Degree Requirements

Undergraduate Bachelor of Science (BS) degrees awarded by the McKelvey School of Engineering include several categories as listed below.

Engineering degrees include the following:

- BS in Biomedical Engineering
- BS in Chemical Engineering
- BS in Computer Engineering
- BS in Electrical Engineering
- BS in Environmental Engineering
- BS in Mechanical Engineering
- BS in Systems Science & Engineering

Computer science degrees include the following:

- BS in Computer Science
- BS in Computer Science + Mathematics
- BS in Computer Science + Economics
- BS in Data Science

Applied science degrees include the following:

- BS Major in Applied Science (Chemical Engineering)
- BS Major in Applied Science (Electrical Engineering)
- BS Major in Applied Science (Mechanical Engineering)
- BS Major in Applied Science (Systems Science & Engineering)

Joint degrees with other undergraduate divisions on campus include the following:

- BS in Business and Computer Science

Engineering Bachelor of Science Degrees

To earn the BS in Biomedical Engineering, BS in Chemical Engineering, BS in Computer Engineering, BS in Electrical Engineering, BS in Environmental Engineering, BS in Mechanical Engineering, or BS in Systems Science & Engineering, a student must satisfy all of the following general distribution requirements:

1. Complete the engineering Common Studies courses outlined below with passing letter grades:
   a. Calculus (Math 131, Math 132, Math 217 and Math 233)
   b. Physics (Physics 191, Physics 191L, Physics 192 and Physics 192L)
   c. Chemistry (Chem 111A or Chem 105 and Chem 151)
   Note 1: Some programs also require Chem 112A or Chem 106 and Chem 152.
   Note 2: The BS in Computer Engineering program permits alternate science courses to satisfy this requirement.
   Note 3: Chem 111A is required for Biomedical Engineering students; Chem 151 is required with Chem 111A and Chem 105.
   d. Technical Writing (Engr 310)
2. Satisfy the specific degree requirements of one of the engineering degree programs as outlined in other sections of this *Bulletin*.
3. Satisfy the requirements listed under All Undergraduate Degrees below.

Computer Science and Applied Science Bachelor of Science Degrees

To earn the BS in Applied Science (Chemical Engineering), BS in Applied Science (Electrical Engineering), BS in Applied Science (Mechanical Engineering), BS in Applied Science (Systems Science & Engineering), BS in Computer Science, BS in Computer Science + Mathematics, BS in Computer Science + Economics, or the BS in Data Science, a student must satisfy all of the following general distribution requirements:

1. Complete at least 120 applicable units.
2. Complete at least 48 units of the 120 in mathematics, natural sciences and engineering.
3. Complete at least 42 units of the total 120 units at the 300 level or higher.
4. Satisfy the specific degree requirements of one of the applied science degree programs, as outlined in other sections of this *Bulletin*.
5. Satisfy the requirements outlined under All Undergraduate Degrees below.

Note: Diplomas for applied science degrees state "Bachelor of Science" and do not indicate the major on the diploma. The major (e.g., Chemical Engineering) is posted on the official transcript.

All Undergraduate Degrees

To earn any undergraduate degree in the McKelvey School of Engineering, a student must accomplish all of the following:

1. Earn at least a C (2.0) cumulative grade-point average in all applicable courses taken at Washington University. All courses must be taken for a letter grade unless otherwise specified. Other course restrictions may apply, and students should closely review the remainder of this *Bulletin* as well as the degree audit system.
2. Earn at least the minimum total number of units specified for the particular degree. All degrees require students to complete at least 120 applicable units.
3. Earn at least a C (2.0) GPA in all engineering courses taken.
4. Satisfy all of the following residency requirements:
   a. Complete a minimum of 30 units of 200-level or higher courses from the school while matriculated at Washington University in a degree program. An approved engineering course transferring in as 200-level or higher from an exchange

program or a study abroad experience sanctioned by the McKelvey School of Engineering may be counted as a school equivalent course for the purpose of satisfying this requirement.

b. Complete a minimum of 60 units at Washington University while matriculated at Washington University in a degree program. Exchange program or study abroad courses sanctioned by the school may be counted toward this requirement.

c. For students who pursue multiple engineering BS degrees, for each additional BS degree from the school, students must complete an additional 15 resident units of 200-level or higher courses from the school, which are in addition to the 30 units of 200-level or higher engineering courses that are listed in 4a above. No more than two BS degrees from the McKelvey School of Engineering may be earned by the same student.

d. For students enrolled in a Washington University undergraduate joint or combined degree program connected to a McKelvey academic department and an academic department outside of McKelvey, the McKelvey academic department may designate specific Washington University courses (200-level or higher) taken outside of the McKelvey School of Engineering to satisfy the residency requirement listed in 4a above. Such designated courses must be required for the core or elective portions of the major-specific requirements of the joint or combined degree program. **Note:** Some departments may have program-specific residency requirements that require students to complete a minimum number of units at Washington University for their specific degree programs. This is currently true in Computer Science & Engineering.

5. Complete the English proficiency requirement as well as the humanities and social sciences requirement of the McKelvey School of Engineering.

English Proficiency Requirement

Every student must demonstrate proficiency in the reading and writing of the English language. First-year engineering students are given an opportunity to take a writing placement exam during the summer before they arrive to campus. Proficiency can be demonstrated by satisfactory performance on this writing placement exam administered by the McKelvey School of Engineering. Waivers of the English proficiency requirement via the writing placement exam do not carry degree credit.

Students who do not demonstrate satisfactory proficiency via the writing placement exam are required to enroll in a course or sequence of courses specified by the test's administrator. The school's English proficiency requirement is then satisfied only by a grade of C- or better in one of the themed college writing courses developed by the College Writing Program (https://collegewriting.wustl.edu/).

Before enrolling in one of the College Writing Program themed courses, some students may be required to complete CWP 1511 Critical Reading and Analytical Writing, CWP 1001 Foundations of Academic Writing or CWP 200 Writing Tutorial.

Courses taken at other institutions to satisfy the English proficiency requirement must be approved by the school's English proficiency coordinator. If the course is so approved, the student must pass with a grade of C- or better.

Humanities and Social Sciences Requirement

To earn any bachelor's degree from the McKelvey School of Engineering, students must complete the school's humanities and social sciences requirement:

1. Minimum units: At least 18 units of humanities and social sciences courses must be completed with passing grades. Humanities and social sciences courses (other than transfer courses) may be taken for pass/fail credit.
2. Breadth: At least 6 units of the 18 must be in the humanities, and at least 6 units must be in the social sciences.
3. Upper-level courses: At least 3 units of the 18 units completed must be from one or more courses numbered 300 or higher.

Note: Joint degree programs may have different humanities/social science degree requirements.

Washington University courses labeled with the EN:H or EN:S attribute in the semester course listings will count, respectively, toward the humanities or social sciences requirement for engineering degrees. In general, most art courses (F10 and F20) will count toward the engineering school's humanities requirement, even if they do not have the specific EN:H designation. Some upper-level art courses are open only to students with an open art program.

Transfer courses must be approved through Engineering Undergraduate Student Services as acceptable transfer credit (http://engineering.wustl.edu/current-students/student-services/Pages/transfer-course-credit.aspx) and as applicable humanities or social sciences courses. All transfer courses must be taken for credit (i.e., not pass/fail), and students must earn a C- or better in transfer courses for the credit to transfer to the school. Grades do not transfer.

Advanced Placement (AP) credit and International Baccalaureate (IB) credit approved through Engineering Undergraduate Student Services may be used to satisfy all or part of the breadth requirement (i.e., the humanities 6-unit requirement and/or the social science 6-unit requirement); however, AP and IB credit may not be used to satisfy the 18 minimum units needed to satisfy the school's overall humanities and social sciences requirement. Students may individually petition Engineering Undergraduate Student Services to have their AP or IB credit counted toward the humanities 6-unit requirement and/or the social sciences 6-unit requirement. Petitions will be reviewed to determine if they conform to guidelines established for awarding humanities and social sciences credit. Guidelines are approved by the Engineering Undergraduate Studies Committee.

Engineering Topics Units

Bachelor's degree programs accredited by the Engineering Accreditation Commission of ABET (http://www.abet.org) require that the program require a minimum of 45 units of engineering topics. A course carrying engineering topics units will be marked in the Course Listings (https://courses.wustl.edu/Semester/Listing.aspx) with the EN:TU attribute.

Engineering Topics/Design Component

Engineering design is the process of devising a system, component or process to meet desired needs. It is a decision-making process (often iterative) in which basic sciences, mathematics and engineering sciences are applied to convert resources optimally to meet a stated objective. Among the fundamental elements of the design process are the establishment of objectives and criteria, synthesis, analysis, construction, testing and evaluation. The engineering design component of a curriculum must include most of the following features: development of student creativity, use of open-ended problems, development and use of modern design theory and methodology, formulation of design problem statements and specifications, consideration of alternative solutions, feasibility considerations, production processes, concurrent engineering design and detailed system descriptions. Further, it is essential to include a variety of realistic constraints, such as economic factors, safety, reliability, aesthetics, ethics and social impact.

Engineering Topics/Science Component

The engineering sciences have their roots in mathematics and basic sciences but carry knowledge further toward creative application. These studies provide a bridge between mathematics and basic sciences on the one hand and engineering practice on the other. Such subjects include mechanics, thermodynamics, electrical and electronic circuits, materials science, transport phenomena and computer science (other than computer programming skills), along with other subjects, depending on the discipline. Although it is recognized that some subject areas may be taught from the standpoint of either basic sciences or engineering sciences, the ultimate determination of the engineering science content is based on the extent to which there is extension of knowledge toward creative application. In order to promote breadth, the curriculum must include at least one engineering course outside of the major disciplinary area.

ABET Mathematics and Basic Science Requirement

Bachelor degree programs accredited by the Engineering Accreditation Commission of ABET (http://www.abet.org) require that the program require a minimum of 30 units of college-level mathematics and basic sciences (some with experimental experience) appropriate to the discipline. The basic sciences are defined as biology, chemistry and physics.

Applicable Undergraduate Engineering Degree Requirements

Undergraduate engineering students are required to satisfy the engineering degree requirements that are published in the online undergraduate Bulletin (http://bulletin.wustl.edu/undergrad/) in effect at the time they first enroll at the university as degree-seeking undergraduate students.

Undergraduate engineering students must complete all undergraduate degree requirements and graduate within 10 consecutive years of enrolling as degree-seeking undergraduate students at the university.

A student who does not graduate within 10 consecutive years will be required to satisfy the degree requirements that are in the most recently published online undergraduate *Bulletin* and to retake courses identified by the chair of the department in which the student is seeking the degree.

- When a student wishes to return to complete course work and earn a degree after the 10-year time period has passed, the most recent online undergraduate *Bulletin* is defined as the catalog in effect when the student re-enrolls in the McKelvey School of Engineering as an undergraduate student seeking a degree.
- When a student has left the university and wishes to complete course work at another university to then transfer back and graduate from the McKelvey School of Engineering and when more than 10 years have elapsed since the student was first enrolled as an undergraduate engineering degree-seeking student, the most recent online undergraduate *Bulletin* is defined as the catalog in effect when the student files an intent to graduate for an engineering undergraduate degree. The course work that the student intends to complete and transfer back to the McKelvey School of Engineering must be approved by the school before the student enrolls in the course work.