

Aerospace Engineering Undergraduate Minor Proposal

Context

An aerospace engineering minor is proposed within the School of Mechanical, Industrial and Manufacturing Engineering in the OSU College of Engineering. Aerospace engineering is a unique blend of all disciplines in engineering. In the state of Oregon, no university-level programs in aerospace engineering, major or minor, exist. Many talented high school students are going out of state to pursue a passion in aviation or astronautics. This minor would, in particular, attract students with a wide range of aero-related interests including dynamics and controls, materials science, robotics, thermal-fluid sciences, design, and electrical and computer engineering and computer science. Since the founding of the student branch of the American Institute of Aeronautics and Astronautics (AIAA) in 2012 the number of student competition teams, affiliated research in the aerospace fields, and aero-related STEM and outreach activities has significantly increased. There has been a strong interest among women in mechanical engineering in aeronautics and astronautics, as evidenced by the number of women participating in aero-related capstone design projects and competitions. The aero-themed section of MIME 101 (our first-year introductory course) continues to show strong enrollment numbers among first-year females, as well. In addition, the minor in aerospace engineering would be an asset for returning veterans or ROTC students that have had experiences in aviation or astronautics during their service. These concepts are aligned with the strategic goals of OSU and with current hiring practices now in the aerospace industry.

The technical challenges in aerospace fields today reflect both national and global concerns. Safe and fuel-efficient air travel, the growing use of Unmanned Aircraft Systems (UAS) in human-centered, commercial and defense sectors, and the ability to successfully launch and deploy satellites for communications, science missions (i.e., global warming research), and space exploration continue to be important investments in private industry and national and international governments. In the context of our engineering program here at OSU, offering an aerospace minor will help directly connect our graduates to the aerospace industry. The aerospace sector in the Pacific Northwest has been growing, including companies such as Columbia Helicopters, Boeing, Blue Origin, NorthWest UAV, Insitu, and Near Space (many of our graduates have joined these companies). In the context of this minor, the ability to solve current and future technical challenges in these industries lies with an engineering workforce that has an aerospace academic foundation.

Typically, engineers in professional aerospace industries have degrees in mechanical or aerospace engineering. There are programs at a number of engineering programs that offer a minor in aerospace engineering, including the University of Texas and Cornell University. A minor in aerospace engineering within MIME would include those courses in which design, dynamics and control, materials science and thermal fluid sciences have a strong emphasis in aerospace sciences. This would be an asset for OSU engineering graduates when applying for not only aerospace industry positions, but post-graduate programs in aerospace fields, as well.

OSU's growing presence in aviation and aerospace is complemented by the development of new transdisciplinary courses that cross boundaries within mechanical engineering and are identified

by the designator AAE (course designator proposal is attached). Due to the prerequisites for the courses under the AAE designator, with the exception of the sophomore course Introduction to Aerospace Engineering, it is expected that primarily engineering majors will elect to participate in an aero minor program. Courses that are now in place for the minor include:

Introduction to Aerospace Engineering; Aerospace Applications in Mechanical Engineering; UAV Engineering; Space Systems Engineering; and Aero Vehicle Design Laboratory. Additional courses to be developed to support the Minor include: Aerospace Structures; Dynamics of Flight Vehicles; and Propulsion.

The offering of an aerospace engineering minor is consistent with the language and emphasis in the university’s SP3.0, released in 2014. OSU highly values interdisciplinary efforts, diversity, internationalization, and service to the local and global community, all priorities within the aerospace engineering minor curriculum.

Alignment with OSU’s Learning Goals for Graduates

A minor in aerospace engineering will provide additional scaffolding for OSU’s Learning Goals for Graduates, with particular emphasis on the categories outlined in the table below.

Minor Requirement	Outcomes	Assessment
AAE core with engineering emphasis (11 cr)	Competency and Knowledge in Multiple Fields	Successful completion of a AERO core with engineering emphasis to lay a foundation for understanding aerospace engineering-related problems
	Critical Thinking	
	Collaboration	
	Social Responsibility and Sustainability	
	Communication	
Thematic Electives (8 cr)	Competency and Knowledge in Multiple Fields	Successful completion of a suite of AAE thematic electives as approved by an academic advisor
	Critical Thinking	
	Social Responsibility and Sustainability	
Experiential learning and understanding of aerospace industry practices (8 cr)	Competency and Knowledge in Multiple Fields	Completion of an approved Capstone Design project
	Social Responsibility and Sustainability	
	Self-Awareness and Lifelong Learning	