ASTRODYNAMICS AND SATELLITE NAVIGATION SYSTEMS - GRADUATE CERTIFICATE

The Astrodynamics and Satellite Navigation Systems Certificate recognizes student accomplishments at the graduate level in successfully completing a specialized program of study in Astrodynamics and Satellite Navigation (ASN). It is essentially a specialization of the AES MS degree in the ASN focus area, with additional requirements for breadth and depth in the ASN area. The certificate will make students more desirable to future employers looking for astrodynamics and satellite navigation specialists.

This certificate is available to graduate degree-seeking and non-matriculated students. Additional certificate information can be found on the department's Astrodynamics and Satellite Navigation Systems Certificate (https://www.colorado.edu/aerospace/current-students/graduates/curriculum/certificate-programs/asn-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

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

Certificate Requirements

Complete all four core area subjects in ASN, plus two advanced ASN courses of the student's choosing (18 credit hours).

Grades of B or higher are required for fulfillment of requirements and certificate award. Students also pursuing other graduate certificates may not use the same courses to count for both certificates.

Code	Title	Credit Hours
Core Requirements [1]		
ASEN 5010	Spacecraft Attitude Dynamics and Control	3
ASEN 5044	Statistical Estimation for Dynamical Systems [2]	3
ASEN 5050	Space Flight Dynamics	3
or ASEN 5052	Analytical Astrodynamics	
ASEN 5090	Introduction to Global Navigation Satellite Systems	3
Advanced Requirements		
Select any two 6000-level ASN courses, including but not limited to:		6
ASEN 6008	Interplanetary Mission Design	
ASEN 6010	Advanced Spacecraft Dynamics and Control	
ASEN 6014	Spacecraft Formation Flying	
ASEN 6015	Space Vehicle Guidance and Control	
ASEN 6020	Optimal Trajectories	
ASEN 6060	Advanced Astrodynamics	
ASEN 6070	Satellite Geodesy	
ASEN 6080	Statistical Orbit Determination	
ASEN 6084	Optical Multi-Target Tracking	
ASEN 6090	Advanced Global Navigation Satellite Systems: Software and Applications	
ASEN 6091	Global Navigation Satellite System (GNSS) Receiver Architecture	
ASEN 6519	Special Topics [3]	
Total Credit Hours		**18**

[1]   Any core requirement can be satisfied by taking an additional 6000-level course which has the corresponding core requirement as a prerequisite. *This substitution does not require a petition.*

[2]   Students are allowed to use ASEN 5044 to satisfy the certificate requirement AND a math course requirement for the MS and/or PhD.

[3]   Topics include GNSS for Remote Sensing and Celestial Mechanics & Advanced Astrodynamics.