Aerospace Engineering Major

Degree Type
Bachelor of Science

The normal period of residency at WPI is 16 terms. In addition to the WPI requirements applicable to all students (see WPI Degree Requirements) students wishing to receive a Bachelor degree in "Aerospace Engineering", must satisfy additional distribution requirements. These requirements apply to 10 units of study in the areas of mathematics, basic sciences, aerospace engineering science and design.

Program Distribution Requirements for the Aerospace Engineering Major

Mathematics and Basic Sciences (Minimum 10/3 Units)

Mathematics (Minimum 7/3 Units)

Must include a minimum of 7/3 Units of mathematics (prefix MA) with topics in: differential, integral, vector, multivariable calculus, differential equations, linear algebra, and applied statistics.

Recommended Courses

Item #	Title	Units
MA 1021	Calculus I	1/3
MA 1022	Calculus II	1/3
MA 1023	Calculus III	1/3
MA 1024	Calculus IV	1/3
MA 2051	Ordinary Differential Equations	1/3
MA 2071	Matrices and Linear Algebra I	1/3
MA 2611	Applied Statistics I	1/3

Physics (Minimum 2/3 Units)

Must include a minimum of 2/3 Units in physics (prefix PH) with topics in: mechanics; electricity and magnetism.

Recommended Courses

Item #	Title	Units
PH 1110	General Physics—Mechanics	1/3
PH 1111	Principles of Physics—Mechanics	1/3
PH 1120	General Physics—Electricity and Magnetism	1/3
PH 1121	Principles of Physics—Electricity and Magnetism	1/3

Chemistry (Minimum 1/3 Unit)

Must include 1/3 Unit in chemistry (prefix CH).

Recommended Courses

Item #	Title	Units
CH 1010	Chemical Properties, Bonding, and Forces	1/3
CH 1020	Chemical Reactions	1/3

Engineering Topics (Minimum 20/3 Units)

Must include 20/3 Units of Engineering Topics, distributed as follows:

Core Aerospace Engineering (Minimum 11/3 Units)

Fluid Dynamics (Minimum 2/3 Units)

2/3 Units of Fluid Dynamics, with topics in: incompressible fluid dynamics; compressible fluid dynamics.

Recommended Courses

Item #	Title	Units
AE 2110	Introduction to Incompressible Fluid Dynamics	1/3
AE 3110	Fundamentals of Compressible Fluid Dynamics	1/3

Propulsion and Energy (Minimum 1/3 Unit)

1/3 Unit in Propulsion and Energy, with topics in: thermal engineering.

Recommended Courses

Item #	Title	Units
AE 2210	Introduction to Thermal Engineering	1/3

Materials and Structures (Minimum 4/3 Units)

4/3 Units in Materials and Structures, with topics in: materials; aerospace structures; structural dynamics.

Recommended Courses

Item #	Title	Units
ES 2001	Introduction to Materials Science	1/3
AE 2410	Introduction to Aerospace Structures	1/3
AE 3420	Fundamentals of Aerospace Structures	1/3
AE 4410	Fundamentals of Structural Dynamics	1/3

Flight Dynamics and Controls (Minimum 2/3 Units)

2/3 Units in Flight Dynamics and Controls, with topics in: dynamics; controls.

Recommended Courses

Item #	Title	Units
AE 2310	Introduction to Aerospace Control Systems	1/3
ES 2503	Introduction to Dynamic Systems	1/3

General Engineering (Minimum 2/3 Units)

1/3 Unit in General Engineering, with topics in: Experimentation.

Recommended Courses

Item #	Title	Units
AE 3010	Experimentation and Data Science with Aerospace Engineering Applications	1/3
ME 3901	Engineering Experimentation	1/3
ME 3902	Project-Based Engineering Experimentation	1/3

1/3 Unit in General Engineering, with topics in: space environments.

Recommended Courses

Item #	Title	Units
PH 2550/AE 2550	Atmospheric and Space Environments	1/3

*Aeronautics *OR* Astronautics Track (Minimum 9/3 Units)*

Aeronautics Track

Fluid Dynamics (Minimum 1/3 Unit)

1/3 Unit in Fluid Dynamics with topics in: aerodynamics.

Recommended Courses

Item #	Title	Units
AE 3120	Fundamentals of Aerodynamics	1/3

Propulsion and Energy (Minimum 1/3 Unit)

1/3 Unit in Propulsion and Energy, with topics in: air breathing propulsion.

Recommended Courses

Item #	Title	Units
AE 4210	Fundamentals of Air-Breathing Propulsion	1/3

Materials and Structures (Minimum 1/3 Unit)

1/3 Unit in Materials and Structures with topics in: composites.

Recommended Courses

Item #	Title	Units
AE 3430	Fundamentals of Composite Materials	1/3

Flight Dynamics and Controls (Minimum 1/3 Unit)

1/3 Unit in Flight Dynamics and Controls with topics in: aircraft dynamics and control.

Recommended Courses

Item #	Title	Units
AE 4310	Fundamentals of Aircraft Dynamics and Control	1/3

Aerospace Design (Minimum 4/3 Units)

4/3 Units in Aerospace Design with topics in: 1/3 Unit in aircraft design; and 3/3 Units MQP.

Recommended Courses

Item #	Title	Units
AE 4510	Aircraft Design	1/3

Astronautics Elective (Minimum 1/3 Unit)

1/3 Unit in Astronautics Elective, with topics in: orbital mechanics or navigation and communications or rocket propulsion or spacecraft dynamics and control.

Recommended Courses

Item #	Title	Units
AE 2320	Introduction to Orbital Mechanics	1/3
AE 3310	Fundamentals of Navigation and Communication	1/3
AE 4220	Fundamentals of Rocket Propulsion	1/3
AE 4320	Fundamentals of Spacecraft Dynamics and Control	1/3

Astronautics Track

Propulsion and Energy (Minimum 1/3 Unit)

1/3 Unit in Propulsion and Energy, with topics in: rocket propulsion.

Recommended Courses

Item #	Title	Units
AE 4220	Fundamentals of Rocket Propulsion	1/3

Flight Dynamics and Control (Minimum 3/3 Units)

3/3 Units in Flight Dynamics and Control, with topics in: orbital mechanics; navigation and communication; spacecraft flight dynamics and control.

Recommended Courses

Item #	Title	Units
AE 2320	Introduction to Orbital Mechanics	1/3
AE 3310	Fundamentals of Navigation and Communication	1/3
AE 4320	Fundamentals of Spacecraft Dynamics and Control	1/3

Aerospace Design (Minimum 4/3 Units)

4/3 Units in Aerospace Design with topics in: 1/3 Unit spacecraft and mission design; and 3/3 Units MQP.

Recommended Courses

Item #	Title	Units
AE 4520	Spacecraft and Mission Design	1/3

Aeronautics Elective (Minimum 1/3 Unit)

1/3 Unit in Aeronautics Elective, with topics in: aerodynamics or air breathing propulsion or composite materials or aircraft dynamics and control.

Recommended Courses

Item #	Title	Units
AE 3120	Fundamentals of Aerodynamics	1/3
AE 3430	Fundamentals of Composite Materials	1/3
AE 4210	Fundamentals of Air-Breathing Propulsion	1/3
AE 4310	Fundamentals of Aircraft Dynamics and Control	1/3

Note: Great Problem Seminar (GPS) courses can only be used to fulfill the HUA, SSPS or the Free Elective requirement.

Major Qualifying Projects

The Aerospace Engineering Program offers opportunities, resources, and organization for Major Qualifying Projects (MQPs). These projects involve designing aerospace systems, components, or processes to meet specific needs while adhering to engineering standards and various constraints. They are based on the knowledge and skills gained in previous coursework and include the integration of aeronautical and/or astronautical engineering topics. MQPs are carried out in the HL 005 AED MQP Lab or other departmental laboratories, and may also involve collaboration with industry or government research centers. All students present their MQPs at a conference held at WPI during the Undergraduate Research Project Showcase. Additionally, students often participate in student conferences and national/international aerospace design competitions.

(https://www.wpi.edu/academics/departments/aerospace-engineering)