



## Aerospace Engineering and Mechanics

Rev. Date:  
6/2015

### Freshman Year

#### Fall Semester

Math 1371 Calculus I  
*(placement into course or pre-req)*

Math 1372 Calculus II  
*(1371)*

Chem 1061/65 Chem Princ I  
*(placement into course, or 1015)*

CSci 1113 Intro to C/C++  
*(Math 1371)*

CSE 1001: 1st Yr Experience

Phys 1301W Intro Physics I  
*(&Math 1371)*

Liberal Education course

Lib Ed or Writ 1301/1401

Lib Ed or Writ 1301/1401

Lib Ed or Writ 1301/1401

### Sophomore Year

#### Fall Semester

Math 2374 Multivariable Calc  
*(1372)*

Phys 1302W Intro Physics II  
*(1301, &Math 1372)*

AEM 2011 Statics  
*(Phys 1301, &Math 2374)*

MatS 2001 Intro to Engrg Matls  
*(Chem 1061/65, Math 1372, Phys 1301, CSE)*

#### Spring Semester

Math 2373 Lin Alg/Diff Eq.  
*(1372)*

AEM 2012 Dynamics  
*(2011, &Math 2373)*

AEM 2301 Mechanics of Flight  
*(Phys 1301, &Math 2373)*

Phys 2303 Phys III Phys of Matter  
*(Phys 1302)*

Liberal Education course

### Junior Year

#### Fall Semester

AEM 4201 Fluid Mechanics  
*(UD, 2012, Math 2373, Math 2374)*

AEM 3031 Deform Body Mech  
*(2011, Math 2374, &Math 2373)*

AEM 3101 Simulation  
*(UD, Math 2373)*

EE 3005 Fundamentals EE  
*(Phys 1302, Math 2373)*

EE 3006 Fund EE Lab  
*(&3005)*

#### Spring Semester

AEM 4202 Aerodynamics  
*(UD, 4201)*

AEM 4501 Aerospace Structures  
*(UD, 3031)*

AEM 4601 Instrumentation Lab  
*(UD, EE 3005, 3006, CSci 1113)*

AEM 4301 Orbital Mechanics  
*(UD, 2012, Math 2373)*

Liberal Education course

### Senior Year

#### Fall Semester

ME 3324 Intro to Thermal Science  
*(Chem 1061/65, Phys 1301, Math 2373)*

AEM 4331 Aero Vehicle Design  
*(AEM Sr., 2301, 4202)*

AEM 4602W Aeromechanics Lab  
*(UD, 4201, 4501, 4601, Writ 1301)*

Technical Elective I

Liberal Education course

#### Spring Semester

AEM 4203 Aerospace Propulsion  
*(UD, 4202)*

AEM 4303W Flight Dyn Control  
*(UD, 2012, 2301, 3101, Writ 1301)*

Technical Elective II

Technical Elective III

### About This Plan

- This plan is not a contract. Curriculum can change.
- Shaded courses are only offered in the indicated semester.
- Course pre-requisites and co-requisites (designated by &) are listed below the course number and title. UD requires admission to the major prior to enrollment.
- Students can take either the CSE-only or University-wide versions of the math courses (1371/1271, 1372/1272, 2373/2243, 2374/2263).
- Students can take Phys 2503 in the fall in place of Phys 2303.
- Double-boxed courses are required for application to this major.
- Chemical Principles lab (1065) must be taken with the lecture (1061).
- Liberal Education and Writing requirements with an (\*) will be fulfilled by taking courses required for this major at UM-TC.

### Applying to your Major

Students who have completed the required courses for admission to this major and have a 3.2 UM-TC technical GPA at the end of the fall semester will be guaranteed admission. All other students who have completed the required courses will be considered for admission on a space-available basis. Admission following the spring semester is only based on space availability. The major application database is available at [z.umn.edu/csemajorapp](http://z.umn.edu/csemajorapp).

### Department Contact Information

- Website: [www.aem.umn.edu/teaching/undergraduate/advising\\_guide/](http://www.aem.umn.edu/teaching/undergraduate/advising_guide/)
- Main Phone: 612-625-8000; Main Office: 107 Akerman Hall
- Director of Undergraduate Studies: Professor Tom Shield
- Email: [aem-dugs@umn.edu](mailto:aem-dugs@umn.edu)
- Permission Number Website: [www.aem.umn.edu/srs](http://www.aem.umn.edu/srs)

### University Degree Requirements

All students must complete the following Writing & Liberal Education requirements, as noted on their APAS report. See link for full Core & Theme names: [z.umn.edu/liberaleducation](http://z.umn.edu/liberaleducation)

#### Writing Requirements:

University Writing:  
Writ 1301/1401 or equivalent

#### Writing Intensive (WI):

Two: 1xxx or 2xxx level \*\*  
One: 3/4/5xxx level (in major)\*  
One: 3/4/5xxx level (any dept.)\*

#### Liberal Education

CORES:	THEMES:
Bio	<b>4 of 5:</b>
Phy*	Civ
His	DSJ
SocS	Env
Ltr	GP
AH	TS
Mth*	

**Total Credits Needed for Degree: 122**

# What can I do with a major in aerospace engineering and mechanics?

Aerospace engineers design, develop, and test new technologies for use in aviation, defense systems, and space exploration. They often specialize in areas such as structural design, guidance, navigation and control, instrumentation and communication, and production methods. They may also specialize in a particular type of aerospace product, such as commercial transports, military fighter jets, helicopters, spacecraft, or missiles and rockets. Many aerospace engineers use computer-aided design (CAD) software, robotics, and advanced electro-optics and lasers. Aerospace engineers may be experts in a particular area, such as aerodynamics, thermodynamics, flight mechanics, guidance and control systems, propulsion, or acoustics.

An aerospace engineer is often a specialist in a particular area such as aerodynamics, fluids, propulsion, heat transfer, structures, aerodynamics, or flight mechanics. Aerospace engineers often apply their knowledge to related fields such as environmental engineering and mechanical engineering.

## Employers *(sample listing)*

ATK	NAVAIR	Honeywell
Federal Aviation Administration	Eaton Corp	The Aerospace Corp
NASA	General Electric	ExxonMobil
Boeing	Schlumberger	Lockheed Martin
FM Global	Emerson Process Mgmt	UTC Aerospace Systems

## Industries *(sample listing)*

Aircraft Design	Space Flight Research	Consulting
Aircraft Parts Manufacturing	Marketing	Satellite Design and Construction
National Defense	Insurance	Propulsion Engineering
Higher Education	Rocketry	

## Positions *(sample listing)*

**Development Engineer:** Applies research findings to develop new or improved products or manufacturing processes.

**Analytical Engineer:** Conducts in-depth assessments of proposed products and evaluates whether the design of each product meets customer requirements.

**Design Engineer:** Takes the concept or working model of a product and creates a design that meets the customer's requirements and industry standards and can be manufactured economically.

**Test Engineer:** Designs and oversees the performance testing of products in wind tunnels as well as in actual flight.

**Project Engineer:** Plans, directs, and coordinates activities of company projects.

**Sales Engineer:** Contacts customers and makes sales presentations to demonstrate how products or services can fulfill particular needs.

**Field Service Engineer:** Examines performance reports on products and makes recommendations to solve problems.

**Systems Engineer:** Defines the customer's requirements and analyses the overall system and subsystem.

**Materials Engineer:** Tests and evaluates materials (conventional or composite) used in aerospace structures.

**Manufacturing Engineer:** Plans the tooling, construction, and assembly of a product as dictated by the design specifications.

*Examples from "Career Opportunities in Aviation and the Aerospace Industry" and AIAA.*

*\*Some positions may require an advanced degree*

**Career Center**  
[cse.umn.edu/career](http://cse.umn.edu/career)  
**Salary Information**  
[z.umn.edu/csosalary](http://z.umn.edu/csosalary)  
**More Information on Undergraduate Majors**  
[cse.umn.edu/majors](http://cse.umn.edu/majors)