

# Mechanical Engineering and Design, BSME

The combined major in mechanical engineering and design is designed to educate students in topics of both disciplines and the interface between them. 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. Today, engineers also play a primary role in the development of new technologies in a variety of fields—energy conversion, solar energy utilization, environmental control, prosthetics, transportation, manufacturing, and new-materials development. Design is the discipline that shapes human experiences in specific situations to improve quality. Designers pose important questions about—and provide significant answers to—how we live. Designers are needed when we don't know what is needed as well as when we think we do. Students in this program will combine the disciplines in order to address complex problems with human-centered solutions.

## Program Requirements

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 (<http://catalog.northeastern.edu/undergraduate/university-academics/university-wide-requirements/>).

## NUpath Requirements

All undergraduate students are required to complete the NUpath Requirements (<http://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>Technical Electives</b>		
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	
<b>Supplemental Credit</b>		
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:

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

Code	Title	Hours
<b>Art and Design Fundamentals</b>		
ARTF 1122	Color and Composition (with optional ARTF 1123)	4
<b>Art and Design Fundamentals Elective</b>		
Complete one of the following:		5
ARTF 1124 and ARTF 1125	Form and Structure and Form and Structure Tools	
ARTF 2220 and ARTF 2221	Movement and Time and Movement and Time Tools	
ARTF 2223 and ARTF 2224	Experience and Interaction and Experience and Interaction Tools	
<b>Design Requirements</b>		
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
<b>Art and Design History Elective</b>		
Complete any one ARTH course.		4
<b>Art and Design Elective</b>		
Complete any one ARTD, ARTE, ARTF, 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
<b>Experience Design Option</b>		
ARTG 3462	Experience Design Principles	
ARTG 3463	Experience Design 2	
<b>Graphic Design Option</b>		
ARTG 2252	Graphic Design Principles	
ARTG 3450	Graphic Design 2	
<b>Information Design Option</b>		
ARTG 2252	Graphic Design Principles	
ARTG 3444	Topics in Information Design Inquiry	
<b>Interaction Design Option</b>		
ARTG 2400 and ARTG 2401	Interaction Design Principles and Interaction Design Principles Tools	
ARTG 3700	Interaction Design 2: Mobile	

**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

**Supplemental Credit**

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>		
GE 1000 or ARTF 1000	First-Year Seminar Art and Design at Northeastern	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 <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 3315	Advanced Writing in the Technical Professions Interdisciplinary Advanced Writing in the Disciplines	4

**Required General Electives**

Code	Title	Hours
Complete 4 semester hours of academic, nonremedial, nonrepetitive courses. Recommend selecting a course to fulfill NUpath DD.		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**

141 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) in approved situations.

**Plan of Study**

**Sample Plans of Study**

**FOUR YEARS, ONE CO-OP IN SUMMER 2/FALL**

Year 1								
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	
ARTF 1000 or GE 1000		1 ARTG 1001 and ARTG 1002		4 Vacation		Vacation		

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CHEM 1151 (ND)	4	GE 1502 (ER)	4
CHEM 1153	0	MATH 1342 (FQ)	4
ENGW 1111 (WF)	4	PHYS 1151 (ND)	3
GE 1501	4	PHYS 1152 (AD)	1
MATH 1341 (FQ)	4	PHYS 1153	1
<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 1122 (with optional ARTF 1123)	4	ARTG 1270 and 1270	4	ME 3475 or 3480	4	Vacation	4
MATH 2321 (FQ)	4	ENCP 2000	4	1 Art and design fundamentals elective	1	5	5
ME 2350	4	MATH 2341	4				
PHYS 1155 (ND)	3	ME 2355	4				
PHYS 1156 (AD)	1	ME 2356	1				
PHYS 1157	1	ME 2380	4				
		ME 2381	0				
<b>17</b>		<b>18</b>		<b>9</b>		<b>0</b>	

**Year 3**

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ARTG 1290 and ARTG 1291	4	ME 3455	4	MEIE 4701 (EI, WI, CE)	4	1 Co-op	0
ENGW 3302 or 3314 (WD)	4	ME 3456	4	1 Art and design elective	1	4	4
ME 2340 (WI)	4	ME 4505 (AD)	4	Engineering tech elective	4	4	4
ME 2341	1	ME 4506	1				
Design Option course 1	4	Design Option course 2	4				
		Engineering tech 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
		Art and design history elective	4
		General elective (NUPath DD)	4
<b>0</b>		<b>18</b>	

**Total Hours: 140**

**FOUR YEARS, ONE CO-OP IN SPRING/SUMMER 1**

**Year 1**

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ARTF 1000 or GE 1000	1	ARTG 1001 and ARTG 1002	4	Vacation	4	0 Vacation	0
CHEM 1151 (ND)	4	GE 1502 (ER)	4				
CHEM 1153	0	MATH 1342 (FQ)	4				
ENGW 1111 (WF)	4	PHYS 1151 (ND)	3				
GE 1501	4	PHYS 1152 (AD)	1				
MATH 1341 (FQ)	4	PHYS 1153	1				
<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		0 ARTF 1122 (EI)	4
ENCP 2000		1 ME 2340 (WI)		4		ME 3475 or 3480	4
MATH 2321 (FQ)		4 ME 2341		1			
ME 2350		4 ME 2355		4			
PHYS 1155 (ND)		3 ME 2356		1			
PHYS 1156 (AD)		1 ME 2380		4			
PHYS 1157		1 ME 2381		0			
		<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 or 3315 (WD)	4
ME 3455		4				MEIE 4701 (EI, WI, CE)	1
ME 3456		1				Engineering tech elective	4
ME 4505 (AD)		4					
ME 4506		1					
Design Option course 1		4					
		<b>18</b>		<b>0</b>		<b>0</b>	<b>9</b>

**Year 4**

Fall	Hours	Spring	Hours
ENCP 3000		1 ARTG 2262 and ARTG 2263	4
MEIE 4702 (EI, WI, CE)		5 Art and Design elective	4
Art and design history elective		4 Art and design fundamentals elective	5
Design Option course 2		4 Engineering tech elective	4
General elective (NUPath DD)		4	
		<b>18</b>	<b>17</b>

**Total Hours: 140**

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

**Year 1**

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ARTF 1000 or GE 1000		1 ARTG 1001 and ARTG 1002		4 Vacation		Vacation	
CHEM 1151 (ND)		4 GE 1502 (ER)		4			
CHEM 1153		0 MATH 1342 (FQ)		4			
ENGW 1111 (WF)		4 PHYS 1151 (ND)		3			
GE 1501		4 PHYS 1152 (AD)		1			
MATH 1341 (FQ)		4 PHYS 1153		1			
		<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 ARTF 1122 (EI)		4 Vacation		Co-op	0
MATH 2321 (FQ)		4 ENCP 2000		1			
ME 2350		4 MATH 2341		4			
PHYS 1155 (ND)		3 ME 2340 (WI)		4			
PHYS 1156 (AD)		1 ME 2341		1			
PHYS 1157		1 ME 2380		4			

		ME 2381		0				
		<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>	
Co-op	0	ENGW 3302 or 3315 (WD)		4 ARTG 1290 and ARTG 1291		4 Co-op		0
		ME 2355		4 ME 3475 or 3480		4		
		ME 2356		1				
		Art and design fundamentals elective		5				
		Design Option course 1		4				
		<b>0</b>		<b>18</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>	
Co-op	0	ENCP 3000		1 MEIE 4701 (EI, WI, CE)		1 Co-op		0
		ME 3455		4 Art and design elective		4		
		ME 3456		1 Engineering tech elective		4		
		ME 4505 (AD)		4				
		ME 4506		1				
		Art and design history 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				
		Engineering tech elective		4				
		General elective (NUPath DD)		4				
		<b>0</b>		<b>17</b>				

Total Hours: 140

**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>	
ARTF 1000 or GE 1000	1	ARTG 1001 and ARTG 1002		4 Vacation		Vacation		
CHEM 1151 (ND)	4	GE 1502 (ER)		4				
CHEM 1153	0	MATH 1342 (FQ)		4				
ENGW 1111 (WF)	4	PHYS 1151 (ND)		3				
GE 1501	4	PHYS 1152 (AD)		1				
MATH 1341 (FQ)	4	PHYS 1153		1				
		<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>	
ARTG 1270 and ARTG 1271	4	Co-op		0 Co-op		0 ARTF 1122 (EI)		4
ENCP 2000	1					ME 3475 or 3480		4
MATH 2321 (FQ)	4							
ME 2350	4							
PHYS 1155 (ND)	3							
PHYS 1156 (AD)	1							

PHYS 1157		1						
		<b>18</b>		<b>0</b>		<b>0</b>		<b>8</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>	
MATH 2341		4 Co-op		0 Co-op		0 Vacation		
ME 2355		4						
ME 2356		1						
ME 2380		4						
ME 2381		0						
Art and Design fundamentals elective		5						
		<b>18</b>		<b>0</b>		<b>0</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>	
ENCP 3000		1 Co-op		0 Co-op		0 ARTG 1290 and ARTG 1291		4
ME 2340 (WI)		4				MEIE 4701 (EI, WI, CE)		1
ME 2341		1				General elective (NUPath DD)		4
ME 3455		4						
ME 3456		1						
ME 4505 (AD)		4						
ME 4506		1						
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				
Art and Design history elective		4 ENGW 3302 or 3315 (WD)		4				
Design Option course 2		4 Art and Design elective		4				
Engineering tech elective		4 Engineering tech elective		4				
		<b>17</b>		<b>16</b>				

**Total Hours: 140**