

# Mechanical Engineering and Design, BSME

The combined major in mechanical engineering and design integrates the development of new technologies in a variety of fields—energy conversion, solar energy utilization, environmental control, prosthetics, transportation, manufacturing, and new-materials development—with the practice of understanding humans, their surrounding contexts and systems, and designing alternative futures. Students are well prepared to study 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.

The program offers several options for the study of design: experience design, a holistic and integrative approach that focuses on the quality of the human experience in concrete situations; graphic design, the integration of text and image to communicate critical concepts; information design, the visualization and physicalization of data to enhance human understanding of complex knowledge; or interaction design, the creation of navigable interfaces and systems that allow audiences to take an active role to achieve meaningful goals.

## 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 may fulfill the EX requirement. Students are responsible for satisfying unfulfilled NUpath requirements with general elective coursework.

## Engineering Requirements

Code	Title	Hours
<b>Required Engineering</b>		
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 or ME 3480	Fluid Mechanics International Applications of Fluid Mechanics	4
ME 4505 and ME 4506	Measurement and Analysis with Thermal Science Application and Lab for ME 4505	5
<b>Senior Capstone Design Project</b>		
MEIE 4701	Capstone Design 1	1
MEIE 4702	Capstone Design 2	5
<b>Upper Mechanical Electives</b>		

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Complete two of the following (at least one must be ME 4550 or ME 4570): 8

ME 4508 or ME 4565	Mechanical Engineering Computation and Design Introduction to Computational Fluid Dynamics	
ME 4550	Mechanical Engineering Design	
ME 4555	System Analysis and Control	
ME 4570	Thermal Systems Analysis and Design	

**Supplemental Credit**

2 semester hours from the following course count toward the engineering requirement: 2

GE 1501	Cornerstone of Engineering 1 <sup>1</sup>	
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3 semester hours from the following course count toward the engineering requirement: 3

GE 1502	Cornerstone of Engineering 2 <sup>1</sup>	
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**Design Requirements**

**Code** **Title** **Hours**

**Art + Design Fundamentals Required**

ARTF 1220	Elements of Visual Composition (with optional ARTF 1121)	2
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**Art + Design Fundamentals Electives**

Complete three of the following: 6

ARTF 1200	Representational Drawing	
ARTF 1210	Abstract Drawing	
ARTF 1230 and ARTF 1231	Making with Form and Materials and Making with Form and Materials Tools	
ARTF 1240 and ARTF 1241	Making with Video, Sound, and Animation and Making with Video, Sound, and Animation Tools	
ARTF 1250 and ARTF 1251	Designing Interactive Experiences and Designing Interactive Experiences Tools	

**Design Requirements**

ARTG 1001 and ARTG 1002	Design Perspectives: An Introduction to Design in the World and Seminar for Design Perspectives	4
ARTG 1270 and ARTG 1271	Design: Process + Practices and Studio for Design: Process + Practices	4
ARTG 1290 and ARTG 1291	Typographic Systems and Studio for Typographic Systems	4
ARTG 2262 and ARTG 2263	Prototyping with Code and Lab for ARTG 2262 (or ARTG Design elective)	4

**Art and Design History Elective**

Complete any one ARTH course. ARTH 1001 Visual Intelligence and ARTH 1002 Seminar in Visual Intelligence are recommended to fulfill this requirement. 4

**Art and Design Elective**

Complete any one ARTD, ARTE, ARTF (4 SH), ARTG, ARTH, ARTS, or GAME course as long as prerequisites have been met. 4

**Design Options**

**Code** **Title** **Hours**

Complete one of the following options: 8

**Experience Design Option**

ARTG 3462	Experience Design Principles	
ARTG 3464	Topics In Experience Design Inquiry	

**Graphic Design Option**

ARTG 2252	Graphic Design Principles	
ARTG 3452	Topics In Graphic Design Inquiry	

**Information Design Option**

ARTG 2242	Information Design Principles	
ARTG 3444	Topics in Information Design Inquiry	

**Interaction Design Option**

ARTG 2400 and ARTG 2401	Interaction Design Principles and Interaction Design Principles Tools
ARTG 3400	Topics In Interaction Design Inquiry

### Supporting Courses: Mathematics/Science

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

Code	Title	Hours
<b>Required Mathematics/Science</b>		
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
<b>Supplemental Credit</b>		
1 semester hour from the following course counts toward the mathematics/science requirement:		1
GE 1501	Cornerstone of Engineering 1 <sup>1</sup>	

### Professional Development

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

### Writing Requirements

Code	Title	Hours
A grade of C or higher is required in each course:		
ENGW 1111	First-Year Writing	4
ENGW 3302 or ENGW 3314 or ENGW 3315	Advanced Writing in the Technical Professions Advanced Writing in the Arts, Media, and Design Interdisciplinary Advanced Writing in the Disciplines	4

### Required General Electives

Code	Title	Hours
Complete 4 semester hours of academic, nonremedial, nonrepetitive courses. Selecting a course to fulfill NUpath DD is recommended.		4

### Integrative Courses

Code	Title	Hours
This course is already required above and also fulfills the integrative requirement:		
MEIE 4702	Capstone Design 2	

**Major GPA Requirement**

2.000 minimum GPA required in IE, ME and MEIE courses

**Program Requirement**

139 total semester hours required

<sup>1</sup> 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 Plan of Study: Four Years, One Co-op in Summer 2/Fall**

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
CHEM 1151 and CHEM 1153 (ND)		4 ARTG 1001 and ARTG 1002		4 Vacation		Vacation	
ENGW 1111 (WF)		4 GE 1502 (ER)		4			
GE 1000		1 MATH 1342 (FQ)		4			
GE 1501		4 PHYS 1151 and PHYS 1152 and PHYS 1153 (ND)		5			
MATH 1341 (FQ)		4					
		<b>17</b>		<b>17</b>		<b>0</b>	<b>0</b>
Year 2							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ARTF 1220 (with optional ARTF 1221)		2 ARTG 1270 and ARTG 1271		4 ME 3475 or 3480		4 Vacation	
ARTF elective		2 ENCP 2000		1 ARTF elective		2	
MATH 2321 (FQ)		4 MATH 2341		4 ARTF elective		2	
ME 2350		4 ME 2355 and ME 2356		5			
PHYS 1155 and PHYS 1156 and PHYS 1157 (ND)		5 ME 2380 and ME 2381		4			
		<b>17</b>		<b>18</b>		<b>8</b>	<b>0</b>
Year 3							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ARTG 1290 and ARTG 1291		4 ME 3455 and ME 3456		5 MEIE 4701 (EI, WI, CE)		1 Co-op	0
ENGW 3302, 3314, or 3315 (WD)		4 ME 4505 and ME 4506 (AD)		5 A+D elective		4	
ME 2340 and ME 2341 (WI)		5 Design option course 2		4 Upper mechanical elective		4	
Design option course 1		4 Upper mechanical elective		4			
		<b>17</b>		<b>18</b>		<b>9</b>	<b>0</b>
Year 4							
Fall	Hours	Spring	Hours				
Co-op		0 ARTG 2262 and ARTG 2263		4			
		ENCP 3000		1			
		MEIE 4702 (EI, WI, CE)		5			
		ARTH elective		4			
		General elective (NUPath DD)		4			
		<b>0</b>		<b>18</b>			

**Total Hours: 139**

**Sample Plan of Study: Four Years, One Co-op in Spring/Summer 1**

Year 1								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	
CHEM 1151 and CHEM 1153 (ND)		4 ARTG 1001 and ARTG 1002		4 Vacation		Vacation		
ENGW 1111 (WF)		4 GE 1502 (ER)		4				
GE 1000		1 MATH 1342 (FQ)		4				
GE 1501		4 PHYS 1151 and PHYS 1156 and PHYS 1157 (ND)		5				
MATH 1341 (FQ)		4						
		<b>17</b>		<b>17</b>		<b>0</b>	<b>0</b>	
Year 2								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	
ARTG 1270 and ARTG 1271		4 MATH 2341		4 Vacation		ARTF 1220 (with optional ARTF 1221)	2	
ENCP 2000		1 ME 2340 and ME 2341 (WI)		5		ARTF elective	2	
MATH 2321 (FQ)		4 ME 2355 and ME 2356		5		ME 3475 or 3480	4	
ME 2350		4 ME 2380 and ME 2381		4				
PHYS 1155 and PHYS 1156 and PHYS 1157 (ND)		5						
		<b>18</b>		<b>18</b>		<b>0</b>	<b>8</b>	
Year 3								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	
ARTG 1290 and ARTG 1291		4 Co-op		0 Co-op		0 ENGW 3302, 3314, or 3315 (WD)	4	
ME 3455 and ME 3456		5				MEIE 4701 (EI, WI, CE)	1	
ME 4505 and ME 4506 (AD)		5				Upper mechanical elective	4	
Design option course 1		4						
		<b>18</b>		<b>0</b>		<b>0</b>	<b>9</b>	
Year 4								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	
ENCP 3000		1 ARTG 2262 and ARTG 2263		4				
MEIE 4702 (EI, WI, CE)		5 A+D elective		4				
ARTH elective		4 ARTF elective		2				
Design option course 2		4 ARTF elective		2				
General elective (NUPath DD)		4 Upper mechanical elective		4				
		<b>18</b>		<b>16</b>				

**Total Hours: 139****Sample Plan of Study: 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 ARTG 1001 and ARTG 1002		4 Vacation		Vacation		
ENGW 1111 (WF)		4 GE 1502 (ER)		4				
GE 1501		4 MATH 1342 (FQ)		4				

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GE 1000	1	PHYS 1151 and PHYS 1152 and PHYS 1153 (ND)	5					
MATH 1341 (FQ)	4							
	<b>17</b>		<b>17</b>		<b>0</b>		<b>0</b>	
<b>Year 2</b>								
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	<b>Summer 1</b>	<b>Hours</b>	<b>Summer 2</b>	<b>Hours</b>	<b>Hours</b>
ARTG 1270 and ARTG 1271	4	ARTF 1220 (with optional ARTF 1221)	2	Vacation		Co-op		0
MATH 2321 (FQ)	4	ARTF elective	2					
ME 2350	4	ENCP 2000	1					
PHYS 1155 and PHYS 1156 and PHYS 1157 (ND)	5	MATH 2341	4					
		ME 2340 and ME 2341 (WI)	5					
		ME 2380 and ME 2381	4					
	<b>17</b>		<b>18</b>		<b>0</b>		<b>0</b>	
<b>Year 3</b>								
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	<b>Summer 1</b>	<b>Hours</b>	<b>Summer 2</b>	<b>Hours</b>	<b>Hours</b>
Co-op	0	ENGW 3302, 3314, or 3315 (WD)	4	ARTG 1290 and ARTG 1291	4	Co-op		0
		ME 2355 and ME 2356	5	ME 3475 or 3480	4			
		ARTF elective	2					
		ARTF elective	2					
		Design option course 1	4					
	<b>0</b>		<b>17</b>		<b>8</b>		<b>0</b>	
<b>Year 4</b>								
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	<b>Summer 1</b>	<b>Hours</b>	<b>Summer 2</b>	<b>Hours</b>	<b>Hours</b>
Co-op	0	ENCP 3000	1	MEIE 4701 (EI, WI, CE)	1	Co-op		0
		ME 3455 and ME 3456	5	A+D elective	4			
		ME 4505 and ME 4506 (AD)	5	Upper mechanical elective	4			
		ARTH elective	4					
		Design option course 2	4					
	<b>0</b>		<b>19</b>		<b>9</b>		<b>0</b>	
<b>Year 5</b>								
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>					
Co-op	0	ARTG 2262 and ARTG 2263	4					
		MEIE 4702 (EI, WI, CE)	5					
		Upper mechanical elective	4					
		General elective (NUPath DD)	4					
	<b>0</b>		<b>17</b>					

Total Hours: 139

**Sample Plan of Study: Five Years, Three Co-ops in Spring/Summer 1**

<b>Year 1</b>								
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	<b>Summer 1</b>	<b>Hours</b>	<b>Summer 2</b>	<b>Hours</b>	<b>Hours</b>
CHEM 1151 (ND)	4	ARTG 1001 and ARTG 1002	4	Vacation		Vacation		

ENGW 1111 (WF)	4	GE 1502 (ER)	4					
GE 1000	1	MATH 1342 (FQ)	4					
GE 1501	4	PHYS 1151 and PHYS 1152 and PHYS 1153 (ND)	5					
MATH 1341 (FQ)	4							
	<b>17</b>		<b>17</b>			<b>0</b>		<b>0</b>
<b>Year 2</b>								
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	<b>Summer 1</b>	<b>Hours</b>	<b>Summer 2</b>	<b>Hours</b>	<b>Hours</b>
ARTG 1270 and ARTG 1271		4 Co-op		0 Co-op		0 Vacation		
ENCP 2000	1							
MATH 2321 (FQ)	4							
ME 2350	4							
PHYS 1155 and PHYS 1156 and PHYS 1157 (ND)	5							
	<b>18</b>		<b>0</b>			<b>0</b>		<b>0</b>
<b>Year 3</b>								
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	<b>Summer 1</b>	<b>Hours</b>	<b>Summer 2</b>	<b>Hours</b>	<b>Hours</b>
MATH 2341		4 Co-op		0 Co-op		0 ARTF 1220 (with optional ARTF 1221)		2
ME 2355 and ME 2356	5					ARTF elective		2
ME 2380 and ME 2381	4					ME 3475 or 3480		4
ARTF elective	2							
ARTF elective	2							
	<b>17</b>		<b>0</b>			<b>0</b>		<b>8</b>
<b>Year 4</b>								
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	<b>Summer 1</b>	<b>Hours</b>	<b>Summer 2</b>	<b>Hours</b>	<b>Hours</b>
ENCP 3000		1 Co-op		0 Co-op		0 ARTG 1290 and ARTG 1291		4
ME 2340 and ME 2341 (WI)	5					MEIE 4701 (EI, WI, CE)		1
ME 3455 and ME 3456	5					Upper mechanical elective		4
ME 4505 and ME 4506 (AD)	5							
Design option course 1	4							
	<b>20</b>		<b>0</b>			<b>0</b>		<b>9</b>
<b>Year 5</b>								
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>					
MEIE 4702 (EI, WI, CE)		5 ARTG 2262 and ARTG 2263	4					
ARTH elective	4	ENGW 3302, 3314, or 3315 (WD)	4					
Design option course 2	4	A+D elective	4					
Upper mechanical elective	4	General Elective (DD)	4					
	<b>17</b>		<b>16</b>					

**Total Hours: 139**