MICHIGAN ENGINEERING
UNIVERSITY OF MICHIGAN

Aerospace Engineering

WHAT IS AEROSPACE ENGINEERING?

Aerospace engineers design, develop, and test aircraft, spacecraft, and missile systems and supervise the manufacture and operation of these systems. Those who work with aircraft are called aeronautical engineers, and those working specifically with spacecraft are astronautical engineers. Aerospace engineers develop new technologies for use in aviation, defense systems, and space exploration, often specializing in areas such as aerodynamics, structural design, guidance, navigation and control, propulsion, instrumentation and communication, or production methods. They also may specialize in a particular type of aerospace system, such as commercial aircraft, military fighter jets, helicopters, jet engines, spacecraft, or missiles and rockets, and may become experts in aerodynamics, thermodynamics, structural mechanics, celestial mechanics, propulsion, acoustics, or guidance and control systems. *

NEEDED SKILLS:

- Decision-making and problem-solving
- Data analysis
- Computer skills
- Active learning - always learning about new ideas, strategies, etc.
- Communication skills, both written and interpersonal
- Time management
- Mathematical reasoning **

INDUSTRIES AND OCCUPATIONS

- Aerospace industry/aerospace parts manufacturing
- Federal Government
- Automotive & other transportation industries
- Navigational instruments manufacturing
- Architectural & landscape engineering
- Scientific research
- Business consulting & management
- Computer systems design industry **

JOB TITLES

- Flight Engineer
- Aerodynamics Analyst
- Design Engineer
- Dynamicist
- Aerospace Stress Engineer
- Flight Systems Test Engineer
- Thermodynamicist
- Aviation Consultant
- Space Engineer
- Propulsion Engineer
- Vibration Engineer **

JOB OUTLOOK

Employment of aerospace engineers is expected to decline 2% from 2014 to 2024. Some aerospace engineers work on projects that are related to national defense and thus require security clearances. These restrictions will help to keep jobs in the United States. In addition, aircraft are being redesigned to cut down on noise pollution and to raise fuel efficiency, increasing demand for research and development. However, growth will be tempered since many of these engineers are employed in manufacturing industries that are projected to grow slowly or decline.*

SALARIES

$107,830. *

The nationwide average salary for employees with a bachelor's degree in Aerospace Engineering

$61,692

UM graduates average starting salaries

Courtesy of the Engineering Career Resource Center

MORE INFORMATION

- www.myplan.com
- stats.bls.gov/ooh
- www.aia-aerospace.org/ (Aerospace Industries Association)
- www.aiaa.org/ (American Institute of Aeronautics and Astronautics)
- Engineering Career Resource Center, 230 Chrysler
- See an AERO advisor. Sign up on the EAC website or contact the AERO Department at 3054A FXB or 734-764-3310.

Information from http://www.bls.gov/ooh/
**Information from: www.myplan.com*

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WHICH AEROSPACE CLASSES SHOULD YOU START WITH?

To begin the Aero major, a good option is to take two of the four sophomore Aero classes, AERO 201, AERO 205, AERO 215 and AERO 225. These classes are prerequisites for further advancement within the Aero department, and AERO 201 or AERO 205 are courses that provide a good introduction to the aerospace engineering field. Aero faculty also recommend taking AERO 285, the Aerospace Engineering Seminar, in fall of sophomore year if possible. Then, other introductory courses include MECHENG 240 and MATSCIE 220. Keep in mind that Aero has a 3 credit advanced math/science elective requirement. Read more about the Aero Department at: http://aerospace.engin.umich.edu/

COURSE DESCRIPTIONS

AEROSP 201 – 3 credits
Introduction to Aerospace Engineering

Prerequisites: Preceded by Engr 100, Engr 101, Physics 140/141, and Math 116.
Flight vehicles in the atmosphere and in space. Flight technologies, including structures, materials, propulsion, aerodynamics, vehicle dynamics, flight control, flight information systems, and systems integration. An overview of aeronautics. Steady aircraft flight and performance. An overview of astronautics.

AERO 205 – 3 credits
Introduction to Aerospace Engineering Systems

Prerequisite: One of : Physics 140/141, Math 116, ENGR 101, or ENGR 100.
A Systems Engineering Experience: Introduces engineering processes by means of design, build, test and operation of flight vehicles. Exposure to technologies including: computer aided design, manufacturing, simulation, composites, mechanisms, instrumentation, and basic electronics. Embedded software development for data acquisition and processing, control, and communications. Individual and team projects.

AEROSP 285 – 1 credit
Aerospace Engineering Seminar

Prerequisite: Preceded by AEROSP 201 or AEROSP 245.
Seminars by noted speakers, designed to acquaint undergraduates with contemporary technologies and broader issues in the global aerospace enterprise. Technical communication based upon the seminars.

AEROSP 215 – 4 credits
Introduction to Solid Mechanics and Aerospace Structures

Prerequisites: Preceded or accompanied by Math 216 and AEROSP 201.
An introduction to the fundamental phenomena of solid and structural mechanics in Aerospace systems. Includes analysis and numerical methods of solutions used for design of thin-walled Aerospace structures. Emphasis is placed on understanding behavior particular to thin-walled structures.

AEROSP 225 – 4 credits
Introduction to Gas Dynamics

Prerequisites: Math 215, Chem 125/130, Physics 140/141.
An introduction to gas dynamics, covering fundamental concepts in thermodynamics and fluid dynamics. Topics include molecular and continuum concepts for fluids, first and second laws of thermodynamics, conservation laws for moving fluids, one-dimensional compressible flows, shocks and expansion waves, flows in nozzles, and two- and three-dimensional compressible flows.

MECHENG 240 – 4 credits
Dynamics & Vibrations

Prerequisites: Physics 140, preceded or accompanied by Math 216.
Vector description of force, position, velocity and acceleration in fixed and moving reference frames. Kinetics of particles, of assemblies of particles and of rigid bodies. Energy and momentum concepts. Euler's equations. Moment of inertia properties. The simple oscillator and its applications.