

# AEROSPACE ENGINEERING SCIENCES - PROFESSIONAL MASTER OF SCIENCE (MSAES)

A professional master's degree (MSAES) in aerospace engineering sciences from CU Boulder is designed for working engineers and people planning to pursue a career in industry. We designed the program with industry partners to meet your needs, further your career and with your location in mind—the degree can be earned on campus or 100 percent online.

For more information, visit the department's Prospective Graduate Students (<https://www.colorado.edu/aerospace/prospective-students/graduates/>) webpage.

## Requirements

### Program Requirements

Students must complete a total of 30 credit hours, equivalent to 10 classes, with a grade of B- or better and a cumulative GPA of at least 3.00. Of these 30 credits, at least 24 credit hours must be completed at the 5000 level or above, and at least 18 of those credits must be in Aerospace Engineering (ASEN) courses, and one approved math course. (Note: EMEN 5405 Fundamentals of Systems Engineering counts as an ASEN class. Seminar credits, even those earned in other disciplines, do not count toward the MS degree.)

Up to 6 credits can be taken at the 4000 level in approved engineering, math and science departments (ECEN, CVEN, MCEN, CHEN, CSCI, ATOC, ASTR, PHYS, MCDB, APPM, MATH, STAT, CHEM, IPHY, GEOL, ENVD). ASEN courses level 4000 or below do not count towards AES graduate degrees.

Code	Title	Credit Hours
<b>ASEN Courses</b>		<b>18</b>
Choose from the list below (subject to change)		
ASEN 5007	Introduction to Finite Elements	
ASEN 5010	Spacecraft Attitude Dynamics and Control	
ASEN 5012	Mechanics of Aerospace Structures	
ASEN 5014	Linear Control Systems	
ASEN 5016	Space Life Sciences	
ASEN 5022	Dynamics of Aerospace Structures	
ASEN 5050	Space Flight Dynamics	
ASEN 5051	Fundamentals of Fluid Dynamics	
ASEN 5052	Analytical Astrodynamics	
ASEN 5090	Introduction to Global Navigation Satellite Systems	
ASEN 5111	Introduction to Aeroelasticity	
ASEN 5114	Automatic Control Systems	
ASEN 5148	Spacecraft Design	
ASEN 5151	Fundamentals of Gas Dynamics	
ASEN 5158	Space Habitat Design	
ASEN 5168	Remote Sensing Instrumentation Design	
ASEN 5188	Fundamentals of Systems Engineering	

ASEN 5218	Large Space Structures Design
ASEN 5235	Introduction to Atmospheric Radiative Transfer and Remote Sensing
ASEN 5245	Radar and Remote Sensing
ASEN 5335	Aerospace Environment
ASEN 5440	Mission Design and Development for Space Sciences
ASEN 5519	Special Topics (Molecular Thermodynamics and Kinetics)
ASEN 6008	Interplanetary Mission Design
ASEN 6010	Advanced Spacecraft Dynamics and Control
ASEN 6011	Experimental Fluid Mechanics
ASEN 6014	Spacecraft Formation Flying
ASEN 6015	Space Vehicle Guidance and Control
ASEN 6020	Optimal Trajectories
ASEN 6024	Nonlinear Control Systems
ASEN 6050	Space Instrumentation
ASEN 6055	Data Assimilation & Inverse Methods for Earth & Geospace Observations
ASEN 6060	Advanced Astrodynamics
ASEN 6061	Molecular Gas Dynamics and DSMC
ASEN 6070	Satellite Geodesy
ASEN 6080	Statistical Orbit Determination
ASEN 6090	Advanced Global Navigation Satellite Systems: Software and Applications
ASEN 6091	Global Navigation Satellite System (GNSS) Receiver Architecture
ASEN 6107	Nonlinear Finite Element Methods
ASEN 6116	Spacecraft Life Support Systems
ASEN 6216	Human Operation of Aerospace Vehicles
ASEN 6265	Fundamentals of Spectroscopy for Optical Remote Sensing
ASEN 6337	Remote Sensing Data Analysis
ASEN 6365	Lidar Remote Sensing
ASEN 6367	Advanced Finite Element Methods for Plates, Shells, and Solids

<b>Math Course</b>		<b>3</b>
Choose from one of the following approved options:		
ASEN 5044	Statistical Estimation for Dynamical Systems	
ASEN 5227	Mathematics for Aerospace Engineering Sciences I	
ASEN 5307	Engineering Data Analysis Methods	
ASEN 5417	Numerical Methods in Engineering and Science	
ASEN 6412	Uncertainty Quantification	
CSCI 5636	Numerical Solution of Partial Differential Equations	
ECEN 5612	Random Processes for Engineers	
ECEN 5632	Theory and Application of Digital Filtering	
ECEN 5652	Detection and Extraction of Signals from Noise	

EMEN 5005 Introduction to Applied Statistical  
Methods

4000, 5000, 6000, or 7000 level MATH course

4000, 5000, 6000, or 7000 level APPM course

4000, 5000, 6000, or 7000 level STAT course

---

<b>Additional Coursework</b>	<b>9</b>
------------------------------	----------

<b>Total Credit Hours</b>	<b>30</b>
---------------------------	-----------

### Time Limit

All degree requirements must be completed within four years of the date of commencing coursework.