

Mechanical Engineering

Bachelor of Science

Mechanical Engineering is a well-established engineering discipline that involves state-of-the-art engineering analysis, design, and research. Mechanical engineers have been in demand for literally hundreds of years and remain one of the more sought-after degree holders.

The common freshman year is the first year of the Mechanical Engineering program. The second year is the same as Aerospace Engineering, which gives the student great flexibility when deciding his or her major field of study.

The Mechanical Engineering program offers two areas of emphasis, or tracks, in High Performance Vehicle and Robotic Systems, which add to the breadth of topics in Mechanical Engineering such as machine design, heat transfer, and vibrations. The Robotic Systems track prepares students for the rapidly expanding robotics field, including applications to the aerospace industry. Attention is paid to the systems nature of robotics to include the integration of mechanics and electronics. The High Performance Vehicle track prepares students for employment in vehicle design and manufacturing, from competition vehicles to fuel-efficient and environmentally friendly vehicles. Subjects include aerodynamics, structures, and safety.

The objective of the Mechanical Engineering degree is to produce graduates who:

- Are prepared to be immediately productive as well-rounded mechanical engineers in aerospace, aviation, and related fields.
- Are able to systematically apply the

fundamental principles of science and mathematics to solve engineering problems.

- Are effective at both oral and written communications.
- Work effectively within a team, in both supporting and leadership roles.
- Have exceptional backgrounds in engineering design that meet system, component, or process requirements and comply with health and environmental requirements.
- Are able to apply their knowledge to real-world multidisciplinary challenges facing society.
- Are able to apply the latest tools and technology to engineering problems.
- Understand the impact of engineering solutions in a global, economic, environmental, political, social, and ethical context.
- Understand the importance of life-long learning and pursue professional development, including advanced degrees and professional registration.

The curriculum is designed to accomplish these objectives with a base of engineering, math, and sciences that includes probability and statistics or numerical methods; engineering economics; advanced mathematics; electrical engineering; and engineering design. The culmination of the program is a two-semester design project that prepares the students for working in a team environment on projects involving mechanical engineering.

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FRESHMAN YEAR

See the common Freshman Year outline on page 160.

Total Credits **32**

SOPHOMORE YEAR

Course Title	Credits
COM221 Technical Report Writing	3
COM219 Speech -OR-	
EGR 120 Engineering Graphics	3
ES 201 Statics	3
ES 202 Solid Mechanics	3
ES 204 Dynamics	3
ES 206 Fluid Mechanics	3
MA 243 Calculus III	4
MA 345 Differential Equations & Matrix Methods	4
PS 105 General Chemistry	4
PS 250 Physics III for Engineers	3
PS 253 Physics Laboratory for Engineers	1
Total Credits	34

JUNIOR YEAR

Course Title	Credits
EE 335 Electrical Engineering	2
EE 336 Electrical Engineering Laboratory	1
ES 305 Thermodynamics	3
ES 320 Engineering Materials	2
ES 321 Engineering Materials Laboratory	1
MA 412 Probability and Statistics -OR-	
MA 438 Numerical Analysis I	3
ME 304 Introduction to Machine Design	3
ME 305 Machine Design Laboratory	1
ME 303 Vehicle Dynamics (HPV) -OR-	
ME 306 Robotic Mechanisms (RS)	3
ME 401 Advanced Fluid Dynamics	3
ME 3/4XX Mechanical Engineering Elective*	3
ME 400 Vibrations and Acoustics	3
ME 410 Advanced Machine Design	2
Total Credits	30

SENIOR YEAR (HIGH PERFORMANCE VEHICLES)

Course Title	Credits
EC 225 Engineering Economics	3
EE 401 Control Systems	3
ES 403 Heat Transfer	3
HU Upper-Level Humanities	3
ME 405 Vehicle Power Systems	3
ME 409 Vehicle Aerodynamics	3
ME 413 Preliminary Design of High Performance Vehicles w/Laboratory	4
ME 423 Senior Design of High Performance Vehicles	3
ME/EE/AE Technical Elective*	6
Total Credits	31

SENIOR YEAR (ROBOTICS SYSTEMS)

Course Title	Credits
EC 225 Engineering Economics	3
EE 401 Control Systems	3
ES 403 Heat Transfer	3
HU Upper-Level Humanities	3
ME 402 Robot Arms	3
ME 404 Mechatronics	3
ME 407 Preliminary Robotic Systems Design with Laboratory	4
ME 427 Senior Robotic Systems Design	3
AE/EE/CEC/CS/ME/SE Technical Elective*	6
Total Credits	31

TOTAL DEGREE CREDITS

127

Accelerated Master of Science Option in Mechanical Engineering

For exceptional students enrolled in the Bachelor of Science degree program, the Mechanical Engineering Department offers the opportunity to pursue an accelerated Master of Science degree program. In this option, up to nine hours of graduate coursework may be taken to fulfill undergraduate technical elective requirements. These hours will count toward both the BS and MS degree requirements provided that the student is enrolled in the accelerated MS option and receives a B or better in the course. Graduate courses taken for technical elective credit must be selected from the list of nine Electro-Mechanical Systems Electives specified under the MSME degree program requirements.

Undergraduate students may apply to the accelerated MS option by submitting an application to the Mechanical Engineering Graduate Program Coordinator. Students must have completed 88 credit hours toward the BS degree and must have a 3.2 minimum GPA to be admitted to the program. Students will be dropped from the program if their GPA falls below 3.0 or if they have not completed the MSME degree requirements within two years of finishing their undergraduate

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degree. The Bachelor of Science degree will be conferred upon completion of all bachelor's degree requirements listed in this catalog; the Master of Science degree will be conferred upon completion of all master's degree requirements listed in this catalog.

Technical electives must be chosen from among the list of nine Electro-Mechanical Systems Electives specified by the MSME program, listed below.

Course	Title	Credits
EE 500	Digital Control Systems	3
EE 505	Advanced Mechatronics	3
CEC 510	Digital Signal Processing	3
ME 500	Clean Energy Systems	3
ME 503	Unmanned and Autonomous Vehicle Systems	3
ME 506	Design for Manufacturing and Assembly	3
ME 508	Hydrogen and Hybrid Vehicle Systems . .	3
ME 510	Micro-Electrical Mechanical Systems . . .	3
SYS 500	Systems Engineering	3

* Students declaring the accelerated MS option are required to choose courses from the above list to replace up to 9 hours of technical electives, ME 3/4XX Mechanical Engineering Elective (3) at the junior level; and ME/EE/AE technical electives (6) at the senior level.