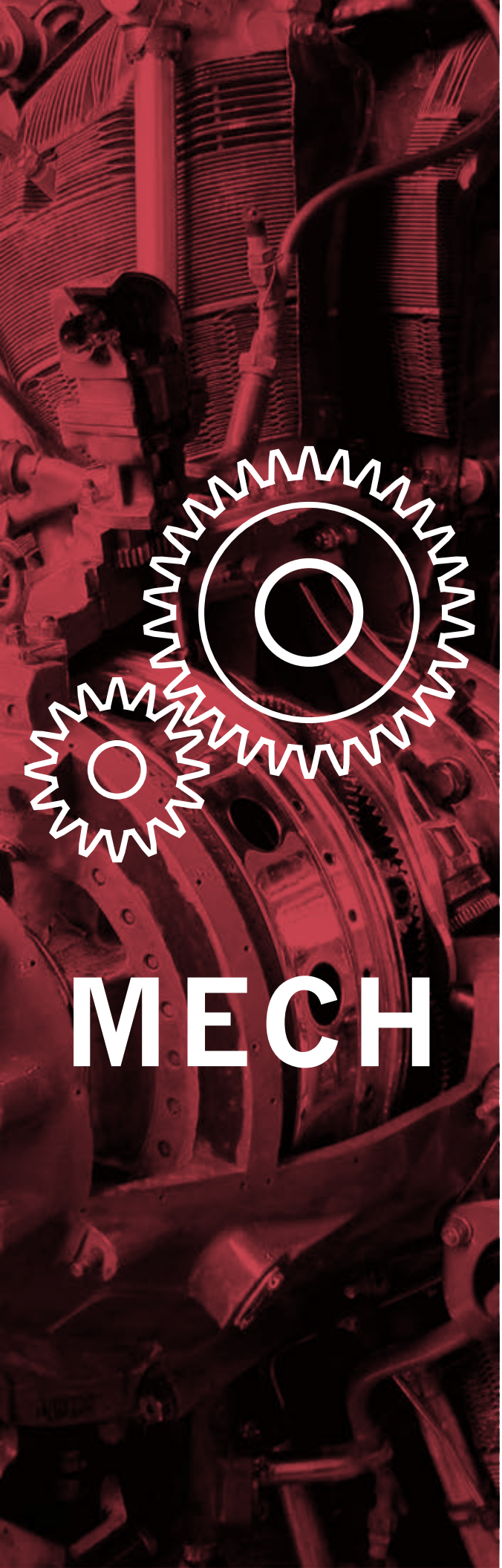


# UNIVERSITY OF THE PACIFIC
# MECHANICAL ENGINEERING

The Department of Mechanical Engineering at Pacific is accredited by the Accreditation Board for Engineering and Technology (ABET). The first two years of the program concentrate primarily on math, science, general education, and general engineering. During the last remaining years, students concentrate more on mechanical engineering topics. Several courses include a laboratory component. A variety of equipment is available such as vibration and noise instruments, robots and mechatronic systems, a wind tunnel, furnaces, solar collectors, HVAC test equipment, a complete machine shop with CNC equipment, data acquisition systems, computer aided design software, materials testing machines, and analytical devices including optical and electron microscopes.

Mechanical engineering is a very broad discipline. Consequently, mechanical engineers are typically found engaged in a diverse range of activities including machine design and analysis, product development, plant design, basic and applied research, environmental control, manufacturing, robotics, and technical sales. Mechanical engineers are employed by virtually every industry that uses engineers such as public utilities, aerospace, consumer products, computers, bioengineering, food processing, automotive, or materials to name some examples. Some people earn a mechanical engineering degree and then use their broad technical background to pursue graduate studies and careers in other fields such as business, law, or medicine.

The student majoring in mechanical engineering receives basic preparation in both of these areas, yet it is possible through several electives to emphasize in Energy Systems or Mechanical Systems. Elective courses in the program are fulfilled by engineering electives chosen by the student, and in their senior year, the student performs a project in the Senior Design courses. A number of mechanical engineering courses are available as engineering electives and certain courses in other engineering departments may also be taken as an engineering elective. Students with an interest in multidisciplinary areas such as mechatronics, bioengineering, nanotechnology, materials, or manufacturing can take electives or additional courses to develop their abilities in these areas.

## MECHANICAL ENGINEERING CONCENTRATIONS

Although many specialties exist within mechanical engineering, two major focus areas are often described:

+ Energy Systems or Thermal Sciences – energy conversion and alternative energy, power devices, combustion, engineering design and analysis involving the transfer of heat and the flow of gases and liquids, and manufacturing of energy systems

+ Mechanical Systems or Applied Mechanics – machine design, structures, systems, and devices where considerations of motion, wear, fatigue, vibration, material selection, manufacturing, strength, and safety are important.

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pacific.edu/engineering

# BACHELOR OF SCIENCE IN MECHANICAL ENGINEERING - PROGRAM CURRICULUM

**DEVELOPMENT OF CURRICULUM PLANS:** STUDENTS WORK WITH THEIR ACADEMIC ADVISERS TO DEVELOP CURRICULUM PLANS IN ACCORDANCE WITH PREREQUISITE REQUIREMENTS AND COURSE SCHEDULES. STUDENTS WHO SUCCESSFULLY COMPLETE THEIR COURSEWORK AND COMPLETE 32 UNITS OF CO-OP CAN GRADUATE. SUMMER COURSES MAY BE DESIRABLE OR NECESSARY TO REDUCE THE COURSE-LOAD DURING SOME FALL OR SPRING SEMESTERS.

**MATHEMATICS & BASIC SCIENCE (30 UNITS MINIMUM)**
MATH 051 [4] CALCULUS I
MATH 053 [4] CALCULUS II
MATH 055 [4] CALCULUS III
MATH 057 [4] DIFFERENTIAL EQUATIONS
MATH/SCIENCE ELECTIVE [3-4]*
PHYSICS 053 [5] PHYSICS I
PHYSICS 055 [5] PHYSICS II
CHEM 024/024L [4] FUNDAMENTALS OF CHEMISTRY WITH LAB
(ALSO ACCEPTABLE WITH CHEM 025 OR CHEM 027)

**MECHANICAL ENGINEERING**
MECH 015 [3] MECHANICAL ENGINEERING GRAPHICS
MECH 100 [4] MANUFACTURING PROCESSES
MECH 120 [3] MACHINE DESIGN AND ANALYSIS I
MECH 125 [3] MACHINE DESIGN AND ANALYSIS II
MECH 129 [3] VIBRATIONS
MECH 140 [3] ENGINEERING DESIGN/SENIOR PROJECT I
MECH 141 [3] ENGINEERING DESIGN/SENIOR PROJECT II
MECH 150 [3] HEAT TRANSFER
MECH 157 [3] THERMODYNAMICS II
MECH 175 [4] SYSTEMS ANALYSIS AND CONTROL
ENGINEERING ELECTIVE [3-4]
ENGINEERING ELECTIVE [3] (MECH)
ENGINEERING ELECTIVE [3] (MECH)

**GENERAL EDUCATION**
PACS 001 [4] PACIFIC SEMINAR 1
PACS 002 [4] PACIFIC SEMINAR 2
PACS 003 [3] PACIFIC SEMINAR 3
GENERAL EDUCATION [3-4] (I-A, I-B, OR I-C)***
GENERAL EDUCATION [3-4] (I-A, I-B, OR I-C)***
GENERAL EDUCATION [3-4] (II-A OR II-C)
ENGR 030 [3] ENGR. ETHICS & SOCIETY (II-B)
***CATEGORY I G.E.'S MUST BE DIFFERENT AREAS.

**ENGINEERING SCIENCE**
ENGR 010 [1] DEAN'S SEMINAR
ENGR 019 [3] COMPUTER APPLICATIONS
ENGR 020 [3] ENGINEERING MECHANICS I (STATICS)
ENGR 025 [1] PROFESSIONAL PRACTICE SEMINAR
ECPE 041/41L [4] CIRCUITS AND CURCUITS LABRATORY
ENGR 045 [4] MATERIALS SCIENCE
ENGR 110 [3] INSTRUMENTATION & EXPERIMENTAL METHODS
ENGR 120 [3] ENGINEERING MECHANICS II (DYNAMICS)
ENGR 121 [4] MECHANICS OF MATERIALS
ENGR 122 [3] THERMODYNAMICS I
CIVL 130 [4] FLUID MECHANICS I

**PROFESSIONAL PRACTICE (CO-OP)**
ENGR 181 [16]
ENGR 182 [16]
ENGR 183 [16]

**32 UNITS OF CO-OP ARE REQUIRED TO GRADUATE. CO-OP IS OPTIONAL FOR NON - U.S. CITIZENS.**

**ENGINEERING ELECTIVES:** A MINIMUM OF 9 UNITS OF ENGINEERING ELECTIVES IS REQUIRED. ENGINEERING ELECTIVES MUST BE CHOSEN FROM THE LIST BELOW. AT LEAST 6 UNITS MUST BE MECH COURSES. (SOME ELECTIVES ARE NOT OFFERED EVERY YEAR)

MECH 104 [3] INTRODUCTION TO MECHATRONICS
MECH 123 [3] KINEMATICS
MECH 151 [3] APPLIED HEAT TRANSFER
MECH 155 [3] SOLAR ENERGY ENGINEERING
MECH 158 [3] AIR CONDITIONING
MECH 160 [3] FLUID DYNAMICS
MECH 178 [3] FINITE ELEMENT METHODS
MECH 191 [1-4] INDEPENDENT STUDY
MECH 193 [3] SPECIAL TOPICS
MECH 197 [2-4] UNDERGRADUATE RESEARCH
MECH 200 [3] (IP) COMPUTER AIDED MANUFACTURING
MECH 202 [3] (IP) POLYMER AND COMPOSITE MATERIALS
MECH 204 [3] (IP) ADVANCED MECHATRONICS
MECH 262 [3] (IP) COMBUSTION
MECH 293 [3] (IP) SPECIAL TOPICS
BENG 103 [4] BIOMATERIALS
BENG 124 [4] BIOMECHANICS
CIVL 132 [4] INTRO. TO ENVIRONMENTAL ENGR.
CIVL 133 [4] WATER RESOURCES ENGINEERING
CIVL 171 [3] WATER AND ENVIRONMENTAL POLICY
CIVL 173 [3] SUSTAINABLE ENGINEERING
ECPE 071/71L [4] DIGITAL DESIGN
ECPE 121 [4] SYSTEMS ANALYSIS
ECPE 131/131 [4] LINTRODUCTION TO INTEGRATED CIRCUITS
ECPE 144 APPLIED ELECTROMAGNETICS
ECPE 163 [4] ENERGY CONVERSION
ECPE 165 [3] POWER SYSTEMS ANALYSIS
ECPE 170 [4] COMPUTER SYSTEMS AND NETWORKS
EMGT 155 [4] COMPUTER SIMULATION
EMGT 170 [4] ENGINEERING ADMINISTRATION
EMGT 172 [3] ENGINEERING ECONOMY
EMGT 174 [3] ENGINEERING PROJECT MANAGEMENT
EMGT 176 [4] SYSTEMS ENGINEERING MANAGEMENT
BUSI 143 [4] PRODUCT INNOVATION

**MATH/SCIENCE ELECTIVE AND ENGINEERING ELECTIVES:** MECHANICAL ENGINEERING STUDENTS ARE REQUIRED TO TAKE ONE MATH/SCIENCE ELECTIVE AND AT LEAST 9 UNITS OF ENGINEERING ELECTIVES TO MEET THE REQUIREMENTS FOR THE B.S.M.E. STUDENTS SHOULD CONSULT THE PACIFIC GENERAL CATALOG, COURSE SCHEDULE, AND THEIR FACULTY ADVISER PRIOR TO SELECTING AN ELECTIVE. PREREQUISITE COURSES MUST BE PASSED WITH A GRADE OF C- OR HIGHER. (SOME ELECTIVES LISTED ARE NOT OFFERED EVERY YEAR.)

***MATH/SCIENCE ELECTIVE:** ONLY ONE MATH OR SCIENCE ELECTIVE COURSE IS REQUIRED. THE MATH/SCIENCE ELECTIVE MUST BE CHOSEN FROM THE FOLLOWING LIST OF ACCEPTABLE MATH, PHYSICS, BIOLOGY, GEOSCIENCE, OR BIOENGINEERING COURSES:

**MATH:** 037, 039, 075, 110, 131, 145, 152, 157 **PHYS:** 057, 101, 105, 125, 127, 170, 181, 183 **GEOS:** 051,053,055,057,061,065
**BIOL:** 041,051 **BENG:** 053,063 (ONLY 3 UNITS OF BENG 053 OR 063 ARE ACCEPTABLE AS BASIC SCIENCE UNITS.)
COMP 051 CANNOT BE ACCEPTED AS A MATH/SCIENCE ELECTIVE UNLESS A STUDENT TRANSFERS TO MECH FROM CS OR CPE.