

# College of Engineering

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## Administration

Elizabeth Loba, Dean  
W1025 Lafferre Hall  
(573) 882 4378  
loboae@missouri.edu

When engineering classes at the University of Missouri began in 1849, a strong tradition was born that continues to grow. At the University of Missouri College of Engineering, we believe that with every innovation we make and every new development we bring to light, we do more than solve the problems of today. Here, we ready the leaders who will blaze forward with a revolution that defines the world for tomorrow. At Mizzou Engineering, collaboration, creativity and research surge together. Where others may see problems, disease and inefficiencies, we see opportunities, potential and infinite possibilities. We teach, we learn, and we analyze — and we demand innovation, inclusion and integrity as we create smarter, safer, more efficient ways of living.

The College of Engineering has a vision for becoming *the* college of choice for faculty and students in four Pillars of Pursuit: Educating Engineering Leaders, Big Data Analytics, Biomedical Innovations and Sustainability in *FEWSed* (Food, Energy, Water, Smart Cities). These pillars represent the College's areas of strength and greatest potential growth as we seek to recruit faculty and train students who will solve the next generation of global challenges.

The college offers fully accredited degree programs in biological, chemical, civil, computer, electrical, industrial and mechanical engineering, along with computer science. All of programs offer both undergraduate and graduate degrees. The college also offers a bachelor's degree in Information Technology. Naval Science is under the academic administration of the college as well. The hallmark of the College of Engineering is excellence in teaching and scholarly pursuits.

## Mission

The mission of the University of Missouri College of Engineering is to educate engineers, create leaders and develop entrepreneurs in a research and interdisciplinary environment.

We do this by:

- Supporting engineering educational programs with extracurricular student activities and research experience.
- Encouraging faculty to be entrepreneurial and interdisciplinary.
- Conducting world class research that produces new knowledge and new researchers for the future.

...resulting in economic development, job creation and an improved standard of living for our state and country.

## Undergraduate

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The MU College of Engineering is committed to a longstanding tradition of educating future engineering leaders. Here, students are inspired and

challenged. Students work, learn, research and create in an atmosphere where innovation, collaboration and finding ways to rise above challenges are more than aspirations — they are simply how we operate.

## Admissions

### Direct Freshman Admission to Engineering

Entering freshmen are expected to have completed 17 units of approved high school course work (in grades 9-12), including 4 units in English, 4 in mathematics and 3 in science with laboratory. Mathematics should include 2 units of algebra, 1 unit of plane and solid geometry (combination course), and 1/2 unit of trigonometry. Additional senior mathematics is recommended.

For direct admission to the College of Engineering, the applicant must meet the qualifications listed below (these numbers are subject to change).

- ACT-Math of at least 26 AND
- ACT-Composite of at least 26 OR high school class rank in the upper 25 percent

For direct admission to one of the College of Engineering degree programs, the applicant must meet the qualifications listed below (these numbers are subject to change).

- ACT-Math of at least 32 AND
- ACT-Composite of at least 32 AND
- High school class rank in the top 10 percent

The average ACT scores for first-time freshmen admitted to the College of Engineering for fall 2016 were ACT-Composite 28.03 and ACT-Math 28.74.

### Pre-Engineering Program (PEP)

Freshmen who do not meet the criteria for direct admission to the College of Engineering are admitted initially into the Pre-Engineering Program. Although admitted to the College of Arts and Science, each PEP student has access to the Engineering Advising Office.

PEP reduces freshman pressures while preserving alternatives. Because PEP students are enrolled in the College of Arts and Science, degree options in the College of Arts and Science are available to those who may decide to change their focus from engineering.

Most first-semester PEP students enroll in one preparatory math course and three courses in the College of Arts and Science, which count in both the engineering and arts and science degree programs. The prime objective is to strengthen math preparation sufficiently for success in engineering.

PEP students are eligible to transfer to the College of Engineering when they meet the following requirements:

- Satisfactory completion of 24 credits
- GPA of 2.0 or higher both Cumulative and last graded term
- A grade of C- or better in MATH 1500 Analytic Geometry and Calculus I or
- Academic good standing
- Students with 60 credits or more must be admitted to their Department of choice prior to being admitted to Engineering
- For admission to Information Technology, students must have GPA of 2.0 or higher in both Cumulative and last graded term

## Declared and Undeclared Status

Freshmen engineering students will start in an undeclared status unless they meet criteria for direct departmental admission (see criteria below). Students admitted to the College of Engineering in undeclared status will work to complete a foundational curriculum consisting of math, science, and engineering courses. Upon completion of the foundational curriculum students will apply for entrance to available degree programs. The specific standards and capacity vary among the degree programs as necessary to align enrollments with educational resources.

## Freshman and Transfer Admission Requirement

### Bioengineering Department

Courses required before consideration for admission into Bioengineering

MATH 1500	Analytic Geometry and Calculus I
MATH 1700	Calculus II
CHEM 1320	College Chemistry I
PHYSCS 2750	University Physics I
BIO_SC 1500	Introduction to Biological Systems with Laboratory (recommended)

### Chemical Engineering Department

Courses required before consideration for admission into Chemical Engineering

MATH 1500	Analytic Geometry and Calculus I
MATH 1700	Calculus II
CHEM 1320	College Chemistry I
CHEM 1330	College Chemistry II
PHYSCS 2750	University Physics I
CH_ENG 1000	Introduction to Chemical Engineering

### Civil and Environmental Engineering Department

Courses required before consideration for admission into Civil and Environmental Engineering

MATH 1500	Analytic Geometry and Calculus I
MATH 1700	Calculus II
CHEM 1320	College Chemistry I
PHYSCS 2750	University Physics I
ENGLISH 1000	Exposition and Argumentation

### Computer Science Department

Courses required before consideration for admission into Computer Science

MATH 1500	Analytic Geometry and Calculus I
MATH 1700	Calculus II
CMP_SC 1050	Algorithm Design and Programming I
CMP_SC 2050	Algorithm Design and Programming II
General Science Elective	

### Information Technology Department

Admittance to Information Technology follows the standard MU admissions requirements

### Electrical and Computer Engineering Department

Courses required before consideration for admission into Electrical and Computer Engineering

MATH 1500	Analytic Geometry and Calculus I
MATH 1700	Calculus II
CHEM 1320	College Chemistry I
CMP_SC 1050	Algorithm Design and Programming I

ECE 1210	Introduction to Logic Systems
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### Industrial and Manufacturing Systems Engineering Department

Courses required before consideration for admission into Industrial and Manufacturing Systems Engineering

MATH 1500	Analytic Geometry and Calculus I
MATH 1700	Calculus II
CHEM 1320	College Chemistry I
PHYSCS 2750	University Physics I
ENGLISH 1000	Exposition and Argumentation

Minimum cumulative GPA of 2.75

### Mechanical and Aerospace Engineering Department

Courses required before consideration for admission into Mechanical and Aerospace Engineering

MATH 1500	Analytic Geometry and Calculus I
MATH 1700	Calculus II
CHEM 1320	College Chemistry I
PHYSCS 2750	University Physics I
ENGLISH 1000	Exposition and Argumentation

Undeclared students should discuss course selection with the academic advisor each semester to keep options open among departmental curricula.

To transfer from one department to another, students must submit an application to the new department. Admittance to the new department will be based upon the student's academic performance and departmental capacity. Students who transfer must satisfy the specific degree requirements of the new department.

## Engineering Dean's Scholars Program

The purpose of the Engineering Dean's Scholars Program is to recognize, mentor and train the highest-achieving students in scholarship and leadership. Engineering Dean's Scholars participate in the Engineering Scholars Freshman Interest Group (FIG) which will be housed in Hudson or Gillett Residence Hall. Faculty-scholar lunches are held several times during the semester to allow the scholars to meet with engineering faculty and to learn about the engineering profession and undergraduate research opportunities.

Scholars participate in leadership or mentoring activities during their sophomore, junior and senior years. Examples of such activities include serving as engineering ambassadors or peer advisors for an engineering FIG, and participating in Undergraduate Research. Students chosen for peer advisor positions have their room and board covered in exchange for their services.

Students who have ACT math and composite scores of 32 and a high school rank in the top 10 percent of their class may submit an application for consideration of admission to the program.

Mizzou Engineering Dean's Scholars Program  
 W1025 Lafferre Hall  
 University of Missouri  
 Columbia, MO 65211  
 (573) 882-4092

## Transfer Students

Students wishing to transfer to MU from an accredited college or university are subject to University regulations described in this catalog.

The MU College of Engineering cooperates with many colleges through articulation agreements that help pre-engineering students transfer to MU

with maximum ease and minimum loss of credits. A student may take the first two years at the participating school and then transfer to MU for the junior and senior years in engineering. After the program is completed, the student is awarded a BS degree in the chosen engineering field.

Transfer students may be admitted to the College as undeclared or may start with a departmental affiliation. Eligibility to enter the College with a departmental affiliation is based upon the student's previous academic performance and department capacity.

Transfer students who enter the College as undeclared, are required to submit an application to enter a degree program. Admittance to the degree program is based upon previous academic performance and department capacity.

To be recommended for the BS degree from the College of Engineering, a student transferring from an accredited institution must complete at least 30 upper-level credits in the degree program at a UM System campus. At least 21 of the 30 credits must be upper-level engineering courses approved by the department awarding the degree.

A student transferring with senior standing from another UM System campus must complete the last 15 credits in residence on the campus where the degree program is located. Twelve of these 15 credits must be in engineering and approved by the department awarding the degree.

Any student whose enrollment in any college-level academic program resulted in dismissal, departure or who are on probation will not be admitted to the College of Engineering.

## International Admission

Admission of international students is determined on an individual basis by a committee of representatives from the Admissions Office and the College of Engineering.

Before registering for classes at the University, international students must take the MU English Language Test, developed for international students. Students passing the test are eligible to take ENGLSH 1000 and any other required English courses.

International students whose test scores indicate that additional English training is needed, including those with transferred English credit, are required to register for an English-language support class. The course, developed for international students, should be taken during the first semester of enrollment. This course does not count toward graduation credit, but regular attendance is required and failure to attend will result in dismissal. The English-language support class taken must be satisfactorily completed before the student can enroll in ENGLSH 1000. Students not satisfactorily completing the class in the first semester of enrollment must re-enroll in the second semester. If the student does not satisfactorily complete the English-language support class in the second term of enrollment, the student will not be permitted to re-enroll in the College of Engineering.

## 60 Credit Hour Rule

To remain in the College of Engineering, students must be admitted to an Engineering degree program by the end of the semester when their total credit hours earned are equal to or greater than 60. Students not admitted by 60 credit hours will become ineligible to remain in the College of Engineering and must transfer to another MU school or college in order to remain a student at the University of Missouri. Transfer students who enter the College of Engineering with 60 or greater credit hours will be given one semester to gain admittance to a degree program. If not admitted to a degree program after one semester, they will become

ineligible to remain in the College of Engineering. If more than one semester is needed to complete the courses required to enter a degree program, a waiver may be granted at the discretion of the college. If students are pre-enrolled for the following term at the time they become ineligible to remain in the College of Engineering, all Engineering courses will be administratively dropped.

## Graduation Requirements

The curriculum provides a solid foundation of mathematics and physical sciences followed by the application of these sciences in engineering specialties. The balance of the curriculum encompasses communication skills, English, social sciences and humanities courses.

Many freshmen are eligible to start with calculus. However, some can profit from additional pre-calculus preparation, which is an addition to the undergraduate curricula.

Students should access the engineering web site (<http://engineering.missouri.edu>) for details regarding social and behavioral sciences and humanities and fine arts requirements.

In addition to the University's general education and graduation requirements, the departments in the College of Engineering may require further specific courses to better equip students to perform in their chosen fields of study.

While many students complete the BS degree program in four years, some may find it advisable to extend the curriculum in order to carry lighter semester loads, add preparatory courses or compensate for part-time work.

## GPA Requirements for Graduation from the College of Engineering

- GPA of record of at least 2.0
- GPA of at least 2.0 in all engineering courses offered by one of the four campuses of the UM System. "Engineering courses" include all courses that are offered through the College of Engineering or its equivalent on the four campuses, or that have "Engineering" in the curricular designator. Only the last grade in a repeated course will be used in the calculation.

## Academic Regulations

### Degree with Honors Requirements

Latin Honors are granted to students who meet the following cumulative GPA requirements:

Latin Honor	GPA
summa cum laude	3.9
magna cum laude	3.7
cum laude	3.5

### Departmental Honors

The college maintains an undergraduate honors program to further challenge those who have established a minimum GPA of 3.0 at the beginning of the junior year. A comparable grade point average is required of transfer students. The program leads to an undergraduate honors thesis on a research or advanced design project, provides for additional curricula flexibility and contains features that ease the transition to graduate school.

Opportunities available to honors students include:

- More personal attention from an honors advisor
- Independent study or undergraduate research with a senior faculty member whose specialty interests the honors candidate

A student who successfully completes the engineering honors program, including the independent project, will be designated an "Honors Scholar in Engineering." Interested students should contact their departmental office.

Qualified engineering students are also welcome to join the programs of the Honors College and may enroll in various honors courses and honors sections of regular courses.

## Courses in Basic Skills

No basic skills courses may be taken to fulfill graduation requirements.

## Curriculum of Record

The curriculum of record is the curriculum a student must satisfy to meet graduation requirements. For students who maintain continuous, full-time enrollment, the curriculum of record is the one approved by the College of Engineering at the time the student achieves upper-division status in the discipline of choice. For others, the curriculum of record is decided by the department faculty.

## Academic Probation and Dismissal

1. A student whose term and cumulative UM GPA are 2.0 or higher is in good academic standing. A "term" is defined as a semester or summer session.
2. A student will be placed on academic probation if while in good academic standing the student has a term GPA less than 2.0 but equal to or greater than 1.0.
  - While on academic probation, a student must enroll in and complete each semester at MU at least 12 credits of course work necessary for the degree. Courses taken through MU's Mizzou Online (self-paced) count as part of these 12 credits. Part-time students must enroll in at least as many credits each semester as the college rules governing part time enrollment.
  - A student will be removed from probation at the end of the term when the term and cumulative GPA are 2.0 or higher, provided the student completed 12 or more hours applicable toward the degree.
  - A student will be continued on probation if while on probation the student has a term GPA greater than or equal to 2.0, but whose cumulative GPA is below 2.0.
3. A student will be dismissed from the College of Engineering if the student:
  - Receives a term GPA of less than 1.0.
  - Receives a term GPA of less than 2.0 while on probation.
  - Fails to complete at least 12 credit hours toward their Engineering degree program while on academic probation.
4. Readmission:
  - Students who are dismissed from the College of Engineering and who wish to appeal their case for continuation must write an appeal letter and submit it to the academic appeals committee.
  - If the appeals committee allows a student to re-enroll on final probation, it may set conditions such as courses to be taken,

minimum grades, total hours, etc to which the student must adhere.

- A student who has been dismissed for academic reasons may be readmitted upon a successful appeal to the academic appeals committee of the College of Engineering.
  - Similarly, students who wish to re-enroll in the college of Engineering after having been out of school as a result of a dismissal must write a letter of appeal to the College of Engineering academic appeals committee requesting readmission.
  - Letter of appeal may be addressed to: Engineering Academic Appeals Committee, W1025 Lafferre Hall, University of Missouri, Columbia, MO 65211. A personal visit with the director of undergraduate studies of the students' department and advisor before appealing by letter is recommended and often helpful, both to the student and to the committee.
  - One of the primary objectives of the appeals committee is evaluate indicators of the likelihood of future success of the student. Accordingly, any appeal letter should include an explanation for past poor performance and reason for expecting better outcomes in the future
5. A student who is dismissed while on final probation will normally be ineligible for readmission.

## Satisfactory/Unsatisfactory Grading Option

Under Satisfactory/Unsatisfactory (S/U) grading, an S is assigned for a grade in the A, B or C range, and a U is assigned for a grade in the D range or for an F. Neither an S nor a U will be calculated into a student's grade point average. A student enrolled in the College of Engineering may not take any math, science or engineering course that counts toward degree requirements under the S/U grading option, unless the course is only offered S/U. In addition, any course specifically required (by course number) in the curriculum may not be taken S/U. This includes ENGLSH 1000 or ENGLSH 1000H. The 18 credits taken to fulfill the University general education distribution requirement may be taken S/U.

## Restrictions

- First-semester freshmen are ineligible to take any course S/U unless it is only offered S/U.
- Only one course per semester may be taken S/U.
- Students on academic probation are not allowed to take any course S/U.
- To be eligible for the Dean's List each term, a student must complete 12 graded credits (S/U courses are not considered "graded").

## Student Services

### Advising

Each student in the College of Engineering is assigned an advisor from the College of Engineering Advising Office who assists the student in reaching academic and professional goals, as well as assist students with time management and academic success strategies. Students are encouraged to meet with their advisors as often as needed. Engineering students have advising holds placed on their accounts each semester and will work with their advisor to verify enrollment and degree progress before enrolling for the following semester. In addition, students have access to work with a faculty mentor in their degree program who can assist with career planning and selection of technical elective coursework.

## Diversity and Outreach Initiatives

At Mizzou Engineering we honor our values by insuring a diverse and inclusive college. The College of Engineering Office of Diversity and Outreach Initiatives facilitates the outreach, recruitment, retention, and overall success of all members of our community, but especially those from backgrounds traditionally underrepresented in engineering. The Office of Diversity and Outreach Initiatives provides professional development programming surrounding inclusion, equity, and diversity for all of our undergraduate, graduate, staff, and faculty. The Office houses many programs including:

- The Inclusivity Center provides a physical space where everyone is welcome as well as a venue for our events and activities.
- The Women in Engineering Center focuses on all activities that support and recruit women students.
- The Minority Engineering Program fosters a support network between students, faculty, and staff to ensure academic success by providing structured progress checks, professional development trainings, early research experience, counseling, academic enrichment, mentoring and information about graduate study for the Engineering Diversity Scholarship recipients.
- The Office of Diversity and Outreach Initiatives serves as a resource for the College of Engineering student organizations to further engage them in diversity and inclusion efforts.

## Study Abroad

College of Engineering and STEM students have opportunities to pursue academic, leadership, and service opportunities around the world. Students can participate in short-term study abroad programs in Europe, Asia, and Latin America and earn college credit towards general education requirements, core engineering requirements, and engineering technical electives to complete graduation requirements. Students can also participate in semester long programs.

## Learning Communities

The college cosponsors several living/learning options for engineering students. The college believes that an environment conducive to the formation of networks, with aspects of social and academic interaction, enhances the retention and ultimate success of students in the engineering curriculum. Students selecting these options generally earn higher grades and are more likely to graduate than the average engineering student.

The Engineering Learning Community (ELC) is a special co-ed environment that offers engineering majors a full range of academic support and activities. ELC allows engineering students to live together, study together and have fun together. Freshman Interest Groups (FIGs) support incoming freshmen. Members of a FIG are co-enrolled in three courses during the first semester of the freshman year with a group of up to 20 students. Each community has its own computer lab, peer tutors, study groups and quiet hours.

## Professional Engineering Registration

The revised statutes of Missouri (Section 327.221) require that each applicant for registration as a professional engineer in Missouri must be a graduate of and hold a degree in engineering in a curriculum accredited by the Accreditation Board for Engineering and Technology. The MU undergraduate programs in biological, chemical, civil, computer,

electrical, industrial and mechanical engineering, and computer science at MU are so accredited.

Senior students are strongly encouraged to take the Fundamentals of Engineering Exam leading to the Fundamentals in Engineering (FE) status as a first step toward registration.

The MU undergraduate programs in biological, chemical, civil, computer, electrical, industrial and mechanical engineering are accredited by the Engineering Accreditation Commission of ABET and computer science is accredited by the Computing Accreditation Commission of ABET [www.abet.org](http://www.abet.org) (<http://www.abet.org>).

## Naval Reserve Officers Training Corps (NROTC)

NROTC was established in 1926 to offer college students the necessary naval science courses to qualify for commissions in the Navy or Marine Corps Reserve. Today, NROTC is one of the primary accession sources of officers for the Navy and Marine Corps.

Scholarship NROTC midshipmen incur no military obligation during their freshman year. This allows students to get a better understanding and appreciation of the life of a Navy or Marine Corps officer. Navy NROTC graduates incur a minimum five years military obligation. Marine NROTC graduates incur a minimum four year military obligation.

The two-year NROTC program is designed for transfer students and for MU students who did not participate in NROTC during the first two years. MU also offers a Minor in Naval Science (<http://catalog.missouri.edu/undergraduategraduate/collegeofengineering/additionalminorsandcertificates/minor-naval-science>).

Navy students should major in a technical course of study while marine students may major in any course of study leading to a baccalaureate degree. Academic credit for naval science courses is accepted toward a baccalaureate degree by most MU schools and colleges. Midshipmen take one naval science course for credit each semester, which provides education and training in various aspects of the Navy or Marine Corps. Associated with each course is a leadership laboratory. NROTC activities include water survival, self-defense, physical fitness, orienteering, aviation, nuclear power indoctrination, pistol/rifle marksmanship and a variety of field trips. Upon graduation, midshipmen are commissioned as Ensigns in the Navy or Second Lieutenants in the Marine Corps.

For additional information, contact:  
Department of Naval Science  
105 Crowder Hall  
(573) 882-6693 or 888-686-7682  
[NROTC@missouri.edu](mailto:NROTC@missouri.edu)  
<http://nrotc.missouri.edu/>

## Graduate

Graduate students have many opportunities to develop special skills in the career paths they choose. Students interested in pursuing a career in academia can participate in the Preparing Future Faculty Fellowship Program, where they can choose courses from the College of Education and have the opportunity to co-teach engineering courses and write proposals.

Additionally, MU promotes technology, innovation and entrepreneurship. Mizzou Engineering sustains a variety of research centers, programs, groups and facilities along with other departmental groups that are designated as areas of exemplary expertise and success. The college contributes significantly to MU's overall annual research and development

spending. The College also offers exceptional business opportunities to corporations, small businesses and start-ups.

MU graduate students have gone on to become faculty at world-class academic institutions in the U.S. and around the world, have created start-up companies as successful entrepreneurs and have secured jobs with leading companies, including Oak Ridge National Laboratory, PepsiCo, Amazon, Google and more.

Graduate engineering programs include

- Biological Engineering
- Chemical Engineering
- Civil & Environmental Engineering
- Computer Science
- Electrical & Computer Engineering
- Industrial Manufacturing & Systems Engineering
- Mechanical & Aerospace Engineering
- MU Informatics Institute

Note: Prospective graduate students must apply to both the degree program of interest and to the MU Graduate School. In most cases, the entire application process may be completed online. Find admission and application details by selecting the degree program of interest in the left navigation column.