School of Engineering

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Degrees Offered and Accreditation

The School of Engineering offers four-year programs leading to Bachelor of Science in Engineering (B.S.E.) degrees in:
- Biomedical Engineering* (128-credits)
- Chemical Engineering* (128-credits)
- Civil Engineering* (128-credits)
- Computer Science and Engineering** (126-credits)
- Computer Engineering* (126-credits)
- Electrical Engineering* (126-credits)
- Engineering Physics (128-credits)
- Environmental Engineering* (128-credits)
- Materials Science and Engineering* (128-credits)
- Mechanical Engineering* (128-credits)

Bachelor of Science (B.S.) degree (120-credits) in Computer Science#
Bachelor of Science (B.S.) degree (139-credits) in Management and Engineering for Manufacturing* (jointly offered with the School of Business) and accredited by the Association to Advance Collegiate Schools of Business (AACSB)

The programs shown above that are asterisked (*), are accredited by the Engineering Accreditation Commission of ABET, www.abet.org. The programs shown above with the pound sign (#) are accredited by the Computing Accreditation Commission of ABET.

The School of Engineering and the College of Liberal Arts and Sciences offer a five-year, double-degree EUROTECH program leading to a B.S. in Engineering degree and a B.A. degree in German. The program includes German Language courses specially designed to include engineering content, engineering courses taught partly in German, and a six-month internship in a company in Germany.

Students who wish to concentrate their elective work in a second field within the School of Engineering may elect a double major program. This program requires the completion of all requirements in both majors. Students are required to inform the Director of Undergraduate Advising if they change or add a major.

The School of Engineering also offers Minors in Bioinformatics, Biomedical Engineering, Computer Science, Electronics and Systems, Engineering Management, Environmental Engineering, Information Assurance, Information Technology, Materials Science and Engineering, Nanomaterials, and Nanotechnology. Please refer to the “Minors” section of this publication for these and other relevant minor descriptions.

Admission Requirements

See Admission to the University section of this publication. All students admitted to the School of Engineering are required to take a calculus placement survey prior to attending summer orientation or registering for their first semester. Based on the survey results, students may be required to take additional preparatory course work that may not be counted toward graduation. Students not admitted into the School of Engineering at the time of entry to the University may apply for admission to a major through the School of Engineering, Undergraduate Programs Office. Admission is competitive. Decisions will be based on several criteria including the applicant’s academic record, courses completed, and space availability. Students in the School may request a change to their major later by submitting an application to the undergraduate programs office and meeting the admission criteria for that major.

Admission to Junior Year. Students should declare their major as soon as possible, but no later than the second semester of their sophomore year.

Supplementary Scholastic Standards. In order to be admitted to their junior year in their selected major in the School of Engineering, each student must have a cumulative grade point average of at least 2.0 in all courses in mathematics, sciences, and engineering applicable toward the degree.

Scholarships. The School of Engineering offers academic merit based scholarships to continuing students. The University offers merit based scholarships to eligible incoming freshmen.

Faculty Advisors, Professional Advisors and Student Mentors. Faculty advisors and professional advisors are assigned to students entering the School of Engineering according to the student’s major. Faculty advisors and professional advisors assist students in their course selections, counsel them in meeting their educational and career goals, and advise them in both academic and non-academic issues. The school’s Mentoring, Advising and Tutoring (MAT) Center is staffed by undergraduate students and provides tutoring, coaching and mentoring to all engineering students during the day. Evening tutoring is available in the Mentoring, Advising and Tutoring (MAT) Center.

School Academic Requirements

Students in the School of Engineering must complete the following requirements:

General Education Requirements. The University has adopted General Education Requirements in a variety of curricular areas, which must be satisfied as part of every bachelor’s degree program. Additionally, each student must demonstrate competency in the University of Connecticut’s five fundamental areas. These requirements appear in the “Academic Regulations” section of this Catalog.

Additionally, all engineering students are required to complete:
- A Plan of Study form submitted during the first semester of the junior year
- MATH 1131Q and 1132Q (or MATH 1125Q, 1126Q, and 1132Q), ENGR 1000 and CSE 1100 or 1101 and PHIL 1104
- All majors, except B.S. in Computer Science majors, are required to complete CHEM 1127Q (or CHEM 1147Q) and PHYS 1501Q and 1502Q or PHYS 1201Q, PHYS 1202Q and PHYS 1230/1530 or PHYS 1401Q and PHYS 1402Q
- The University writing (W) course requirement is fulfilled through required major-specific W course work. Most programs have the required two W courses specified in the curriculum. If there are not two W courses in the program, each student must take a minimum of one W course outside the major to satisfy the University’s General Education writing requirements.

Credit Restrictions. The following courses may not be counted for credit toward graduation in the School of Engineering: MATH courses numbered 1120Q and below; MATH 1110; PHYS 1010 and 1030Q; CSE 1000. MATH 1125, only 1 credit can be used toward the required credits for the degree. No course taken on a Pass/Fail basis may be counted for credit toward graduation or may be used to meet any course requirements of the School of Engineering. Only eight credits for courses numbered CHEM 1124Q, 1125Q, 1126Q, 1127Q, 1128Q, 1147Q, and 1148Q and only eight credits for courses numbered PHYS 1201Q through 1602Q may be applied toward the degree.

Major Requirements and Normal Sequences. In addition to the University General Education requirements and the School requirements listed above, the requirements for the specific majors are listed in the following pages. Additionally, students successfully completing these courses will have met their general education computer technology and information literacy exit requirements for this major. Full program details, normal/updated course sequences, and accreditation requirements can be found in the respective Guide to Course Selection for each major.

Accreditation Graduation Requirements. These requirements are for the following programs: Biomedical Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Computer Science and Engineering, Electrical Engineering, Environmental Engineering, Management and Engineering for Manufacturing, Materials Science and Engineering, and Mechanical Engineering.

ABET Requirements
1. Humanities Credits - Minimum 18 credits - including CA 1, CA 2, CA 4 including English 1010, 1011, or 2011
2. Math/Science Credits - Minimum of 32 credits (any CA 3 class) including all courses from CHEM, PHYS, EEB, BIOL, MARN, MATH, MCB, NUSC, NRE, PNB, PLSC, GSCI, GEOG, SOIL, and STAT (unless restricted by program or school)
3. Engineering Credits - Minimum of 48 credits from BME, CHEG, CE, CSE, ECE, ENGR, ENVE, MEM, MSE, ME excluding ENGR 1000 and ENGR 1166

Accreditation Documentation Statements. The program educational objectives are intended to be statements that describe the expected accomplishments of graduates during the first several years following graduation from the program. Each program’s educational objectives are listed within the actual program.

Bachelor of Science in Engineering in Biomedical Engineering

Biomedical Engineering majors are required to complete the following:

- BIOL 1107;
- BME 2101, 3120, 3500, 3600W, 3700, 4900, 4910;
- CHEM 1128Q (or 1148Q) and 2443;
- CE 2110; ECE 2001W, 3101;
- ENGR 1166;
- MATH 2110Q, 2410Q;
- MSE 2101;
- PNB 2264;
- PHYS 1502Q;
- STAT 3025Q;
- BME/Engineering electives 9 credits minimum BME electives and 9 credits minimum engineering electives;
- Elective (3 credits).

No more than 3 credits of independent study can count toward the 9 credits of BME electives.

The professional requirements and electives are specified in the Biomedical Engineering Guide to Course Selection.

The Biomedical Engineering undergraduate program educational objectives are that our alumni/ae: will be engaged in professional practice as biomedical engineers and/or biomedical scientists in occupational settings involving human health and well-being; will advance in their professional careers; and will engage in professional development, or post-graduate education, to continuing their self-development in biomedical engineering or other related fields.

Bachelor of Science in Engineering in Chemical Engineering

Chemical Engineering majors are required to complete the following:

- CHEG 2103, 2111, 3112, 3123, 3124, 3127, 3128, 3145, 3151, 4137W, 4140, 4142, 4143, and 4147;
- CHEG Electives (6 credits minimum);
- CHEG 1128Q (or 1148Q), 2443, 2444, 2446;
- ENGR 1166; MATH 2110Q and 2410Q;
- Professional/Engineering Requirements (9 credits); MCB/BIOL/ CHEM requirement*;
  - Elective courses (5 credits).

*Students may select BIOL 1107/1108; MCB 2000, 2610 or 3010; CHEM 3332, 3563, 3564; or other appropriate classes by petition.

Selection of Professional Requirements courses must include engineering design work as detailed in the Chemical Engineering Guide to Course Selection. At least three credits of Professional Requirements must be outside of Chemical Engineering. A maximum of six credits of independent chemical engineering research credits may be applied toward degree requirements.

The Chemical Engineering undergraduate program educational objectives are that our alumni/ae: our graduates will be gainfully employed in chemical engineering or related career paths including industrial, academic, governmental and non-governmental organizations. Our graduates will continue their professional activities and/or training to enhance their careers and/or pursue post-graduate studies.

Bachelor of Science in Engineering in Civil Engineering

Civil Engineering majors are required to complete the following:

- CE 2110, 2211, 2410, 2710, 3110, 3120, 3510, 3630 or 3640 and 4900W and 4920W; CE/ENVE 2251;
- ENVE 2310;
- CE 3520 or ENVE 3200;
- CE 3610 or ENVE 3220;
- A minimum grade of C- is required in each of the following courses: CE 2110, 2211; CE/ENVE 2251, 2410, 2710, 3110, 3120, 3510 and 4900W and 4920W; ENVE 2310
- CHEM 1128Q or 1148Q;
- ENGR 1166 (section offered by the CEE Department recommended);
- MATH 2110Q and 2410Q;
- Professional Requirements courses (18 credits);
- Science elective (minimum of 3 credits);
- Elective courses (as needed to reach 128 credits total).

The professional requirements are satisfied by eighteen (18) credits of 2000-level or higher courses in engineering, science, or mathematics or MGMT 5335 or OPIM 3801. At least one course each from four of the following different technical areas must be selected:

Construction Management Engineering: CE 4210
Environmental/Sanitary Engineering: ENVE 3220, 4310 (ENVE 3220 may be used only to fill the professional requirements by students who have taken CE 3610)
Geotechnical Engineering: CE 4510, 4530, 4541
Hydraulic/Water Resources Engineering: ENVE 4810, 4820
Structural Engineering: CE 3630 or 3640
Surveying/Geodetic: CE 4410
Transportation Engineering: CE 4710, 4720, 4750

No course that was used to meet another Civil Engineering course requirement may double count as a Professional Requirement. Courses taken from the above list but not used to fulfill the four technical area requirements may be used to satisfy remaining professional requirements. Following is a list of suggested courses that may also be considered for the professional requirements: CE 2120; CE 3520 or ENVE 3200 (if both taken); CE 3610 or ENVE 3220 (if both taken); CE 3630 or CE 3640 (if both taken); CE 4610, 4730, 4740; EBE 3247; ECE 2000; ENVE 4800; GSCI 3710.

The science elective may be satisfied by BIOL 1107; EEB 2208; ENVE 4320; GEOG 1300, 1302, 2300; GSCI 1050, 1051, 3710; NRE 3105; PSYC 1100; or any other science course outside of CHEM or PHYS approved by the CE Program.

The Civil Engineering undergraduate program educational objectives are to prepare our alumni/ae with the knowledge and skills needed to: actively contribute to the advancement practice and profession of engineering practice in the public or private sectors in the technical areas of environmental, geotechnical, structural, transportation, and water resources engineering; recognize the importance of, and follow a path that can lead to licensure as professional engineers who design and construct solutions to civil engineering problems in the natural and built environments; and adopt and continuously practice life-long learning through post-graduate and professional education.

Bachelor of Science in Engineering in Computer Engineering

Offered jointly by the Departments of Computer Science and Engineering and Electrical and Computer Engineering majors

Computer Engineering majors are required to complete the following:

- CSE 1102, 2100, 2102, 2300W, 2500, 3666, 4300;
- ECE 1101, 2001, 3101, 3201, 3221, 3401, 3421, 4099W, 4901, 4902;
- MATH 2110Q, 2210Q and 2410Q;
- STAT 3345Q;
- Professional Requirements courses (9 credits);
- Design Laboratory courses (6 credits including ECE 3411 or CSE 4903);
- Elective course (4 credits);

Further details and course sequences are given in the Computer Engineering Guide to Course Selection.

The Computer Engineering program combines coursework in computer science and electrical engineering providing a program that focuses on the design of computer hardware and digital systems.

The Computer Engineering undergraduate program educational objectives are that our alumni/ae: make technical contributions to design, development,
and manufacturing in their practice of computer engineering, advance in their
professional career and engage in professional development or post-graduate
education to pursue flexible career paths amid future technological changes.

Bachelor of Science in Computer Science

Computer Science majors are required to complete the following:

• CSE 1102, 2100, 2102, 2300 or 3666, 2500, 3000 or 3002, 3502, 4300, 4939W and 4940;
• MATH 2210Q, and either MATH 2110Q or 2410Q;
• Either STAT 3025Q or STAT 3375Q;
• One two-semester laboratory course sequence from either chemistry
  (CHEM 1127Q-1128Q, 1137Q-1138Q or 1147Q-1148Q) or physics
  (PHYS 1401Q-1402Q, 1501Q-1502Q or 1601Q-1602Q);
• One additional science course (from BIOL 1107, 1108, or 1110; CHEM
  1127Q, or 1128Q; PHYS 1401Q, 1402Q, 1502Q, 1601Q, or 1602Q) but not
  in the same department as the two semester sequence;
• Either CSE 4101 or CSE 4102;
• Three courses from CSE 3300, 3800, 3802, 4095 with prior approval, 4500,
  4701, 4703, 4705, 4707, 4709, or any 3-credit CSE graduate course;
• Additional CSE courses as required to reach 42 credits in CSE courses
  not including CSE 2500;
• A minimum of three 3-credit courses at the 2000-level or above in a
  single related area forming a cohesive body of knowledge outside of
  Computer Science;
• Elective courses to reach a minimum of 120 credits.

Further details and course sequences are given in the Computer Science
Guide to Course Selection.

The Computer Science program combines a rigorous education in computer
science with added coursework in an area outside of computing, in the sci-
ceses, business or humanities. With a background that combines computer
science and a non-computing discipline, our graduates have the breadth of
understanding to apply computer science to other disciplines, which is particu-
larly valuable as computing has become a key aspect of nearly all endeavors.

The Computer Science undergraduate program educational objectives are
that our alumni/ae: practice as computing professionals in
electrical engineering; advance in their professional
practice; and enhance their skills and embrace new computing
 technologies through self-directed professional development or post-graduate
education.

Bachelor of Science in Engineering

Bachelor of Science in Engineering in Electrical Engineering

Electrical Engineering majors are required to complete the following:

• CSE 1102 or ENGR 1166 or ECE 1110 (students who take a non-EE
  version of ENGR 1166 must also take ECE 1110);
• CSE 2300W;
• ECE 2001, 3001, 3101, 3111, 3201, 3211 or 3212 or 3231, 3221 or 4201,
  4099W, 4111 or 4112, 4211 or 4225, 4901 and 4902;
• MATH 2110Q, 2210Q and 2410Q;
• STAT 3345Q or MATH 3160;
• Professional Requirements courses (12 credits);
• Design Laboratory courses (6 credits);
• Elective courses (7 credits).

Further details and course sequences are given in the Electrical Engineering
Guide to Course Selection.

The Electrical Engineering program educational objectives are that our alumni/
æ: make technical contributions to design, development, and manufactur-
ing in their practice of electrical engineering; advance in their professional
career; and engage in professional development or post-graduate education
to pursue flexible career paths amid future technological changes.

Bachelor of Science in Engineering in Environmental Engineering

Environmental Engineering majors are required to complete the following:

• CE 2110, 2211, CE 3120/ENVE 3120 or (CHEG 3123);
• CHEG 2111;
• CHEM 1125Q (or 1148Q);
• ENGR 1166;
• ENVE 1000, ENVE 2251/CE 2251, 2310, 3200, 3220, 3230, 3270,
  4210, 4310, 4810 or 4820, 4910W, 4920W;
• MATH 2110Q and 2410Q;
• ENVE 4320 and one of the following: NRE 3105, 3205, 3155;
• NRE 4135 (or GSCI 3710/ENVE 3530);
The Management and Engineering for Manufacturing undergraduate program educational objectives are that our alumni/ae: practice their profession with solid engineering and business knowledge and skills and have a total enterprise vision of world class manufacturing and service organizations; compete successfully using lean manufacturing and quality management principles in the design, manufacture of products, and development of services; and apply high professional standards, with up to date knowledge and personal skills, integrating global factors in their approach to engineering and business decisions.

Bachelor of Science in Engineering in Materials Science and Engineering

Materials Science and Engineering majors are required to complete the following:

- CHEM 112Q or 114Q;
- ENGR 116E;
- MATH 2110Q and 2410Q;
- ENGR 2110 and 3110;
- Professional requirement courses (12 credits);
- Technical Elective courses (9 credits).

Elective sequences that satisfy the (12 credit) MSE concentrations in Electronic Materials, Metallurgy, Biomaterials, Nanomaterials, and Energy Materials as well as recommended Professional and Technical Electives are listed below.

Electronic Materials Concentration: PHYS 3401, 3150, 4210; MSE 4241, 5317

Metallurgy Concentration: Four courses from the following: MSE 3020, 3032, 3034, 3036, 4021, 4034, 4038, ME 3228

Biomaterials Concentration: At least one of the following: MSE 3700; BME 4701, 4710. The additional required credits can come from the previous list or from the following: BME 1107; MCB 2210; CHEM 2443; a BME special topics course taught as Regenerative Medicine and Engineering; MSE 4095 biomaterials research in faculty labs* (3 credits total, may be split across multiple terms); additional courses with biomaterials content taught by various departments*

(*Must be approved by biomaterials advisor)

Nanomaterials Concentration: At least one of the following: MSE 4240, 4241; ENGR 3195 when taught as Nanoscience and Society. The additional required credits can come from the previous list or from the following: ENGR 4243, 4244; PHYS 2300, 3401, 3402; CHEM 3563, 3564; MSE 4095 nanomaterials research in faculty labs* (3 credits total, may be split across multiple terms); additional courses with nanomaterials content taught by various departments*

(*Must be approved by nanomaterials advisor)

Energy Materials Concentration: MSE 4800 and 4801; two elective courses chosen from CHEG 3563; CHEM 3563; ME 3270; and ME 3285

Recommended Professional Elective courses: 12 credits from: any 3000 or 4000 level MSE elective course, BME 3700 and 4701; CHEG 3156; ME 3217 and 3228. Only one 3-credit independent study course may be used as a professional elective. Students with CGPA of 3.2 or greater may elect letter-grade graduate courses.

Technical Elective Requirement: Nine credits, selected from the basic sciences, mathematics, and in any engineering discipline other than Materials Science and Engineering are accepted as technical electives. At least 3 credits must be selected from the basic sciences or mathematics: Mathematics (MATH), Biological Sciences (BIOL), Chemistry (CHEM), Molecular and Cell Biology (MCB), Physics (PHYS), and Statistics (STAT).

Selection of courses is detailed in the Materials Science and Engineering Guide to Course Selection at www.mse.engr.uconn.edu.

The Materials Science and Engineering program educational objectives are that within three to five years after graduation, in their professional careers and/or graduate programs, our alumni/ae will have: progressed in responsible professional positions and/or will have attained or will be successfully moving toward attaining post-graduate degrees; earned recognition for applying and
continually expanding special, in-depth competencies in materials design, selection, characterization, and/or processing; earned recognition for applying and continually expanding professional skills of critical and cooperative thinking, communication, and leadership; and become engaged with and contributing to professional societies and collaborating with the MSE Program Faculty in providing opportunities for current and potential MSE majors.

**Bachelor of Science in Engineering in Mechanical Engineering**

Mechanical Engineering majors are required to complete the following:

- CE 2110, 2120, and 3110;
- ECE 2000 or 2001/W;
- ENGR 1166;
- MATH 2110Q and 2410Q;
- ME 2233, 2234, 3220, 3227, 3242, 3250, 3253, 3255, 3263, 3264, 4972, and 4973W;
- MSE 2001 or 2101;
- ME Requirement (9 credits);
- Professional Requirements (6 credits);
- Electives (5 credits).

All mechanical engineering students are required to have at least six credits of work in the mathematical sciences and sciences beyond those courses specifically required in the program. The course credits can be met at any course level. Those at the 2000-level and above can be used to meet the professional requirements of the program. Restrictions on courses are noted in the following:

All MATH 2000-level and above courses except MATH 2194W, 2720W, 2784, and 2794W; all STAT courses except STAT 1000Q; all BIOL, EEB, MCB, and PNB courses; all CHEM courses except CHEM 1101; all GSCI courses, all MARN courses may be used.

Concentration requirements: 9 credits (3 courses, 2000-level and above); no course grades of less than C; plan of study for concentration; must take courses from subset of identified courses.

**Aerospace Concentration**: Three courses from: ME 3239, 3251, 3275, 3280, 5311*, 6160* or 3295 Special Topics taught as any of these: Acoustics, Aerospace Control Systems, Computer Aided Engineering, or Propulsion.

**Energy and Power Concentration**: Three courses from: ME 3239, 3270, 3275, 3280, 3285, 5311*, 6160*, or Special Topics 3295 when taught as any of these: Fuel Cells, Micro-Nanoscale Energy Transport and Conversion, Propulsion, or Sustainable Energy.

*These courses are offered as combined Undergraduate/Graduate classes. Students may opt to take the graduate course or take it as ME 3295 Special Topics.

**Dynamic Systems and Control Concentration**: Three courses from: ME 3214, Special Topics 3295 when taught as any of these: Aerospace Control Systems, Acoustics, Advanced Vibrations, Intelligent Material Systems and Structures, Linear Automatic Control Systems, or Mechatronics, ME 5160, 5180, 5210, 5420, 6330, or 5895 Special Topics when taught as Mechatronics.

**Design and Manufacturing Concentration**: Three courses from: ME 3217, 3221, 3222, 3224, 3225, 3228, 5511, 5515, 5150, 5210, 5220 or Special Topics 3295 when taught as any of these: Advanced Manufacturing, Analytical and Applied Kinematics, Computer Aided Engineering, Geometric Modeling, Intelligent Material Systems and Structures, Principles of Machining and Machine Tools, or Principles of Optimum Design.

Details on the ME and Professional Requirements are specified in the *Guide for Mechanical Engineering Majors*.

The faculty of the Mechanical Engineering program at the University of Connecticut strives to continuously improve our undergraduate program in Mechanical Engineering. The program’s educational objectives are that our graduates: will be gainfully employed in Mechanical Engineering or related career paths including industrial, academic, governmental and non-governmental organizations and will continue their professional development by engaging in professional activities and/or training to enhance their careers and/or pursue post-graduate studies.