**WHAT IS AEROSPACE ENGINEERING?**

Aerospace engineers design, develop, and test aircraft, spacecraft, and missile systems, and supervise the manufacture and operation of these systems. 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, flight software 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, software, or guidance and control systems. Aerospace engineers typically specialize in one of two types of engineering: aeronautical or astronautical. Aeronautical engineers work with aircraft. They are involved primarily in designing aircraft and propulsion systems and in studying the performance of aircraft. They work with the theory, technology, and practice of flight within the Earth’s atmosphere. Astronautical engineers work with the science and technology of spacecraft and how they perform inside and outside the Earth’s atmosphere. This includes work on small satellites such as cubesats, and traditional large satellites. Aeronautical and astronautical engineers face different environmental and operational issues in designing aircraft and spacecraft. However, the two fields overlap a great deal because they are both based on the same physics and engineering principles.

**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
- Scientific research
- Business consulting & management
- Computer systems industry

**JOB TITLES**
- Design Engineer
- Aerodynamics Analyst
- Structural Analyst
- Dynamicist
- Propulsion Engineer
- Flight Systems Test Engineer
- Space Engineer
- Vibration Engineer
- Flight Test Engineer
- Aviation Consultant

**SALARIES**
- $115,220*
  The nationwide median salary for employees with a bachelor’s degree in Aerospace Engineering
- $70,495
  UM graduates average starting salaries

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

**JOB OUTLOOK**

Employment of aerospace engineers is projected to grow 6 percent from 2016 to 2026, about as fast as the average for all occupations. Aircraft are being redesigned to cause less noise pollution and have better fuel efficiency, which will help sustain demand for research and development. In addition, as international governments refocus their space exploration efforts, new companies are emerging to provide access to space beyond the access afforded by standard governmental space agencies.

**MORE INFORMATION**
- www.myplan.com
- stats.bls.gov/ooh
- www.aia-aerospace.org/ (Aerospace Industries Association)
- www.aiia.org/ (American Institute of Aeronautics and Astronautics)
- Engineering Career Resource Center, 230 Chrysler
- Contact the AERO Department at 3054A FXB or 734-764-3310 or email Linda Weiss at lweiss@umich.edu
Aerospace Engineering

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, AEROSP 201, AEROSP 205, AEROSP 215 and AEROSP 225. These classes require 1st-Year Math, Physics or Chemistry courses and are prerequisites for further advancement within the Aero department. AEROSP 201, AEROSP 205 or AEROSP 225 are courses that provide a good introduction to the aerospace engineering field. Aero faculty also recommend taking AEROSP 285, the Aerospace Engineering Seminar, as soon as possible during the 1st or 2nd year. Another introductory course is MECHENG 240. Keep in mind that Aero requires a 3 credit advanced math/science elective.

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.

AEROSP 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 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.