Mechanical Engineering

Mechanical engineering is one of the most diverse and exciting branches of engineering. Its scope ranges from the design of very fine and sensitive instruments to the design of mammoth power plants. Mechanical engineering can encompass aerodynamics, lasers, high performance engines, electronic controllers, computer modeling and simulation, composite materials and robotics.

Mechanical engineering involves the creative design, manufacturing, testing, evaluation and distribution of such devices as automobiles, prosthetic limbs, home appliances, spacecraft, all types of engines, air conditioning equipment, artificial organs, nuclear and fossil fuel power plants, controls, robotics, and many types of instruments.

In order to prepare for such a broad field, mechanical engineers must have a solid foundation in physics, chemistry and mathematics. This field also includes studies in basic mechanics of solids and fluids, electricity and electronics, controls, dynamic analysis, mechanical design, thermodynamics, applied mechanics, and heat transfer.

Pursuing Mechanical Engineering at Ohio State

Students who wish to major in mechanical engineering should have a solid high school background in math and science. They should also have a natural interest in how mechanical things work, and how they might be improved. Perseverance, imagination, and the ability to invent and analyze are also important.

Students may directly enroll as pre-engineering students; however, selection is competitive. Factors used to determine eligibility to directly enroll include ACT/SAT scores (emphasis on math), strong college prep curriculum (emphasis on math, science and rigorous courses), and class rank or GPA. The middle 50 percent of directly enrolled pre-majors (autumn 2014) had an ACT score range of 28–32 and 96 percent were in the middle 50 percent of their high school classes. Students not eligible to directly enroll in engineering may enroll in Science, Technology, and Environment Exploration (see exploration.osu.edu).

Acceptance into the major is competitive and based on the eligibility point-hour ratio (EPHR) in these pre-major courses:

- Engineering 1181 and 1182
- Mathematics 1172 and 2173
- Mechanical Engineering 2010
- Chemistry 1250
- Physics 1250 and 1251
- Statistics 3450

Application to the major is not allowed until the semester during which the EPHR courses are to be completed.

Program Educational Objectives

The program educational objectives of the mechanical engineering undergraduate program are to educate graduates who will be ethical, productive and contributing members of society. As they progress after graduation, our alumni will do the following:

1. Use their engineering foundation for success in
   - Technical careers in industry, academia, government or other organizations
   - Graduate school in engineering
   - Nontechnical careers in areas such as law, medicine, business, public policy, secondary education, service industries, etc.
   - Careers involving engineering practice, research and development, or engineering education, management or service
   - Careers involving management or entrepreneurship

2. Use lifelong learning skills to
   - Take advantage of professional development opportunities in their disciplines
   - Develop new knowledge and skills and pursue new areas of expertise or careers
   - Adapt to changing global markets and workforce trends

3. Engage in professional service by
   - Using their engineering background to advance society and to help solve technical and societal problems
   - Developing new knowledge and products that will promote sustainable economic development to improve the quality of life
   - Promoting the practice of engineering as a source of societal good

The Student Outcomes supporting our Educational Objectives can be found at go.osu.edu/me_outcomes.

Mechanical Engineering Requirements

Summary of the major requirements for mechanical engineering:

- Engineering survey (1 course)
- Fundamentals of Engineering (2 courses)
- Chemistry (1 course)
- Electrical circuits and electronic devices (1 course)
- Manufacturing process engineering (1 course)
- Engineering economics (1 course)
- Materials science, biology or additional chemistry (1 course)
- Mathematics (4 courses)
- Mechanical engineering core (16 courses)
- Physics (2 courses)
- Statistics (1 course)
- Technical electives (12 credit hours)

Major requirements total 107 credit hours. General Education courses add 24 credit hours, bringing the total credit hours for the mechanical engineering degree to 131.

For more information, check these websites:

Mechanical Engineering: mae.osu.edu
College of Engineering: engineering.osu.edu
Ohio State: osu.edu
Admissions: undergrad.osu.edu
Multicultural Center: multiculturalcenter.osu.edu
First Year Experience: fye.osu.edu
Curriculum Sample
This is a sample list of classes a student will take to pursue a Bachelor of Science in Mechanical Engineering (BSME). Since university students need more than specific education in a narrow field, they also will take classes to complete General Education (GE) requirements. Because GE courses come from a variety of academic areas of study, this course work helps students develop fundamental skills essential to collegiate success and allows them to tailor these courses toward their interests. Note: This sample represents one of several possible paths to a degree in mechanical engineering. Consult the departmental website, mae.osu.edu, for details.

Freshman Year:
Engineering survey 1
Fundamentals of Engineering 4
Calculus and Analytic Geometry 10
Chemistry 4
Physics 5
GE courses 6
Total hours 34

Sophomore Year:
Intro to Design in Mechanical Engineering 3
Numerical Methods in Mechanical Engineering 3
Linear Algebra, ODEs, and PDEs 6
Physics 5
Statistics 2
Statics 2
Mechanics of Materials 3
Dynamics 3
Engineering Economics 2
Materials science, biology or chemistry 4
GE courses 3
Total hours 32

Junior Year:
Design of Machine Elements 7
Electrical Circuits and Electronic Devices 3
Fluid Mechanics 3
System Dynamics, Vibration and Control 6
Thermodynamics 3
Measurements and Data Analysis in ME 3
GE courses 6
Total hours 31

Senior Year:
Heat Transfer 3
Capstone Design 5
Capstone Laboratory 2
Manufacturing and Process Engineering 3
Technical electives 12
GE courses 9
Mechanical engineering senior exit survey Total hours 34

Ohio State’s mechanical engineering program is accredited by the Engineering Accreditation Commission of ABET, abet.org.

Co-Curricular Opportunities
There are many opportunities for undergraduates to get involved in student chapters of national societies, organizations and various project teams. The student organization link on mae.osu.edu lists those organizations and project teams associated with the Department of Mechanical and Aerospace Engineering.

The College of Engineering helps undergraduate engineering students obtain career-related employment of three types: cooperative education, internships and part-time jobs. For more information, consult the Engineering Co-op and Internship Program (ECIP) at ecs.osu.edu.

Honors, Research and BS/MS Programs
The mechanical engineering program provides high-achieving and creative students research opportunities that result in graduating with either research distinction or Honors research distinction. Eligible students work one-on-one with a faculty member to develop an individual research project, earn six credit hours of technical elective credit, and write an undergraduate thesis that will require an oral defense to a faculty committee. To qualify for the research distinction program, students must have an overall 3.0 GPA going into their final year of studies in the mechanical engineering curriculum, and for the Honors research distinction program, at least a 3.4 overall GPA.

Students with at least a 3.5 overall GPA are also eligible for the BS/MS combined degree program. This is an efficient way to earn a master’s degree, as students have the opportunity to double-count credit from their undergraduate degree toward a graduate degree in the Department of Mechanical and Aerospace Engineering. Students in this program are normally accepted at the end of their junior year and begin taking graduate-level courses during their final year of studies. Most students can complete master’s requirements in three semesters after completing a bachelor’s degree.

Career Prospects in Mechanical Engineering
Perhaps the greatest single reason for studying mechanical engineering is to prepare students for employment in a wide range of exciting industries including aerospace, automotive, biomedical, chemical, computers, electronics, fossil and nuclear power, manufacturing, pharmaceuticals, robotics, and textiles.

Mechanical engineers find employment in eight broad classifications within the field: research, development, design, testing and evaluation, production and manufacturing, operation and maintenance, marketing and sales, and administration. The breadth of the mechanical engineering program also provides for greater mobility for career shifts later in life. Additionally, a Bachelor of Science in Mechanical Engineering can open the door to post-graduate study in several engineering fields, business, law, and medicine.

Beginning salaries for graduates with a degree in mechanical engineering range from $53,000 to $74,000 with the average being around $63,000. Salaries depend on candidates’ skills, previous work experience and other factors determined by various employers including the willingness to relocate. For more information on jobs, visit ecs.osu.edu.

Revised July 2015. Information subject to change. For the most up-to-date information on the mechanical engineering program, visit mae.osu.edu.

Contact information:
Mechanical and Aerospace Engineering
250 Scott Lab | 201 West 9th Ave | Columbus, Ohio 43210-1142
614-292-0515 | maeadvisor@osu.edu