

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.

University-Wide Requirements

All undergraduate students are required to complete the University-Wide 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/nu-path/>).

Engineering Requirements

| Code | Title | Hours |
|---------------------------------------|---|-------|
| Required Engineering | | |
| 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 |
| Senior Capstone Design Project | | |
| MEIE 4701 | Capstone Design 1 | 1 |
| MEIE 4702 | Capstone Design 2 | 5 |
| Technical Electives | | |
| Complete three of the following: | | 12 |

| | | |
|--|---|---|
| ME 4508 | Mechanical Engineering Computation and Design | |
| 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 | |
| 3 semester hours from the following course count toward the engineering requirement: | | 3 |
| GE 1502 | Cornerstone of Engineering 2 | |

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 |

Supplemental Credit

| | | |
|--|------------------------------|---|
| 1 semester hour from the following course counts toward the mathematics/science requirement: | | 1 |
| GE 1501 | Cornerstone of Engineering 1 | |

Professional Development

| Code | Title | Hours |
|---------------------------------|--|-------|
| Professional Development | | |
| GE 1000 or ARTF 1000 | Introduction to the Study of Engineering 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 | |

| | |
|---|---|
| 1 semester hour from the following course counts toward the professional development requirement: | 1 |
| GE 1502 Cornerstone of Engineering 2 | |

Design Requirements

| Code | Title | Hours |
|-----------|-----------------------|-------|
| ARTF 1122 | Color and Composition | 4 |

Complete one of the following: 4

| | | |
|-----------|----------------------------|--|
| ARTF 1121 | Conceptual Drawing | |
| ARTF 1124 | Form and Structure | |
| ARTF 2220 | Movement and Time | |
| ARTF 2223 | Experience and Interaction | |

Design Requirements

| | | |
|-----------|------------------------------------|---|
| ARTG 1250 | Design Process Context and Systems | 4 |
| ARTG 2250 | Typography 1 | 4 |

Complete one of the following design options: 8

Interactive Design Option

| | | |
|-----------|----------------------------------|--|
| ARTG 2400 | Interaction Design 1: Responsive | |
| ARTG 3700 | Interaction Design 2: Mobile | |

Graphic and Information Design Option

| | | |
|-----------|------------------|--|
| ARTG 2252 | Graphic Design 1 | |
| ARTG 3450 | Graphic Design 2 | |

Experience Design Option

| | | |
|-----------|---------------------|--|
| ARTG 3462 | Experience Design 1 | |
| ARTG 3463 | Experience Design 2 | |

Art + Design Electives

Art + Design History Elective 4

Complete any ARTH course. Recommend selecting an ARTH course that fulfills both NUpath IC and SI.

Design Elective 8

Complete two ARTG courses (at least one at 3xxx-level or higher).

Art + Design Elective 4

Complete any one ARTG, ARTE, ARTD, ARTH, ARTS course.

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 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

Program Requirement

143 total semester hours required

Plan of Study

Sample 4 Years, Two Co-ops Curriculum Outline (Co-op in Summer 2/Fall)

Year 1

| Fall | Hours | Spring | Hours | Summer 1 | Hours | Summer 2 | Hours | | |
|---|-------|---------------------------------------|-------|--------------------------|-------|----------|-------|---|---|
| Students will need to have AP credit for Calc. AB (MATH 1341, Calculus 1) | 4 | MATH 2321 | 4 | ME 2350 | 4 | Vacation | 0 | | |
| MATH 1342 | 4 | PHYS 1151 and PHYS 1152 and PHYS 1153 | 5 | Art + Design fundamental | 4 | | | | |
| CHEM 1151 and CHEM 1153 | 4 | GE 1502 | 4 | | | | | | |
| ARTF 1000 or GE 1000 | 1 | ARTF 1122 | 4 | | | | | | |
| GE 1501 | 4 | | | | | | | | |
| ENGW 1111 | 4 | | | | | | | | |
| | | 21 | | | 17 | | | 8 | 0 |

Year 2

| Fall | Hours | Spring | Hours | Summer 1 | Hours | Summer 2 | Hours | | |
|---------------------------------------|-------|---------------------------|-------|-----------------|-------|----------|-------|---|---|
| MATH 2341 | 4 | ME 2355 and ME 2356 | 5 | ME 3475 or 3480 | 4 | Co-op | 0 | | |
| PHYS 1155 and PHYS 1156 and PHYS 1157 | 5 | ME 2380 and ME 2381 | 4 | ARTG 2250 | 4 | | | | |
| ME 2340 and ME 2341 | 5 | ME 3455 and ME 3456 | 5 | | | | | | |
| ARTG 1250 | 4 | ENCP 2000 Design option 1 | 4 | | | | | | |
| | | 18 | | | 19 | | | 8 | 0 |

Year 3

| Fall | Hours | Spring | Hours | Summer 1 | Hours | Summer 2 | Hours | | |
|--|-------|-------------------------------|-------|-----------------------------|-------|----------|-------|---|---|
| Co-op | 0 | ME 4505 and ME 4506 | 5 | MEIE 4701 | 1 | Co-op | 0 | | |
| ENGW 3302 or 3315 (to be taken online) | 4 | Engineering tech elective 1 | 4 | Engineering tech elective 2 | 4 | | | | |
| | | Design option 2 | 4 | Art + Design elective | 4 | | | | |
| | | Art + Design history elective | 4 | | | | | | |
| | | ENCP 3000 | 1 | | | | | | |
| | | 4 | | | 18 | | | 9 | 0 |

Year 4

| Fall | Hours | Spring | Hours |
|------------------------------|-------|-----------------------------|-------|
| Co-op | 0 | MEIE 4702 | 5 |
| General elective (NUpath DD) | 4 | Engineering tech elective 3 | 4 |
| | | Design elective 1 | 4 |
| | | Design elective 2 | 4 |
| | 4 | | 17 |

Total Hours: 143

Sample Five Years, Three Co-ops Curriculum Outline (Co-op in Summer 2/Fall)

Year 1

| Fall | Hours | Spring | Hours | Summer 1 | Hours | Summer 2 | Hours |
|--|-------|---------------------------------------|-------|----------|-------|----------|-------|
| Students will need to have AP credit for Calc.AB (MATH 1341, Calculus 1) | 4 | MATH 2321 | 4 | Vacation | 0 | Vacation | 0 |
| MATH 1342 | 4 | PHYS 1151 and PHYS 1152 and PHYS 1153 | 5 | | | | |
| CHEM 1151 and CHEM 1153 | 4 | GE 1502 | 4 | | | | |
| ARTF 1000 or GE 1000 | 1 | ARTF 1122 | 4 | | | | |
| GE 1501 | 4 | | | | | | |
| ENGW 1111 | 4 | | | | | | |
| | 21 | | 17 | | 0 | | 0 |

Year 2

| Fall | Hours | Spring | Hours | Summer 1 | Hours | Summer 2 | Hours |
|---------------------------------------|-------|--------------------------|-------|----------|-------|----------|-------|
| PHYS 1155 and PHYS 1156 and PHYS 1157 | 5 | ENCP 2000 | 1 | Vacation | 0 | Co-op | 0 |
| ME 2350 | 4 | MATH 2341 | 4 | | | | |
| ARTG 1250 | 4 | ME 2340 and ME 2341 | 5 | | | | |
| General elective (NUpath DD) | 4 | ME 2380 and ME 2381 | 4 | | | | |
| | | Art + Design fundamental | 4 | | | | |
| | 17 | | 18 | | 0 | | 0 |

Year 3

| Fall | Hours | Spring | Hours | Summer 1 | Hours | Summer 2 | Hours |
|-------|-------|---------------------|-------|-----------------|-------|----------|-------|
| Co-op | 0 | ME 2355 and ME 2356 | 5 | ME 3475 or 3480 | 4 | Co-op | 0 |
| | | ME 3455 and ME 3456 | 5 | ARTG 2250 | 4 | | |

| | | | |
|-------------------|---|----|---|
| ENGW 3302 or 3315 | 4 | | |
| Design option 1 | 4 | | |
| ENCP 3000 | 1 | | |
| | 0 | 19 | 8 |
| | | | 0 |

Year 4

| Fall | Hours | Spring | Hours | Summer 1 | Hours | Summer 2 | Hours |
|-------|-------|-------------------------------|-------|-----------------------------|-------|----------|-------|
| Co-op | 0 | ME 4505 and ME 4506 | 5 | MEIE 4701 | 1 | Co-op | 0 |
| | | Engineering tech elective 1 | 4 | Engineering tech elective 2 | 4 | | |
| | | Design option 2 | 4 | Art + Design elective | 4 | | |
| | | Art + Design history elective | 4 | | | | |
| | 0 | | 17 | | 9 | | 0 |

Year 5

| Fall | Hours | Spring | Hours |
|-------|-------|-----------------------------|-------|
| Co-op | 0 | MEIE 4702 | 5 |
| | | Engineering tech elective 3 | 4 |
| | | Design elective 1 | 4 |
| | | Design elective 2 | 4 |
| | 0 | | 17 |

Total Hours: 143