developer



“ This major gives me a broad background and opens many doors. It is also applicable to any business or industry. ”

—Daniel,
Class of 2019



CEMS.UMN.EDU

MATERIALS SCIENCE AND ENGINEERING

Materials scientists and engineers advance the science and technology of producing materials for nearly every product imaginable—from cellphones and artificial joints to automobiles and huge turbine rotors. They study a material's properties and structure, evaluate its performance, and improve or customize it. Materials engineers also design reliable, economical manufacturing processes, and select the best material for the final product.



“My professors are renowned leaders in their respective areas of research, yet they are incredibly invested in teaching. It shows in their interactions with us.”

—Ishita,
Class of 2019

WHAT WILL I STUDY?

The curriculum includes:

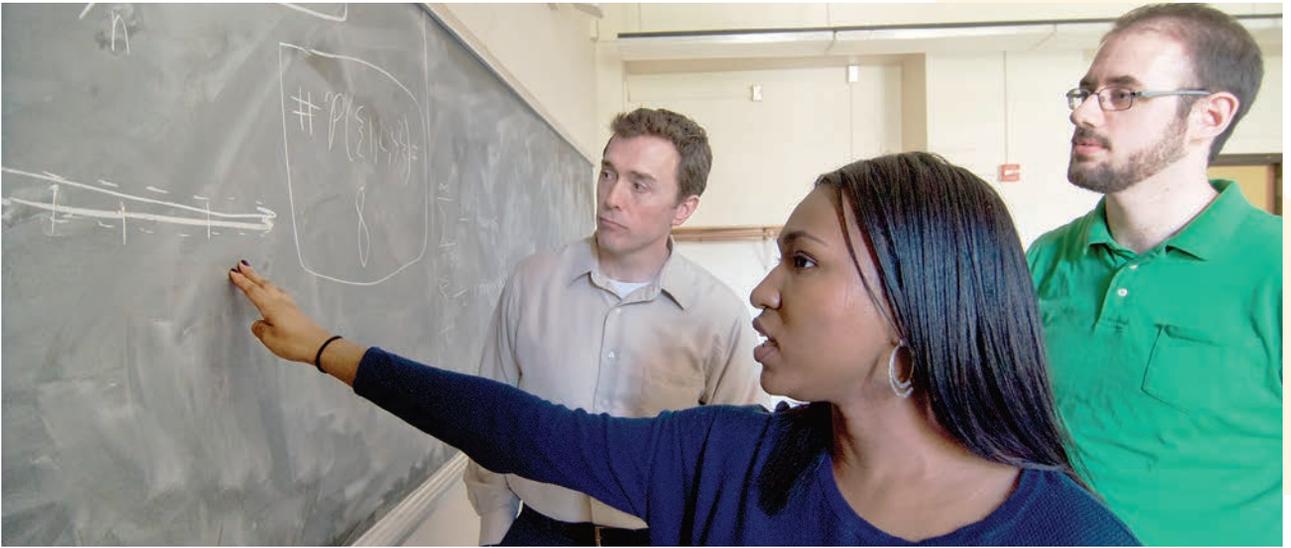
- Courses on the fundamentals of engineering materials (metals, ceramics, polymers, semiconductors, composites) and the science of materials (thermodynamics, kinetics, electronic, magnetic, optical properties)
- Hands-on learning in the Valspar Undergraduate Teaching Lab on materials structure, properties, performance, and processing

You may choose elective courses that focus on a specialty area. Because chemical engineering and materials science are combined in a single department, there are unique opportunities to pursue a double major and work with faculty on research projects.

CAREERS

- Ceramic engineer
- Component engineer
- Metallurgical engineer
- Materials scientist
- Polymer engineer
- Process engineer
- Procurement engineer
- Quality control engineer
- Researcher
- Semiconductor engineer

MATHEMATICS



MATH.UMN.EDU

More than just numbers and formulas, mathematics is the study of structure, symmetry, and patterns, and their many applications to real-world problems. Mathematics has permeated every field of science and engineering, and it plays an indispensable role in modern biology and medicine, finance, economics, sociology, and many other disciplines.

Mathematics offers intellectual challenges and wide-ranging career opportunities that are consistently rated at the top of lists of all professions.

WHAT WILL I STUDY?

Our program offers undergraduate and graduate courses that you may customize based on your interests and career plans. The mathematics major includes broad technical electives, as well as required courses in physics. Taking classes in complementary disciplines such as engineering, chemistry, computer science, statistics, biology, and economics can expand your career options.

You may also specialize in actuarial mathematics, computer applications, mathematical biology—genomics or physiology—or mathematics education. Many students who pursue our actuarial curriculum pass the first two actuarial examinations before graduation.

CAREERS

- Actuary
- Cryptologist
- Economist
- Inventory strategist
- Mathematician
- Operations research analyst
- Research scientist
- Statistician
- Teacher



The University of Minnesota has outstanding mathematics faculty, and the breadth of course offerings is fantastic.

—Austin,
Class of 2020

MECHANICAL ENGINEERING



ME.UMN.EDU

Mechanical engineering encompasses energy conversion science and engineering, transportation, bioengineering, environmental engineering, medical device design, heating and refrigeration, fluid power and mechanics, manufacturing, and nanofabrication. This degree is versatile. Mechanical engineers work in a wide range of fields and often collaborate on team projects involving aeronautics, civil engineering, and electronics.

WHAT WILL I STUDY?

Your first year provides a foundation of mathematics, physics, and chemistry. Your second and third years are devoted to these core topics:

- Statics and dynamics
- Solid mechanics
- Design and manufacturing
- Thermodynamics, fluid mechanics, and heat transfer

In your last year, you will focus on a specific area through technical electives, specialized labs with modern computer-based tools, and a capstone design project.

An optional co-op technical program is available, in addition to an integrated five-year program for a combined bachelor's and master's degree in mechanical engineering.

CAREERS

- Automotive engineer
- Biomedical engineer
- Controls engineer
- Combustion and fluid power engineer
- Energy systems engineer
- Environmental engineer
- Manufacturing engineer
- Packaging engineer
- Product or process design engineer
- Thermal management systems engineer



“I've fulfilled many personal goals as a CSE student, including learning how to translate technical information and present it with confidence.”

—Andrew,
Class of 2019



Physicists explore the fundamental properties, laws, and structure of all forms of matter—living and non-living. They examine the relationships among space, time, matter, and energy. Studies range from the smallest subatomic elementary particles to galaxies forming the universe. This major prepares you for careers in physics research, engineering and applied physics, computer applications, secondary school teaching, or biomedical sciences.

PHYSICS

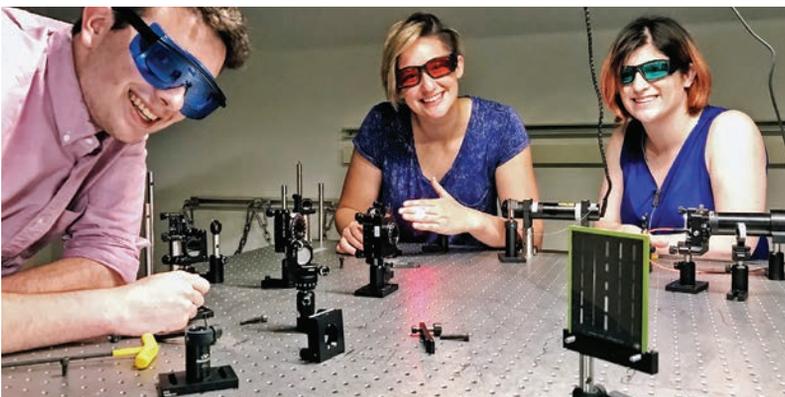
WHAT WILL I STUDY?

Our program emphasizes the important connection between reality and theory with a substantive laboratory component. You will learn to construct predictive mathematical and numeric models of the physical world, which can open career opportunities for you in research, data science, and emerging fields.

In the fundamental course “Methods of Experimental Physics,” you will use a variety of modern equipment and understand how to design, analyze, and present the results of your own experiments.

You may choose from five emphasis areas:

- Professional physics
- Engineering
- Biology
- Teaching
- Computation



CAREERS

- Researcher
- Data scientist
- Test and systems engineer
- Laser engineer
- Physicists
- Technical manager
- Physical scientist
- Professor



“ I love the sense of camaraderie at this university. Everyone works together to help each other succeed. ”

—Amanda,
Class of 2018



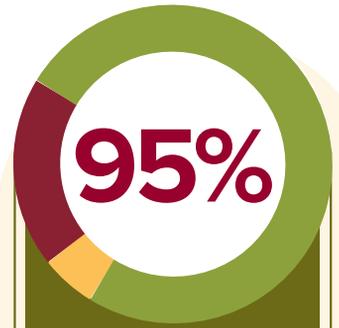
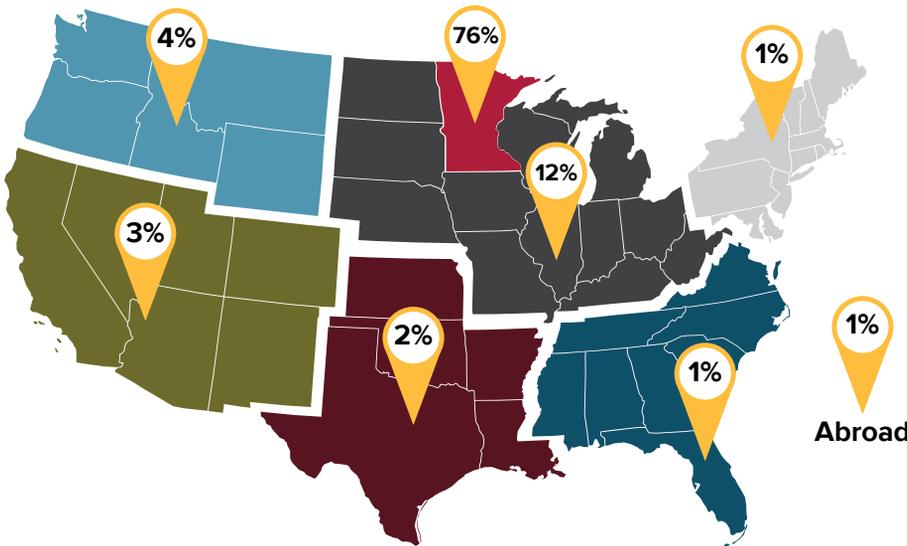
WHAT ARE MY CAREER OPPORTUNITIES?



CSE GRADUATES earn an average starting salary of \$64,100. Our career counselors can help with résumés, cover letters, and interview preparation—as well as connect you with alumni and employers when you start looking for positions.

- 350+ companies recruit at the biannual CSE Career Fairs
- 150+ alumni serve as mentors
- 500+ students participate in CSE mentor programs each year

EMPLOYMENT BY REGION



of graduates in 2016-17 reported having a job in their field or were enrolled in graduate/professional school within six months of graduation.

- 75% industry
- 20% graduate school
- 5% other



HEAR FROM STUDENTS
 about academics and
 career planning:
cse.umn.edu/viewbook

**Prominent companies
 that hire CSE graduates:**

- 3M*
- Abbott
- Accenture
- Amazon
- Andersen Corporation
- Apple, Inc.
- Best Buy*
- Boeing
- Boston Scientific
- Cargill
- Cognizant Technology Solutions
- Cummins
- Eaton Corporation
- Ecolab*
- Emerson
- Epic Systems Corp.
- ExxonMobil
- Ford Motor Company
- General Electric
- General Mills*
- Google
- Honeywell
- IBM
- Ingersoll Rand
- Intel
- Land O'Lakes*
- Lockheed Martin
- Medtronic, Inc.*
- Microsoft, Inc.
- Schlumberger
- Seagate Technology
- Starkey Hearing Technologies
- Target Corporation*
- The Dow Chemical Company
- UnitedHealth Group*
- U.S. Bank*
- UTC Aerospace Systems
- Xcel Energy*

* Fortune 500 in Minnesota

WHAT'S THE AVERAGE STARTING SALARY?*

| | |
|--|-------------------|
| Aerospace Engineering and Mechanics. | \$66,300 |
| Astrophysics. | \$51,600 |
| Biomedical Engineering | \$60,800 |
| Bioproducts and Biosystems Engineering | \$59,100 |
| Chemical Engineering | \$62,700 |
| Chemistry | \$50,900 |
| Civil Engineering | \$55,500 |
| Computer Engineering | \$70,100 |
| Computer Science | \$73,900 |
| Earth Sciences | \$44,000** |
| Electrical Engineering | \$64,400 |
| Environmental Engineering | \$48,800 |
| Geoengineering. | \$56,400** |
| Industrial and Systems Engineering | \$63,900 |
| Materials Science and Engineering | \$59,100 |
| Mathematics. | \$61,700 |
| Mechanical Engineering. | \$64,900 |
| Physics | \$54,700 |

* 2016-17 CSE graduating class

** National average; cohort data unavailable



AM I READY FOR THE BIG TEN?



YOU ARE. If you want an exciting atmosphere and incredible experience, you are at the right place. The University of Minnesota is a member of the legendary Big 10 conference, known for stellar athletics and academics. Our school spirit is strong and our traditions are rich—*Go Gophers!*

WHY MINNESOTA?

LOCATION IS EVERYTHING.

The mighty Mississippi is in our backyard and we're walking distance to a bustling downtown! You'll also be close to lots of internship and employment opportunities. Minnesota is home to 19 Fortune 500 companies.

ARE THERE SCHOLARSHIPS?

INDEED. Fill out the Free Application for Federal Student Aid (FAFSA) when you submit your college application. In addition to University-wide scholarships, loans, and work-study payments, the college oversees and distributes more than \$2.2 million in financial aid annually to freshmen, transfer, and current students just in CSE.





Profile of admitted students*

NEW FRESHMEN

14,000+

Applications received

1,177

Incoming

98.4%

Graduated in top 25% of their high school class

31.7 Average composite ACT score

1,394 Average SAT score

Top places they come from:



NEW TRANSFER STUDENTS

3.6 Average GPA in math, science, engineering

From non U of M programs **324**

247 From other U of M programs

* Fall 2017 statistics

WHEN DO I APPLY?

AS SOON AS POSSIBLE. Application opens in August, and admission to the College of Science and Engineering is competitive. We review applicants based on many factors, including:

- Coursework through high school graduation (admitted students typically exceed the University's subject requirements)
- Grade point average
- Class rank (if available)
- ACT or SAT scores

See the full list of assessment factors at admissions.tc.umn.edu.

HEAR FROM STUDENTS about student groups: cse.umn.edu/viewbook





SO, WHAT'S NEXT?

SAY YES. Families who visit tell us that meeting current students, speaking with faculty, and seeing campus help them better understand what makes us special.

- **Schedule your tour today:**
admissions.tc.umn.edu/visit
612-625-2008
- If you're interested in **transferring to CSE**, call 612-625-6403 or email csetransfer@umn.edu



Curiosity is still making discoveries on Mars since landing in 2012—and deputy project manager Steve Lee, a 1985 CSE alum, remains involved in the mission. But, he'll soon oversee a new one: Europa Lander.

Photo courtesy Steve Lee/NASA. Selfie by Curiosity.

CONNECT WITH US!

The College of Science and Engineering community is active online. If you're on social media, like us and follow us:



facebook.com/umncse



cse.umn.edu/flickr



[@UMNCSE](https://twitter.com/UMNCSE)



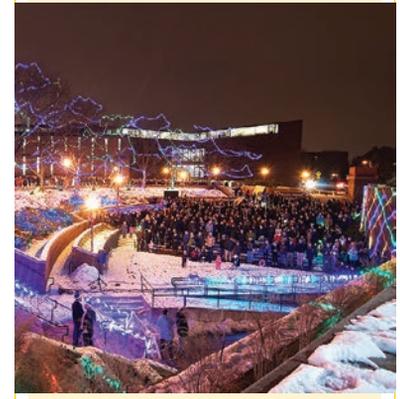
cse.umn.edu/linkedin



youtube.com/umncse



[@umncse](https://instagram.com/umncse)



Sure, it gets cold here—
but we celebrate winter!

At the CSE Light Show,
Tesla Works student
group synchronizes

**250,000
LED lights**

to music.

This publication was produced by the College of Science and Engineering Communications Office, in cooperation with CSE Collegiate Life, Academic Advising, and Career Center.

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FACTS

WORTH SHARING

CSE.UMN.EDU

430 Tenured/tenure-track faculty

5,526 Total undergraduate enrollment*

12 Departments

• **1,200** First-year students

• **18** Undergraduate majors

• **457** Transfer students

• **13** With a graduating class of fewer than 100 students

96.4% freshman retention rate*

• **30.8%** female freshman students*

* Fall 2017

65,000+ Living alumni

In the last five years, faculty and students have generated:

4,150 companies founded worldwide by CSE alumni

721 Inventions

• **500,000+** People employed

192 Patents

• **\$90 billion** annual revenue generated

26 start-up companies launched by discoveries at CSE

... ON CAMPUS:

4 minutes
Approximate time to walk from Lind Hall to SMART Learning Commons in Walter Library



The Civil Engineering Building beat Disney's Epcot for a building design award

8 p.m.

Historic telescope viewing at Tate observatory on Fridays during fall and spring semesters

\$0

Price to ride the Campus Connector from East Bank to the West Bank or St. Paul Campus

1.3 million pounds

Amount of vertical force researchers can exert in the MAST Lab to test the effects of earthquakes and hurricanes

FutureGopher @umncse