GIS AND COMPUTATIONAL SCIENCE - CERTIFICATE

The Department of Geography (GEOG) and the Department of Computer Science (CSCI) are offering a joint undergraduate certificate in GIS and computational science. The program draws upon faculty expertise in both departments, providing interdisciplinary training in spatial data analysis and computation, both of which characterize GIS in most career paths.

Geographic Information Scientists (GIScientists) have an ongoing concern with the collection, analysis and display of high precision spatial data. Computational geospatial skills are in high demand on campus and in local, regional and national job markets such as government employment, industry or consulting careers, and graduate school.

The certificate is available for all majors to apply to and may be of particular interest for students in other earth science disciplines and social science disciplines.

Non-matriculated students may enroll at CU through Continuing Education and once admitted, may apply for the certificate.

Requirements

Admissions

Visit the GIS and Computational Science Certificate (https://www.colorado.edu/geography/undergraduate-certificate-gis-and-computational-science/) website for application and admissions details.

Prerequisites

Two prerequisites are required for admission into the certificate program (7–8 credits; alternatively, some prerequisites can be met by completing AP coursework in high school or by completing an equivalent course that transfers from another college).

Code	Title	Credit Hours
Prerequisities		
GEOG 3023	Statistics and Geographic Data (or equivalent course w/spatial statistics focus)	4
CSCI 1200	Introduction to Computational Thinking	3-4
or CSCI 1300	Computer Science 1: Starting Computing	
or INFO 1701	Programming for Information Science 1	

Required Courses and Credits

The certificate requires 18–20 hours of coursework, including required courses and electives (but excluding prerequisites). Courses required for this certificate are offered each semester, and geography electives are typically offered at least once per year. Required courses and electives must be taken at CU Boulder.

Students who fulfill the introductory statistics requirement through AP coursework in high school are eligible to take an additional elective. Students undertaking the certificate as well as a GEOG minor can count no more than 9 credits from the GIS GEOG courses listed below toward the GEOG minor requirements.

Students must earn a C- or better in all coursework in the certificate and may not take certificate courses Satisfactory/Unsatisfactory (S/U).

Code	Title	Credit Hours
Required Courses		
Three (3) core courses are required:		11-12
GEOG 4103	Geographic Information Science: Spatial Analytics (prereqs GEOG 3023 and 3053)	
INFO 2201	Programming for Information Science 2	
or CSCI 2270	Computer Science 2: Data Structures	
GEOG 3053	Geographic Information Science: Mapping (may be concurrent with GEOG 3023) [1]	
or GEOG 4603	GIS in the Social and Natural Sciences	
Electives		
Choose two or more GIS electives to fulfill 18-20 credit hours, note only one remote sensing-focused course may count towards the GIS certificate:		6-7
GEOG 4043	Advanced Geovisualization and Web Mapping	
GEOG/GEOL 4093	Remote Sensing of the Environment	
GEOG 4203	Geographic Information Science: Spatial Modeling	
GEOG 4303	Geographic Information Science: Spatial Programming	
GEOG 4403	Geographic Information Science: Space Time Analytics	
GEOG 4503	Geographic Information Science: Project Management	
GEOL 3050	GIS for Geologists	
One or two upper-division GIS-based courses in another A&S department (syllabi to be approved beforehand by the certificate oversight faculty committee) (2-4 credits apiece)		
On occasion, a GIS-based Special Topics class in GEOG or a cognate unit will be considered for inclusion as an elective. Syllabi for any special topics electives must be approved by the certificate oversight faculty committee before a student enrolls in the class.		
Total Credit Hours		**18-20**

[1] Students cannot apply both GEOG 3053 and GEOG 4603 to the certificate.

Learning Outcomes

By the completion of the program, students will be able to:

- Demonstrate knowledge and skills to identify, analyze and understand spatial patterns, with an emphasis on computation and analytical problem solving.
- Demonstrate the ability to apply computational knowledge and skills in a GIS environment to tackle society's important and pressing environmental problems.
- Demonstrate the ability to describe the special characteristics (scale dependence, spatial autocorrelation) and perform spatial data analysis with the possibility of developing additional programming skills.