

Engineering

Faculty: All faculty in the David Crawford School of Engineering

Students in Norwich University's interdisciplinary BS in Engineering program will engage in an innovative approach to interdisciplinary engineering education that is guided by current challenges of broad human concern that address societal needs. Students will attain proficiency in skills necessary to contribute to solving complex and multi-disciplinary problems. The curriculum will include innovative problem-based seminar studio courses that employ modules to develop competencies in engineering fundamentals.

Mission:

Prepare students to excel in engineering and related fields. Make clear to students that above all else, the engineering profession is committed to bettering the world. Provide fundamental, laboratory-oriented, hands-on education in engineering and related fields. Foster creativity, critical thinking, and problem solving abilities and motivate students to consider the societal and environmental consequences of their work. Enable students to be leaders in their profession, community, nation, and the world.

Upon completion of the program, students are awarded the BS in Engineering, are prepared to sit for Fundamentals of Engineering Exam (F.E. exam), and have a foundational understanding of engineering and science fundamentals.

Goals:

The educational objectives of the interdisciplinary BS in Engineering program are designed to prepare graduates who, during their first few years of professional practice will:

- Be employed by industry or government in the fields, such as, design, research and development, experimentation and testing, manufacturing, and technical sales
- Assume an increasing level of responsibility and leadership within their respective organizations
- Communicate effectively and work collaboratively in multidisciplinary and multicultural work environments
- Recognize and understand global, environmental, social, and ethical contexts of their work

Outcomes:

Students in the BS in Engineering program will demonstrate an ability to:

- Apply knowledge of mathematics, science, and engineering
- Design and conduct experiments, as well as to analyze and interpret data
- Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- Function on multidisciplinary teams
- Identify, formulate, and solve engineering problems
- Demonstrate an understanding of professional and ethical responsibility
- Communicate effectively
- Demonstrate the understanding of the impact of engineering solutions in a global, economic, environmental, and societal context
- Recognize the need for, and an ability to engage in life-long learning
- Demonstrate knowledge of contemporary issues
- Use the techniques, skills, and modern engineering tools necessary for engineering practice.
- With the knowledge that engineering changes society, engineers must understand that they are leaders.

Careers for this Major:

The BS in Engineering program is designed to allow graduates the option of beginning a career in either the military or civilian life immediately upon graduation, or furthering their education in graduate school. Studies are designed to give both a broad engineering background and a focus in a specific topic area necessary to apply engineering principles and methods to solve multi-disciplinary problems in an ever increasing range of applications.

- Clean water
- Sustainability
- Renewable Energy
- Cyber Security
- Bio-mechanical / biomedical / assistive technologies

The BS in Engineering curriculum is designed to be accredited by the Engineering Accreditation Commission (EAC) of ABET. 415 N. Charles Street, Baltimore, MD, 21201, 1.410.347.7700.

Note: The application for accreditation of the BS in Engineering program is planned to be submitted to ABET as soon as the first students in the program complete their graduation requirements.

B.S. in Engineering - Curriculum Map 2017-2018 Catalog

Print PDF Curriculum Map (http://catalog.norwich.edu/residentialprogramscatalog/collegeofprofessionalschools/thedavidcrawfordschoolofengineering/eng/engr_1499876873805.pdf)

Freshman		
Fall	Cr. Spring	Cr.
CH 103 General Chemistry I	4 EN 102 Composition and Literature II	3
EN 101 Composition and Literature I	3 EG 110 Introduction to Engineering II	3
MA 107 Precalculus Mathematics	4 MA 121 Calculus I (General Education Math)	4

EG 109 Introduction to Engineering I	3	General Education History/Literature/Arts & Humanities/ Social Science (http://catalog.norwich.edu/archives/2017-18/residentialprograms/catalog/generaleducationgoals)	3
		General Education Lab Science (http://catalog.norwich.edu/archives/2017-18/residentialprograms/catalog/generaleducationgoals)	4
Semester Total Credits	14	Semester Total Credits	17
Sophomore			
Fall	Cr.	Spring	Cr.
PS 211 University Physics I	4	EE 200 Engineering Programming	3
MA 122 Calculus II (General Education Math)	4	EG 202 Engineering Mechanics (Statics,Dynamics)	3
EG 201 Engineering Mechanics (Statics, Dynamics)	3	EG 206 Thermodynamics I	3
EE 204 Electrical Circuits I	3	Math Elective ²	3
Engineering Elective (CE, EE, EM, ME) ^{1, 4}	3	Math or Science Elective ^{2, 3}	4
Semester Total Credits	17	Semester Total Credits	16
Junior			
Fall	Cr.	Spring	Cr.
EG 301 Mechanics of Materials	3	EN 204 Professional and Technical Writing	3
EG 303 Fluid Mechanics	3	Engineering Elective (CE, EE, EM, ME) ^{1, 4}	3
EG 350 Engineering Economics and Decision Analysis	3	Engineering Elective (CE, EE, EM, ME) ^{1, 4}	3
EM 461 Project Management	3	Engineering Elective (CE, EE, EM, ME), Math Elective or Science Elective ^{1, 2, 3, 4}	3
Concentration/Focus Area Elective	3	General Education History/Literature/Arts & Humanities/ Social Science (http://catalog.norwich.edu/archives/2017-18/residentialprograms/catalog/generaleducationgoals)	3
Math Elective ²	3	Concentration/Focus Area Elective	3
Semester Total Credits	18	Semester Total Credits	18
Senior			
Fall	Cr.	Spring	Cr.
Concentration/Focus Area Elective	3	Concentration/Focus Area Elective	3
Concentration/Focus Area Elective	3	Concentration/Focus Area Elective	3
General Education History/Literature/Arts & Humanities/ Social Science (http://catalog.norwich.edu/archives/2017-18/residentialprograms/catalog/generaleducationgoals)	3	General Education History/Literature/Arts & Humanities/ Social Science (http://catalog.norwich.edu/archives/2017-18/residentialprograms/catalog/generaleducationgoals)	3
EG 450 Professional Issues	3	Engineering Elective (CE, EE, EM, ME) ^{1, 4}	3
Engineering Elective (CE, EE, EM, ME) ^{1, 4}	3		
Semester Total Credits	15	Semester Total Credits	12
Total Credits For This Major: 127			

¹ CE 211, CE 214, CE 328, CE 332, CE 348, CE 421, CE 422, CE 444, CE 460, EE 204, EE 215, EE 303, EE 321, EE 325, EE 350, EE 356, EE 357, EE 359, EE 366, EE 373, EE 411, EE 459, EE 463, EE 478, EE 486, EG 203, EG 447, EM 220, EM 401, ME 211, ME 307, ME 311, ME 356, ME 363, ME 370, ME 435, ME 465, ME 490

² Math courses 200 level or higher that may NOT be counted as both a Math Elective and a Concentration/Focus Area Elective.

³ BI 101, BI 102, BI 220, BI 275, CH 104, CH 204, CH 205, CH 327, ES 270, GL 110, GL 156, GL 253, GL 255, GL 257, GL 262, GL 265, ID 110

⁴ Science or Engineering courses may NOT be counted as both an Engineering Elective and a Concentration/Focus Area Elective.

Courses

EG 043 Conference 0 Cr.

A scheduled weekly conference hour with the faculty and senior engineering students for discussions of topics such as placement, professional registration, professional ethics, and professional growth after graduation. The course includes a substantial writing component on ethics. A grade of satisfactory (S) is required for graduation. Classroom 1 hour. Prerequisite: senior standing.

EG 044 Conference 0 Cr.

A scheduled weekly conference hour with the faculty and senior engineering students for preparation of the Fundamentals of Engineering (FE) exam. The student must take the FE exam to receive a satisfactory grade in this course. EG 044 is not required if the student has already passed the FE exam. Classroom 1 hour. Prerequisite: senior standing.

EG 109 Introduction to Engineering I 3 Cr.

An introduction to engineering as a profession, this course presents the concepts and methods of engineering design and their application to solving problems from various engineering disciplines. The use of fundamental engineering skills and the associated tools to aid in defining problems and developing solutions is introduced (e.g. graphical communication/sketching, algorithmic problem solving, data analysis and visualization). The non-technical aspects of engineering required for career success-teamwork, written and oral communication, and problem-solving are practiced. Classroom 2 hours; laboratory 3 hours.

EG 110 Introduction to Engineering II 3 Cr.

A follow-on to EG 109, this course introduces discipline-specific tools as a context for designing and conducting experiments as well as solving engineering problems related to a specific discipline or a thematic problem area of societal importance. Design projects will include the technical and non-technical aspects of engineering design. This course presumes an understanding of engineering design and problem solving processes. Prerequisite: EG 109 or permission of the David Crawford School of Engineering Director. Classroom 2 hours; laboratory 3 hours.

EG 111 Fundamentals of Engineering I 3 Cr.

An introduction to engineering and the concepts of engineering design. Includes an introduction to graphical communication skills used in engineering through the use of sketching and computer-aided design (CAD) on personal computers. The concepts of orthographic and isometric drawings are stressed and extended to include sections and dimensions. The use of spreadsheets in engineering is also included. This course is open only to students in an Engineering major or those with permission of the Engineering Division Head. Classroom 2 hours, laboratory 3 hours.

EG 112 Fundamentals of Engineering II 4 Cr.

A continuation of the concepts of engineering design. Includes an introduction to engineering computing through the design of algorithms using structured techniques that employ a high-level engineering computer language. This course is open only to students in an Engineering major or those with permission of the Engineering Division Head. Classroom 3 hours, laboratory 2 hours.

EG 201 Engineering Mechanics (Statics, Dynamics) 3 Cr.

A course in elementary engineering mechanics. Vector notation. Force systems, moments, equilibrium, the free body diagram. Friction, simple frames, trusses, beams, centroids, and second moments. Kinematics: rectilinear and curvilinear motion; translation and rotation; relative motion. Kinetics: force, mass, and acceleration; impulse and momentum; work and energy. Elementary vector calculus. Classroom 3 hours. Corequisites: MA 122 and PS 211.

EG 202 Engineering Mechanics (Statics, Dynamics) 3 Cr.

A course in elementary engineering mechanics. Vector notation. Force systems, moments, equilibrium, the free body diagram. Friction, simple frames, trusses, beams, centroids, and second moments. Kinematics: rectilinear and curvilinear motion; translation and rotation; relative motion. Kinetics: force, mass, and acceleration; impulse and momentum; work and energy. Elementary vector calculus. Classroom 3 hours. Prerequisites: EG 201 and MA 122.

EG 203 Materials Science 3 Cr.

An introduction to the science of materials based on the physics and chemistry of their internal structures. The effects of structure on the properties and behavior of metallic, polymeric, ceramic, semiconductor, and composite materials. Classroom 3 hours. Prerequisite: CH 103.

EG 206 Thermodynamics I 3 Cr.

A study of the fundamental concepts and laws of thermodynamics and of the properties of pure substances, with applications to engineering processes and operations. Classroom 3 hours. Corequisite: MA 122.

EG 301 Mechanics of Materials 3 Cr.

A course on the concepts of stress and strain; effect of loads; analysis of plane stress and strain; deformations of beams, shafts, and axial members; buckling and combined stresses. Classroom 3 hours. Prerequisite: EG 201.

EG 303 Fluid Mechanics 3 Cr.

A study of fluid properties and their significance. Fundamental mechanics of compressible and incompressible fluid motion with application to engineering problems. Topics include resistance of fluids in laminar and turbulent flow; open-channel flow; fluid statics; dimensional analysis and similitude. Classroom 3 hours. Prerequisite: MA 122; Prerequisite or concurrent enrollment: EG 206 or permission of the instructor.

EG 350 Engineering Economics and Decision Analysis 3 Cr.

Engineering Economics and Decision Analysis (3cr.) This course focuses on the application of cost benefit analysis to engineering and other technical projects. Time value of money and accounting perspectives are used to evaluate projects. The concept of risk and its importance to financial decision making is also introduced.

EG 400 Design Thinking and Innovation 3 Cr.

This course explores the experience and practice of innovation by examining creativity as the ability to turn ideas into action. It examines the development, management, evolution, and broad context of emerging technologies and associated ventures. Students will complete innovation challenges from start to finish and leave with an understanding of the key tenets of design thinking and a sense for ways they can incorporate them into their work. This 'hands-on', project-based course involves students in the design and development of 'visual brand languages' for emerging technologies, foundation exercises in creativity, and case studies based on pivotal products from the past 50 years. Prerequisite: Not open to freshmen students.

EG 447 Special Projects (Technical Elective) 1-6 Cr.

A report on an approved engineering design project or topic area to meet the specific objectives of a student in a particular area of study. Limited to students who have organized plans and/or projects that can be related to their engineering interests. Hours and credits to be arranged. Prerequisite: permission of the curriculum department chair and advisor.

EG 450 Professional Issues 3 Cr.

A course to prepare the engineering student for the non-technical aspects of the engineering profession. Topics covered include engineering registration, ethical responsibilities, malpractice and legal responsibilities, and the business aspects of the engineering profession. Classroom 2 hours. Recitation 2 hours. Prerequisites: junior or senior status.