

# DEPARTMENT OF MECHANICAL ENGINEERING

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170 DODGE HALL

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**Chairperson:** *Gary C. Barber*

**Professors emeriti:** *Robert Edgerton, Michael Y.Y. Hung, Gilbert L. Wedekind*

**Professors:** *Gary C. Barber, Bhushan L. Bhatt, Randy Gu, Zissimos Mourelatos, Sayed Nassar, Lianxing Yang*

**Associate professors:** *Yin-Ping Chang, Laila Guessous, Ching L. Ko, Christopher Kobus, Michael A. Latcha, Keyu Li, Qian Zou, Brian P. Sangeorzan, Lorenzo Smith*

**Assistant professors:** *Xia Wang*

**Adjunct professors:** *Ismat Abu-Isa, Alex Alkidas, Yung-Li Lee*

**Adjunct associate professors:** *Fang Chen, Phil Szuba, Simon C.Y. Tung*

**Adjunct assistant professors:** *Suresh Ramalingham, Saeed Siavosbani*

## Advisory Board

The Mechanical Engineering Advisory Board assists the department in enhancing its educational and research programs and ensuring their relevance to current and emerging technological needs. Board members are:

*David Gorsich, Ph.D., Chief Scientist, TARDEC*

*Ray Kuczera, Regional Engineering Director, GKN Driveline*

*Yung-Li Lee, Ph.D., Senior Specialist, Chrysler, LLC*

*Suresh Ramalingham, Ph.D., Senior Project Engineer, Advanced Manufacturing, Chrysler LLC*

*Philip Szuba, Ph.D., Vice President, Black and Decker*

*Yucong Wang, Ph.D., Surface Engineering and Tribology Center, General Motors Powertrain*

*Han Zhao, Ph.D., Design Engineer, Continental Teves*

## Mission

The Department of Mechanical Engineering carries out the mission of the School of Engineering and Computer Science by offering undergraduate majors in mechanical engineering including various options. The department also offers a master's program in mechanical engineering and a Ph.D. in mechanical engineering.

## Major in mechanical engineering

The field of mechanical engineering offers career opportunities in areas such as design, analysis, test development, research and the manufacturing of various products. Oakland University's mechanical engineering program provides the student with a foundation in the fundamental concepts and principles associated with mechanics of solids, thermodynamics, fluid and thermal energy, materials, manufacturing, design of mechanical systems, electrical circuits, computer programming and software utilization. A



**Professional subjects****Required:**

ME 308	Computer-Aided Design	3
ME 322	Engineering Mechanics	4
ME 331	Introduction to Fluid and Thermal Energy Transport	4
ME 361	Mechanics of Materials	4
ME 372	Properties of Materials	4
ME 421	Vibrations and Controls	4
ME 486	Mechanical Systems Design	4
ME 456	Energy Systems Analysis and Design or ME 482 Fluid and Thermal Systems Design	4
ME 492	Senior Mechanical Engineering Design Project or ME 490* Senior Project	<u>4</u>
		35

**Electives —**

**Professional electives:** three mechanical engineering electives  
(see description below)

12

**Free electives:** (may be used to satisfy writing requirement)

4

Total 128

*\*ME 490 requires approval of project proposal by the Mechanical Engineering Dept., if taken in place of ME 492 and project must be team-based.*

**Economics requirement**

In addition to the requirements stated above, mechanical engineering students must fulfill the economics requirement. This may be met by completion of ECN 150, 200, 201 or 210. However, ECN 201 is not part of the general education requirement.

**Performance requirements**

In addition to previously stated requirements, satisfactory completion of the program requires an average grade of at least 2.00 within each group: namely, mathematics and science, core subjects and professional subjects. Within professional subjects, at most two grades below 2.0 are permitted; at most two different courses may be repeated and three repeat attempts are permitted.

**Approved math or science electives**

Students majoring in mechanical engineering are advised to take MTH 275 to broaden their knowledge of linear algebra. However, students having an explicit interest in broadening their knowledge in a specific area of mathematics or science should elect a course from the following approved course list. For more information about these selections, students are encouraged to visit with an undergraduate adviser before registering for an approved math or science elective.

APM 332	Applied Matrix Theory (4)
APM 357	Elements of Partial Differential Equations (4)
APM 433	Numerical Methods (4)
APM 434	Applied Numerical Methods: Matrix Methods (4)
CHM 158	General Chemistry II (5)
BIO 111	Biology (4)
PHY 325	Biological Physics (4)
PHY 331	Optics (4)
PHY 366	Vibrations and Waves (4)
PHY 371	Foundations of Modern Physics (4)

MTH 275      Linear Algebra (4)  
 MTH 352      Complex Variables (4)

Or others by approval by petition to the SECS Committee on Academic Standing.

## Mechanical engineering electives

Mechanical engineering students must complete at least three (3) additional 400- or 500-level (**must have instructors permission to take 500-level courses**) courses with an ME designation or other approved 400-level engineering courses with a ECE, ISE designation.

Students interested in broadening their knowledge in a specific area of mechanical engineering should elect sequences of courses as described in the specialized professional options listed below to satisfy the mechanical engineering electives requirement. These options list elective courses that are fundamental to each area, as well as other relevant professional electives.

### Professional options

#### 1. Energy, fluid and thermal systems option

This option includes courses in the fluid and thermal energy transport area.

Recommended fundamental subjects:

ME 438      Fluid Transport (4)  
 ME 448      Thermal Energy Transport (4)

##### Other relevant courses:

ME 454      Alternative Energy Systems (4)  
 ME 456      Energy Systems Analysis and Design (4)  
 ME 457      Internal Combustion Engines I (4)  
 ME 482      Fluid and Thermal Systems Design (4)

#### 2. Computer-aided design option

This option includes courses in the computer-aided design (CAD) and analysis area.

Recommended fundamental subjects:

ME 487      Mechanical Computer-Aided Engineering (4)  
 ME 488      Mechanical Computer-Aided Manufacturing (4)

#### 3. Automotive Engineering option

This option includes courses with an automotive engineering emphasis area with two possible areas of specialty: automotive structures or internal combustion engines.

##### Recommended fundamental subjects: Automotive Structures Specialty

ME 461      Analysis and Design of Mechanical Structures (4)  
 ME 484      Vehicle Dynamics (4)

or

##### Recommended fundamental subjects: Internal Combustion Engines Specialty

ME 456      Energy Systems Analysis and Design (4)  
 ME 457      Internal Combustion Engines I (4)

##### Other relevant courses:

ME 423      Acoustics and Noise Control (4)  
 ME 438      Fluid Transport (4)  
 ME 448      Thermal Energy Transport (4)  
 ME 467      Optical Measurement and Quality Inspection (4)  
 ME 487      Mechanical Computer-Aided Engineering (4)

ME 489	Fasteners and Bolted Joints (4)
ECE 431	Automatic Control Systems (4)
ECE 473	Automotive Electronics (4)
ECE 475	Automotive Mechatronics I (4)

#### 4. Manufacturing Engineering option

This option includes courses in the manufacturing area.

**Recommended fundamental subjects:**

ME 472	Material Properties and Processes (4)
ME 474	Manufacturing Processes (4)

**Other relevant courses:**

ME 467	Optical Measurement and Quality Inspection (4)
ME 473	Flexible Manufacturing Systems (4)
ME 478	Robotic Systems (4)
ME 488	Mechanical Computer-Aided Manufacturing (4)
ECE 431	Automatic Control Systems (4)
ISE 483	Production Systems and Workflow Analysis (4)
ISE 484	Flexible Manufacturing Systems (4)
ISE 485	Statistical Quality Analysis (4)

#### 5. Plastics and Composites Manufacturing Engineering option

This option includes courses in the plastics and composites manufacturing area.

**Recommended fundamental subjects:**

ME 443	Polymeric Materials (4)
ME 544	Plastics Processing Engineering (4)

### Sample mechanical engineering schedule

Students entering the School of Engineering and Computer Science with the required background may follow a schedule such as the one indicated below. However, students will need additional time to complete the program if they do not have the required background upon entrance to the program.

**Freshman year**—fall semester: EGR 120, MTH 154, CHM 143, EGR 141, general education, 17 credits; winter semester: MTH 155, PHY 151, EGR 240, general education, 16 credits.

**Sophomore year** — fall semester: APM 255, PHY 152, EGR 250, general education, 16 credits; winter semester: MTH 254, EGR 260, EGR 280, general education, 16 credits.

**Junior year** —fall semester: ME 322, ME 331, ME 372, general education, 16 credits; Winter semester: ME 308, ME 361, free or professional elective, science elective, 15 credits.

**Senior year**— fall semester: ME 421, ME 486, one professional subject (required or elective), general education, 16 credits; winter semester: ME 492, three professional subjects (required or elective), 16 credits.