

# Mechanical Engineering Curriculum Guide



*Class of 2018*

Department of Mechanical Engineering

University of Rochester

Undergraduate Coordinator

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\*\*This is to be a guide only. Mechanical Engineering students should always consult with their ME Faculty Advisers regarding course work.

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## PROGRAM IN MECHANICAL ENGINEERING

Mechanical engineers are among the most versatile, flexible, and broadly based engineers in the profession. Our students acquire knowledge in the fields of energy, material properties, fluid mechanics, solid mechanics, dynamics, laboratory techniques, design methodology, and system analysis. Our graduates apply their skills in jobs requiring engineering design, development, manufacturing, research, and resource management.

The University of Rochester has offered an undergraduate degree in mechanical engineering for over 80 years. This program provides effective preparation for students who enter industry immediately upon graduation as well as good background for graduate study in engineering and other fields.

The curriculum provides a balance of courses in the humanities and social sciences, physics, applied mathematics, and basic engineering. Emphasis is placed on the underlying fundamentals in the engineering course work, enabling graduates to adapt throughout their careers to rapid advances in sciences and technology. Training in the design process gradually supplements the analytical content of the courses as the undergraduate progresses. Our laboratory and design courses emphasize team projects. Formal oral and written presentations are key elements of these projects. A required senior year sequence in design acts as a capstone in this process.

Many undergraduates in the department assist faculty members in research projects during the academic year and the summer. This work can lead to publication in professional archival literature. It is encouraged for those students so inclined. Recent projects involving undergraduates include experiments in controlled nuclear fusion using high-powered lasers, use of the electron microscope and testing machines to study engineering materials, mechanics of soldered and welded joints, studies in human microcirculation, experimental studies in optics manufacturing, modeling crystal growth, and experiments on nonlinear dynamical systems.

## CURRICULUM AND REQUIREMENTS

### *Required Mechanical Engineering Courses*

ME 110 – Intro to CAD and Drawing  
ME 120 – Engineering Mechanics I – Statics  
ME 121 – Engineering Mechanics II – Dynamics  
ME 123 – Thermodynamics  
ME 160 – Engineering Computation I  
ME 204 – Mechanical Design  
ME 205 – Advanced Mechanical Design  
ME 213 – Mechanical Systems  
ME 223 – Heat Transfer  
ME 225 – Introduction to Fluid Dynamics  
ME 226 – Introduction to Solid Mechanics  
ME 241 – Fluid Dynamics Laboratory  
ME 242 – Materials and Solids Laboratory  
ME 251 – Heat and Power Applications  
ME 260 – Engineering Computation II  
ME 280 – Introduction to Materials Science

### *Foundation Requirements for Mechanical Engineering*

- ❖ One semester of Chemistry CHM 137 (recommended) or CHM 131
- ❖ Calculus MTH 161, 162, 164, and 165 (*MTH 141, 142, and 143 equivalent to MTH 161 & 162*)
- ❖ Two Physics courses, PHY 121 and 122. Prior to sequence students must complete PHY 099.
- ❖ One Natural Science course (see attached list)
- ❖ Circuits – ECE 210 is recommended (Junior year)
- ❖ Engineering Computing – ME 160 (2credits), ME 260 (2 credits)
- ❖ Technical Elective – an EAS 10x course is recommended first year (see attached list)

## **TECHNICAL & NATURAL SCIENCE ELECTIVES**

### TYPICAL TECHNICAL ELECTIVES

We recommend that students take an EAS10x course in their first year. Other acceptable courses fulfilling this requirement are listed below. Because new courses are sometimes added, this list is not comprehensive. Students should check with the ME department about the acceptability of any course not on the list. Note that the typical technical elective should normally be a four credit course. However, it may be possible to combine two 2-credit courses, provided both courses otherwise qualify.

BME – Any course at the 200 level or higher except BME 201

CS – 170, 171, 172, 173, and any course at the 200 level or higher

CHE – 113 and any course at the 200 level or higher

ECE – 111, 112, 113, 114, 140 and any course at the 200 level or higher

ME – Any course not otherwise required (with the restriction that EAS104/ME104 must be taken in the first year)

OPT – Any course at the 200 level or higher

MTH – 150 and any course at the 200 level or higher

STT – 212 & 213

\*\*If taken during the first year, any course listed or cross-listed as EAS 10x, including BME 101, CHE 150, ECE 101, ME 104, or OPT 101.

\*\*Note that AP credit cannot normally be used to satisfy this requirement. However, if a student is granted credit for a course on the Technical Elective list, that course can then be used to fulfill this requirement. Example: A student receives an AP score of 4 or 5 on their Statistics test, which may be used for STT 212. Since STT 212 is on the list of acceptable Technical Electives, this credit may be used to fulfill the requirement for a Technical Elective.

### TYPICAL NATURAL SCIENCE DISTRIBUTION REQUIREMENT (NSDR)

AST – 111, 142 and any course at the 200 level or higher

BIO – 110, 111, 198, and any course at the 200 level or higher

CHM – 132 and any course at the 200 level or higher

EES – 100, 101, 102, 103, 105, 106, 119 and any course at the 200 level or higher

MTH – 150 and any course at the 200 level or higher

PHY – 103, 123, 143 and any course at the 200 level or higher

\*\*Note that AP credit cannot normally be used to satisfy this requirement. However, if a student is granted credit for a course on the NSDR list, that course can then be used to fulfill this requirement. Examples:

- A) A student receives an AP score of 4 or 5 on their Earth and Environmental Sciences test and is granted credit for EES 103. Since EES 103 is on the list of acceptable NSDR courses, the credit for EES 103 may be used to fulfill the Natural Science Distribution Requirement.
- B) A student receives an AP score 4 or 5 on their Biology test and is granted four credits of elective Biology. This does not provide credit for a course on the NSDR list and so cannot fulfill the Natural Science Distribution Requirement. However, it can be used as one of the student's free electives.

## Standard Four-Year Program

Below is the standard four-year program for students who decide on a mechanical engineering major in their first or second year.

### First Year

Fall

MTH 161            4 Credit Hours  
CHM 137            4 Credit Hours  
Technical Elective    4 Credit Hours  
WRT 105            4 Credit Hours  
PHY 099            No Credit

Total Credit Hours: 16

Spring

MTH 162            4 Credit Hours  
PHY 121            4 Credit Hours  
Dist. Req.            4 Credit Hours  
ME 120             4 Credit Hours

Total Credit Hours: 16

### Second Year

Fall

MTH 165            4 Credit Hours  
PHY 122            4 Credit Hours  
ME 110             2 Credit Hours  
ME 121             4 Credit Hours  
ME 160             2 Credit Hours

Total Credit Hours: 16

Spring

MTH 164            4 Credit hours  
ME 123             4 Credit Hours  
ME 226             4 Credit Hours  
ME 260             2 Credit Hours  
WRT 273            2 Credit Hours

Total Credit Hours: 16

### Third Year

Fall

ME 225            4 Credit Hours  
ME 280            4 Credit Hours  
Nat. Sci. Elec.    4 Credit Hours  
Dist. Req.        4 Credit Hours

Total Credit Hours: 16

Spring

ME 223            4 Credit Hours  
ME 241            4 Credit Hours  
Circuits            4 Credit Hours  
Dist. Req.        4 Credit Hours

Total Credit Hours: 16

### Fourth Year

Fall

ME 204            4 Credit Hours  
ME 242            4 Credit Hours  
ME 213            4 Credit Hours  
Dist. Req.        4 Credit Hours

Total Credit Hours: 16

Spring

ME 205            4 Credit Hours  
ME 251            4 Credit Hours  
Free Elec.        4 Credit Hours  
Free Elec.        4 Credit Hours

Total Credit Hours: 16

### *Degree Foundation Requirements for engineering majors*

- ❖ WRT 105 – Reason and Writing (a basic writing course)
- ❖ WRT 273 – Communication and Professional Identity
- ❖ One Cluster in humanities or social science plus one extra humanity or social science course
- ❖ Two free electives

## **WRITING REQUIREMENTS**

### ***Primary Writing Requirement***

The Primary Writing Requirement is normally completed in the first year, and must be satisfied before admission to the program. (WRT 105 – Reason and Writing)

### ***Upper Level Writing Requirement***

Upper Level Writing Requirements are satisfied in the Junior and Senior years with the completion of ME 241, 242, 204 and 205. These courses cannot be completed outside of the University of Rochester.

## **TRANSFER CREDITS**

Students who use transfer credit for any one or more of these courses from another institution to the UR must consult with the Mechanical Engineering Department's transfer approval adviser.

## **ADMISSION TO THE MECHANICAL ENGINEERING MAJOR**

For admission to the mechanical engineering major, the student must have completed the first two years as listed in the four-year degree program below. In addition, the student must have attained a grade-point average of 2.0 or better in all mechanical engineering courses taken, and an overall grade-point average of 2.0 or better.

## **ELECTIVES**

Our program has one required technical elective and one required natural science elective. There are also two free electives in addition to the four required Cluster electives in the humanities and social sciences. These may be used to make it easier to complete a minor, acquire a language, take graduate courses in engineering, acquire business/management skills, or generally broaden the undergraduate experience.

## **DISTRIBUTION REQUIREMENTS**

In addition to the required writing course, students must take four courses in the humanities or social sciences. Three of these courses must constitute a cluster.

## **REGISTRATION FORMS**

Your registration *must* be signed by your advisor and have the department authorization stamp. The stamp may be acquired from the Undergraduate Coordinator. The stamp is required on all registration forms from first year through and including sophomore year.

## **PETITIONS**

Students may petition for exception from some mechanical engineering program requirements. Please contact the Chair of the Mechanical Engineering Undergraduate Committee for information.

## **AVERAGE FOR GRADUATION**

Mechanical Engineering majors must obtain a cumulative average of 2.0 or higher for all required mechanical engineering courses, and an overall grade-point average of 2.0 or higher.

## **ASME**

Students are encouraged to join and be active in the student chapter of ASME, the professional society for mechanical engineers. In addition, seniors are encouraged to take Part A of the New York State Professional.