HYPERSONICS - GRADUATE CERTIFICATE

This certificate recognizes student accomplishments at the graduate level in successfully completing a specialized program of study in the cross-disciplinary field of hypersonics. It is sponsored by the Ann and H. J. Smead Department of Aerospace Engineering Sciences (AES) and the Paul M. Rady Department of Mechanical Engineering (ME) and involves courses from AES and ME.

The purpose of the certificate is to develop interdisciplinary skills in the field of hypersonics, which requires knowledge about fundamental areas such as gas dynamics, materials, controls, and how their inter-relationships determine hypersonic vehicle performance.

This certificate is available to graduate degree-seeking and non-matriculated students. Additional certificate information can be found on the department's Hypersonics Certificate (https://www.colorado.edu/aerospace/academics/graduates/curriculum/certificate-programs/hypersonics-certificate/) webpage.

Distance Education Option

Students can take individual courses toward a master's degree or graduate certificate through distance education (online). For more information, connect with the individual graduate program directly.

Requirements

Admission Requirements

- Completed undergraduate degree from an institution accredited by an agency recognized by the U.S. Department of Education or its equivalent.
- Undergraduate courses in calculus, linear algebra and differential equations; two semesters of undergraduate calculus-based physics; and at least two semesters of upper-division undergraduate courses in engineering or physics.
- Ability to program at a level that will enable successful completion of graduate course assignments.

For more information, degree-seeking students may visit the AES Certificates (https://www.colorado.edu/aerospace/academics/graduates/curriculum/certificates/) webpage; nondegree-seeking and non-matriculated students may visit the AES Certificates & Continuing Education (https://www.colorado.edu/aerospace/admissions/graduates/degree-programs/certificates-continuing-education/) webpage.

Required Courses and Credits

The standard requirements of this certificate program are the completion of twelve (12) hours of graduate-level coursework (typically four 3-credit courses) with grades of B or higher in each course. Students also pursuing other graduate certificates may *not* use the same courses to count for both certificates.

There is one required course, ASEN 5519 Special Topics (Introduction to Hypersonics). Each student is free to choose the other three courses from the elective list below.

Code	Title	Credit Hours
Course Requirements		
ASEN 5519	Special Topics (Intro to Hypersonics)	3
Electives		
Choose three:		9
ASEN 5018	Graduate Projects I (Specifically focused on hypersonics, approved by certificate coordinator)	
or ASEN 6028	Graduate Projects II	
ASEN 5121	Boundary Layers and Convection	
ASEN 5151	Fundamentals of Gas Dynamics	
ASEN 5212	Composite Structures and Materials	
ASEN 5519	Special Topics (Hypersonic Vehicle Design Project)	
ASEN 5519	Special Topics (Molecular Thermo & Kinetics)	
ASEN 5849	Independent Study (Specifically focused on hypersonics, approved by certificate coordinator)	
ASEN 6015	Space Vehicle Guidance and Control	
ASEN 6037	Turbulent Flows	
ASEN 6061	Molecular Gas Dynamics and DSMC	
ASEN 6331	Computational Fluid Dynamics	
MCEN 5022	Classical Thermodynamics	
MCEN 5024	Materials Chemistry and Structures	
MCEN 5042	Heat Transfer	
MCEN 5152	Introduction to Combustion	
MCEN 5228	Special Topics in Mechanical Engineering (High Temperature Materials)	
MCEN 6001	Reacting Flows	
Total Credit Hours		**12**