

# REMOTE SENSING - GRADUATE CERTIFICATE

Remote sensing (satellite and ground-based) is increasingly being used as a technique to probe the Earth's atmosphere, ocean, and land surfaces. Probing of other planets is accomplished largely by satellite remote sensing. Given national priorities in such areas as climate and global change, the interest in remote sensing will only increase with time. Graduate students, research staff and faculty work on a wide variety of topics ranging from the theory of remote sensing, to instrument development and application.

This certificate is available to graduate degree-seeking and non-matriculated students. Additional certificate information can be found on the department's Remote Sensing Certificate (<https://www.colorado.edu/aerospace/current-students/graduates/curriculum/certificates/remote-sensing-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 (<https://www.colorado.edu/aerospace/academics/graduates/curriculum/certificates/>) webpage; nondegree and non-matriculated students may visit the AES Certificates & Continuing Education (<https://www.colorado.edu/aerospace/admissions/graduates/degree-programs/certificates-continuing-education/>) webpage.

### Certificate Requirements

Four courses are required totaling at least 12 credit hours.

- Two courses from one of the following topical areas (6 credit hours):
  - Data analysis
  - Instrumentation and measurement techniques
  - Remote sensing theory
- One course in each of the two remaining topical areas (6 credit hours).

Note that MS students using the Remote Sensing Certificate for their degree requirements in lieu of an MS thesis or two semester graduate projects may count a maximum of 2 of the 4 required RSESS Focus Area courses toward the certificate requirement.

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
<b>Data Analysis Courses</b>		
ASEN 5307	Engineering Data Analysis Methods	3
ASEN 6337	Remote Sensing Data Analysis	3
ASTR 5550	Observations, Data Analysis and Statistics	3
ECEN 5244	Stochastic / Environmental Signal Processing	3
ECEN 5254	Remote Sensing Signals and Systems	3
ECEN 5612	Random Processes for Engineers	3
ECEN 5652	Detection and Extraction of Signals from Noise	3
GEOG 5103	Geographic Information Science: Spatial Analytics	4
GEOG 5203	Geographic Information Science: Spatial Modeling	4
GEOG 5303	Geographic Information Science: Spatial Programming	4

Code	Title	Credit Hours
<b>Instrumentation &amp; Measurement Techniques Courses</b>		
ASEN 5168		3
ASEN 5245	Radar and Remote Sensing	3
ASEN 6050	Space Instrumentation	3
ASEN 6091	Global Navigation Satellite System (GNSS) Receiver Architecture	3
ASEN 6365	Lidar Remote Sensing	3
ASTR 5760	Astrophysical Instrumentation	3
ECEN 5134	Electromagnetic Radiation and Antennas	3
GEOG 5100	Special Topics: Geography (Topic needs to be relevant to instrumentation/ measurement)	1-4
PHYS 5160	Fundamentals of Optics and Lasers	3

Code	Title	Credit Hours
<b>Remote Sensing Theory Courses</b>		
ASEN 6265	Fundamentals of Spectroscopy for Optical Remote Sensing	3
ATOC 5235	Introduction to Atmospheric Radiative Transfer and Remote Sensing	3
ATOC 5560	Radiative Processes in Planetary Atmospheres	3
ECEN 5264	Electromagnetic Absorption, Scattering, and Propagation	3
GEOG 5093	Remote Sensing of the Environment	4
GEOG 5100	Special Topics: Geography (Advanced Remote Sensing)	1-4
PHYS 5150	Introductory Plasma Physics	3