Mechanical Engineering, BSME

Mechanical engineering involves the design, development, and manufacture of machinery and devices to transmit power or to convert energy from thermal to mechanical form in order to power the modern world and its machines. Its current practice has been heavily influenced by recent advances in computer hardware and software.

Mechanical engineers use computers to formulate preliminary and final designs of systems or devices, to perform calculations that predict the behavior of the design, and to collect and analyze performance data from system testing or operation.

Traditionally, mechanical engineers have designed and tested devices, such as heating and air-conditioning systems, machine tools, internal-combustion engines, and steam power plants. Today they also play primary roles in the development of new technologies in a variety of fields—energy conversion, solar energy utilization, environmental control, robotics, prosthetics, transportation, manufacturing, and new-materials development.

The curriculum in mechanical engineering focuses on four areas: applied mechanics, thermofluids engineering, materials science, and controls. Applied mechanics is the study of the motion and deformation of structural elements acted on by forces in devices that range from rotating industrial dynamos to dentists' drills. Thermofluids engineering deals with the motion of fluids and the transfer of energy, as in the cooling of electronic components or the design of gas turbine engines. Materials science is concerned with the relationship between the structure and properties of materials and with the control of structure, through processing, to achieve desired properties. Practical applications are in the development of composite materials, metallurgical process industries, and advanced functional materials. Controls are critical to any engineered system in which sensors and actuators of several types communicate and function in order to impart desired behavior from these systems.

Courses in each area form the foundation for advanced analytical and creative design courses that culminate in a two-semester capstone design project. Faculty encourage students throughout the curriculum to use computer-aided design tools and high-performance computer workstations.

More than 90 percent of department undergraduate students take advantage of the cooperative education program. Cooperative education assignments increase in responsibility and technical challenge as students progress through the program. Initial positions may involve computer-intensive CAD/CAM assignments or programming tasks, while more advanced jobs will place students in design, quality-control systems, robotics, biomedical devices, and performance testing of equipment.

Visit the department website (https://mie.northeastern.edu/academics/undergraduate-studies/mie-accreditation/) for program educational objectives.

Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses listed below unless otherwise indicated. Also complete any corequisite labs, recitations, clinicals, or tools courses where specified and complete any additional courses needed beyond specific college and major requirements to satisfy graduation credit requirements.

Universitywide Requirements

All undergraduate students are required to complete the Universitywide Requirements (https://catalog.northeastern.edu/undergraduate/university-academics/university-wide-requirements/).

NUpath Requirements

All undergraduate students are required to complete the NUpath Requirements (https://catalog.northeastern.edu/undergraduate/university-academics/nupath/).

NUpath requirements Interpreting Culture (IC), Understanding Societies and Institutions (SI), Engaging Differences and Diversity (DD), and Integrating Knowledge and Skills Through Experience (EX) are not explicitly satisfied by required engineering coursework. Successful completion of a cooperative education experience fulfills the EX requirement. Students are responsible for satisfying unfulfilled NUpath requirements with general elective coursework.

Engineering Requirements

Code	Title	Hours
Required Engineering		
EECE 2210 and EECE 2211	Electrical Engineering and Lab for EECE 2210	5

ME 2340 and ME 2341	Introduction to Material Science and Lab for ME 2340	5
ME 2350	Statics	4
ME 2355 and ME 2356	Mechanics of Materials and Lab for ME 2355	5
ME 2380 and ME 2381	Thermodynamics and Recitation for ME 2380	4
ME 3455 and ME 3456	Dynamics and Lab for ME 3455	5
ME 3475	Fluid Mechanics	4
or ME 3480	International Applications of Fluid Mechanics	
ME 4505 and ME 4506	Measurement and Analysis with Thermal Science Application and Lab for ME 4505	5
ME 4508	Mechanical Engineering Computation and Design	4
or ME 4565	Introduction to Computational Fluid Dynamics	
ME 4550	Mechanical Engineering Design	4
ME 4555	System Analysis and Control	4
ME 4570	Thermal Systems Analysis and Design	4
Mechanical Engineering Capstone		
MEIE 4701	Capstone Design 1	1
MEIE 4702	Capstone Design 2	5
Mechanical and Industrial Engineering Technical Elective		
Complete one technical elective in one of the following subject areas:		4
EMGT, ENGR, ENSY, IE, ME, or MEIE		
Supplemental Credit		
2 semester hours from the following course counts toward the engineering requirement:		2
GE 1501	Cornerstone of Engineering 1 [1]	
3 semester hours from the following course counts toward the engineering requirement:		3
GE 1502	Cornerstone of Engineering 2 [1]	

Supporting Courses: Mathematics/Science

Complete all mathematics/science courses with a minimum of 30 semester hours.

Code	Title	Hours
Required Mathematics/Science		
CHEM 1151 and CHEM 1153	General Chemistry for Engineers and Recitation for CHEM 1151	4
MATH 1341	Calculus 1 for Science and Engineering	4
MATH 1342	Calculus 2 for Science and Engineering	4
MATH 2321	Calculus 3 for Science and Engineering	4
MATH 2341	Differential Equations and Linear Algebra for Engineering	4
PHYS 1151 and PHYS 1152 and PHYS 1153	Physics for Engineering 1 and Lab for PHYS 1151 and Interactive Learning Seminar for PHYS 1151	5
PHYS 1155 and PHYS 1156 and PHYS 1157	Physics for Engineering 2 and Lab for PHYS 1155 and Interactive Learning Seminar for PHYS 1155	5
Science/Math Elective		
Complete one of the following:		4-5
BIOL 1111 and BIOL 1112	General Biology 1 and Lab for BIOL 1111	
BIOL 2217 and BIOL 2218	Integrated Anatomy and Physiology 1 and Lab for BIOL 2217	
CHEM 2311 and CHEM 2312 and CHEM 2319	Organic Chemistry 1 and Lab for CHEM 2311 and Recitation for CHEM 2311	

MATH 3081	Probability and Statistics
PHYS 2303	Modern Physics
PHYS 3601	Classical Dynamics
PHYS 3602	Electricity and Magnetism 1
Supplemental Credit	
1 semester hour from the following course counts toward the mathematics/science requirement:	1
GE 1501	Cornerstone of Engineering 1 [1]

Professional Development

Code	Title	Hours
Required Professional Development		
GE 1000	First-Year Seminar	1
ENCP 2000	Introduction to Engineering Co-op Education	1
ENCP 3000	Professional Issues in Engineering	1
Additional Required Courses		
1 semester hour from the following course counts toward the professional development requirement:		1
GE 1501	Cornerstone of Engineering 1 [1]	
1 semester hour from the following course counts toward the professional development requirement:		1
GE 1502	Cornerstone of Engineering 2 [1]	

Writing Requirements

Code	Title	Hours
A grade of C or higher is required in each course:		
ENGW 1111	First-Year Writing	4
ENGW 3302	Advanced Writing in the Technical Professions	4
or ENGW 3315	Interdisciplinary Advanced Writing in the Disciplines	

Required General Electives

Code	Title	Hours
Complete 24 SH of academic, nonremedial, nonrepetitive courses.		24

Program Requirement

140 total semester hours required

Major GPA Requirement

2.000 minimum GPA required in ME/MEIE/EECE/ENCP coursework

[1] Students can substitute Engineering Design (GE 1110) and Engineering Problem Solving and Computation (GE 1111) for Cornerstone of Engineering 1 (GE 1501) and Cornerstone of Engineering 2 (GE 1502) .

Plan of Study

Sample Plans of Study

FOUR YEARS, TWO CO-OPS IN SUMMER 2/FALL

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 and CHEM 1153 (ND)	4	GE 1502 (ER)	4	MATH 2321 (FQ)	4	General elective	4
ENGW 1111 (WF)	4	MATH 1342 (FQ)	4	ME 2350	4	General elective	4
GE 1000	1	PHYS 1151 and PHYS 1152 and PHYS 1153 (ND)	5				
GE 1501	4	General elective	4				
MATH 1341 (FQ)	4						
	17		**17**		**8**		**8**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ENGW 3302 or 3315 (WD)	4	ENCP 2000	1	ME 3475 or 3480	4	Co-op	0
MATH 2341	4	ME 2340 and ME 2341 (WI)	5	General elective	4		
ME 2355 and ME 2356	5	ME 2380 and ME 2381	4				
PHYS 1155 and PHYS 1156 and PHYS 1157 (ND)	5	ME 3455 and ME 3456	5				
		General elective	4				
	18		**19**		**8**		**0**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op	0	ENCP 3000	1	ME 4550	4	Co-op	0
		ME 4505 and ME 4506 (AD)	5	MEIE 4701 (EI, WI, CE)	1		
		ME 4555	4	General elective	4		
		ME 4570	4				
		General Elective	4				
	0		**18**		**9**		**0**

Year 4

Fall	Hours	Spring	Hours
Co-op	0	EECE 2210 and EECE 2211	5
		ME 4508	4
		MEIE 4702 (EI, WI, CE)	5
		MIE technical elective	4
	0		**18**

Total Hours: 140

FOUR YEARS, TWO CO-OPS IN SPRING/SUMMER 1

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 and CHEM 1153 (ND)	4	GE 1502 (ER)	4	ME 2350	4	General elective	4
ENGW 1111 (WF)	4	MATH 1342 (FQ)	4	MATH 2321 (FQ)	4	General elective	4
GE 1000	1	PHYS 1151 and PHYS 1152 and PHYS 1153 (ND)	5				
GE 1501	4	General elective	4				
MATH 1341 (FQ)	4						
	17		**17**		**8**		**8**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ENCP 2000	1	Co-op	0	Co-op	0	ME 3475 or 3480	4
MATH 2341	4					General elective	4
ME 2355 and ME 2356	5						
ME 2380 and ME 2381	4						
PHYS 1155 and PHYS 1156 and PHYS 1157 (ND)	5						
	19		**0**		**0**		**8**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ENGW 3302 or 3315 (WF)	4	Co-op	0	Co-op	0	ME 4550	4
ME 3455 and ME 3456	5					MEIE 4701 (EI, WI, CE)	1
ME 4505 and ME 4506 (AD)	5					General elective	4
ME 4570	4						
	18		**0**		**0**		**9**

Year 4

Fall	Hours	Spring	Hours
EECE 2210 and EECE 2211	5	ME 2340 (WI)	4
ENCP 3000	1	ME 2341	1
ME 4555	4	ME 4508	4
MEIE 4702 (EI, WI, CE)	5	MIE technical elective	4
General elective	4	Science/math elective	4
	19		**17**

Total Hours: 140

FIVE YEARS, THREE CO-OPS IN SUMMER 2/FALL

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 and CHEM 1153 (ND)	4	GE 1502 (ER)	4	Vacation		Vacation	
ENGW 1111 (WF)	4	MATH 1342 (FQ)	4				
GE 1000	1	PHYS 1151 and PHYS 1152 and PHYS 1153 (ND)	5				
GE 1501	4	General elective	4				
MATH 1341 (FQ)	4						
	17		**17**		**0**		**0**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
MATH 2321 (FQ)	4	ENCP 2000	1	Vacation		Co-op	0
ME 2350	4	MATH 2341	4				
PHYS 1155 and PHYS 1156 and PHYS 1157 (ND)	5	ME 2355 and ME 2356	5				
General elective	4	ME 2380 and ME 2381	4				
		General elective	4				
	17		**18**		**0**		**0**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op	0	ENGW 3302 or 3315 (WD)	4	ME 3475 or 3480	4	Co-op	0
		ME 2340 and ME 2341 (WI)	5	General elective	4		
		ME 3455 and ME 3456	5				
		ME 4508	4				
	0		**18**		**8**		**0**

Year 4

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Co-op	0	ENCP 3000	1	ME 4550	4	Co-op	0

		ME 4505 and ME 4506 (AD)	5	MEIE 4701 (EI, WI, CE)	1		
		ME 4555	4	General elective	4		
		ME 4570	4				
		Math/science elective	4				
	0		**18**		**9**		**0**

Year 5

Fall	Hours	Spring	Hours				
Co-op	0	EECE 2210 and EECE 2211	5				
		MEIE 4702 (EI, WI, CE)	5				
		General elective	4				
		MIE technical elective	4				
	0		**18**				

Total Hours: 140

FIVE YEARS, THREE CO-OPS IN SPRING/SUMMER 1

Year 1

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 and CHEM 1153 (ND)	4	GE 1502 (ER)	4	Vacation		Vacation	
ENGW 1111 (WF)	4	MATH 1342 (FQ)	4				
GE 1000	1	PHYS 1151 and PHYS 1152 and PHYS 1153 (ND)	5				
GE 1501	4	General elective	4				
MATH 1341 (FQ)	4						
	17		**17**		**0**		**0**

Year 2

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ENCP 2000	1	Co-op	0	Co-op	0	Vacation	
MATH 2321 (FQ)	4						
ME 2350	4						
PHYS 1155 and PHYS 1156 and PHYS 1157 (ND)	5						
General elective	4						
	18		**0**		**0**		**0**

Year 3

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
MATH 2341	4	Co-op	0	Co-op	0	ENGW 3302 or 3315 (WD)	4
ME 2340 and ME 2341 (WI)	5					ME 3475 or 3480	4
ME 2355 and ME 2356	5						
ME 2380 and ME 2381	4						
	18		**0**		**0**		**8**

Year 4

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ME 3455 and ME 3456	5	Co-op	0	Co-op	0	ME 4550	4
ME 4505 and ME 4506 (AD)	5					MEIE 4701 (EI, WI, CE)	1
ME 4508	4					General elective	4

ME 4570	4				
	18	**0**	**0**	**9**	

Year 5

Fall	Hours	Spring	Hours
EECE 2210 and EECE 2211	5	General elective	4
ENCP 3000	1	General elective	4
ME 4555	4	Math/science elective	4
MEIE 4702 (EI, WI, CE)	5	MIE technical elective	4
General elective	4		
	19		**16**

Total Hours: 140