GEOGRAPHIC INFORMATION SCIENCE UNDERGRADUATE CERTIFICATE

Introduction

Please click here (http://catalog.ucdenver.edu/cu-denver/undergraduate/schools-colleges-departments/college-liberal-arts-sciences/geography-environmental-sciences/) to see Geography and Environmental Sciences department information.

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The Geographic Information Science (GISci) Certificate in the Department of Geography and Environmental Sciences is designed to provide CU Denver undergraduates and graduates, as well as non-degree seeking students interested in professional development, with proficiency in the application of spatial thinking, geographic information science, and geo-technologies in the social and physical sciences, spanning the natural, built and human environments and emphasizing human-environment interconnections. The GISci Certificate core establishes a broad foundation in spatial technologies and methodologies, including geographic information systems, remote sensing, cartography, spatial extensions to database management systems, and statistics. From this base, students can delve into various specialization areas depending on their interests.

Upon successful completion of the certificate, students will be able to:

- articulate and apply basic theoretical underpinnings of spatial analytical principles, methodologies, and techniques;
- effectively utilize at least three different types of software used for spatial analysis;
- apply geospatial thinking, geographic information science, and geo-technologies appropriately; and
- analyze diverse real-world problems that have a spatial dimension and develop alternative solutions to them.

Program Delivery

- This is an on-campus program.

Declaring This Certificate

- CU Denver undergraduate students in any discipline or major may be admitted to the program.
- Of the four core requirements, only the statistics class has prerequisites, including algebra and introductory calculus. Because of the technical nature of the GIS and remote sensing course work, however, some mathematical experience is desirable prior to beginning the program.
- Students may begin the program in any semester or during the summer by making arrangements with the GISci certificate coordinator, and completing and signing the Application for GISci Certificate. This application is required to be formally registered in the GISci Certificate program, and must be completed no later than the semester prior to the scheduled completion of the certificate.

Procedure to request the issuing of GIS Certificate

When you have completed all the courses required for the Graduate or Undergraduate GISc Certificate with a grade of B- or above, send the following information to the GIS coordinators (Rafael Moreno **(**rafael.moreno@ucdenver.edu**) and** Peter Anthamatten **(**peter.anthamatten@ucdenver.edu**)).** Students must complete the certificate and submit a notification of completion to the GIS coordinator(s) before graduation.

These program requirements are subject to periodic revision by the academic department, and the College of Liberal Arts and Sciences reserves the right to make exceptions and substitutions as judged necessary in individual cases. Therefore, the College strongly urges students to consult regularly with their Geographic Information Science undergraduate certificate advisor to confirm the best plans of study before finalizing them.

General Requirements

Students must satisfy all requirements as outlined below and by the department offering the certificate.

- Click here (http://catalog.ucdenver.edu/cu-denver/undergraduate/academic-policies-procedures/) for information about Academic Policies.

Certificate Requirements

1. Students must complete a minimum of 18 credit hours from the approved courses.
2. Students must complete a minimum of 12 upper division (3000-level and above) credit hours from the approved courses.
3. Students must earn a minimum grade of B- (2.7) in all courses that apply to the certificate and must achieve a minimum cumulative certificate GPA of 3.0. All graded attempts in required and elective courses are calculated in the certificate GPA. Courses taken using P +/P/F or S/U grading cannot apply to certificate requirements.
4. Students must complete all credit hours with CU Denver faculty. Students who completed a statistics course at another institution may apply that transferred course with certificate advisor approval, and must complete all remaining courses with CU Denver faculty.

Program Restrictions, Allowances and Recommendations

1. The certificate will be awarded when the student graduates with the bachelor's degree.
2. Although the five core courses may be taken in any order, it is advisable to begin with GEOG 2080 Introduction to Mapping and Map Analysis followed by GEOG 4080 Introduction to GIS, since these courses familiarize students with many key concepts used in the other classes.
3. All core courses are offered on a yearly basis. Any alterations to the program **must** be approved by the GISci certificate advisor. Any changes to the standard curriculum program must be approved in writing by the GISci Certificate advisor and filed with the GISci Certificate Application Form.

4. Because a certificate is a CU Denver certification of a students' specialized knowledge in an advanced subject matter, all courses in a certificate program are expected to be taken in residency at CU Denver. Only in rare circumstances will exceptions be made regarding this policy. Courses taken within the GISci Certificate Program may be used towards one other degree requirement.
5. Please pay attention to prerequisites for specific courses.

Code	Title	Hours
Complete the following required courses:		*12*
GEOG 2080	Introduction to Mapping and Map Analysis	
GEOG 4060	Remote Sensing I: Introduction to Environmental Remote Sensing	
GEOG 4080	Introduction to GIS	
GEOG 4081	Cartography	
Complete one of the following statistics courses, or one approved by GIS Certificate advisor. [2]		*3*
ANTH 4050	Quantitative Methods in Anthropology	
BANA 2010	Business Statistics	
CVEN 3611	Engineering Statistics	
ECON 3811	Statistics with Computer Applications	
MATH 2830	Introductory Statistics	
PSYC 2090	Statistics and Research Methods	
SOCY 3119	Qualitative Methods	
Complete one of the following elective courses:		*3*
GEOG 4070	Remote Sensing II: Advanced Remote Sensing	
GEOG 4085	GIS Applications for the Urban Environment	
GEOG 4090	Environmental Modeling with Geographic Information Systems	
GEOG 4091	Open Source Software for Geospatial Applications	
GEOG 4092	GIS Programming and Automation	
GEOG 4095	Deploying GIS Functionality on the Web	
GEOG 4235	GIS Applications in the Health Sciences	
CVEN 5382	Geospatial Data Development	
CVEN 5385	GIS Relational Database Systems (or an elective approved by the GISci Certificate Coordinator)	
Or an elective course approved by GIS Certificate Coordinator. [1]		
Total Hours		**18**

[1] Although only one elective is required to complete the Undergraduate GISci Certificate, it is strongly recommended that additional elective courses are taken to broaden the experience and knowledge of the student in GIS analysis and applications. A three-credit hour internship with a geospatial faculty sponsor is highly recommended.

[2] Approved statistics courses may have prerequisites, and some are 4 credit hours.

To learn more about the Student Learning Outcomes for this program, please visit our website (https://clas.ucdenver.edu/ges/programs/certificates/gis-certificate/#learning_outcomes-280).