

# FREE AND OPEN SOURCE SOFTWARE FOR GEOSPATIAL APPLICATIONS GRADUATE CERTIFICATE

Please click here to see Geography and Environmental Sciences department information.

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## Certificate Objectives

1. Provide students and working geospatial professionals with the knowledge and skills for the effective use and development of FOSS4G solutions in diverse application contexts. This complements and enhances the knowledge and skills they have in the use of geospatial proprietary software solutions.
2. Students will be exposed to several FOSS4G alternatives to address the needs of a geospatial information infrastructure from desktop, database management systems, systems automation/customization, all the way to Web/Cloud-based applications and enterprise level solutions.
3. Students will acquire the necessary knowledge and skills to effectively use the most advanced FOSS4G alternatives to develop solutions for each of levels of a geospatial information infrastructure previously mentioned.
4. Students will have the knowledge and hands-on skills that will enable them to design and develop hybrid geospatial information infrastructures that make use of proprietary software and FOSS4G incorporating each them in a combination that maximizes efficiency of the end infrastructure.

## Current CU Denver Students

A student may begin the program in any semester or during the summer by making arrangements with the FOSS4G Certificate Coordinator. This should be done as soon as you have decided to pursue the certificate, and no later than the semester previous to completion of all the courses required to obtain the certificate.

## Former CU Denver Students or Graduates of Other Universities

In order to start the certificate program, you will need to apply to the university as a non-degree seeking student if you are not already enrolled in a graduate program within CU Denver. Once accepted, you will be able to enroll in all of the appropriate classes.

**Admissions:** <https://www.ucdenver.edu/admissions/non-degree-admissions> (<https://www.ucdenver.edu/admissions/non-degree-admissions/>).

Specific questions about enrollment or tuition should be addressed directly to the University Registrar's Office or Bursar's Office.

For graduate and non-degree seeking students, the certificate will be awarded upon completion of the program and be added to the student's transcript.

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 Free and Open Source Software for Geospatial Application advisor to confirm the best plans of study before finalizing them.

**Graduate Education Policies and Procedures apply to this program.**

## Program Requirements

1. Students must complete a minimum of 12 credit hours.
2. Students must complete a minimum of 12 graduate (5000-level or higher) credit hours.
3. Students must earn a minimum grade of B (3.0) or higher in all courses that apply to the certificate and must achieve a minimum cumulative program GPA of 3.0. All graded attempts in required and elective courses are calculated in the certificate GPA. Students cannot complete certificate or ancillary course requirements as P+/P/F or S/U.
4. Students must complete all coursework with CU Denver faculty.

## Program Restrictions, Allowances and Recommendations

1. The students will have the option to take other courses above and beyond the core requirements for the certificate.

Code	Title	Hours
<i>Complete the following courses:</i>		12
CVEN 5385	GIS Relational Database Systems	
Students learn the principles and techniques to design a spatial database and perform multiple analyses and functions in a FOSS4G spatial database management system.		
GEOG 5086	FOSS4G Systems Integration	
This course functions as the capstone for the certificate. It concentrates on applying all the knowledge and skills previously obtained and adding more in the area of integration of geospatial information infrastructures based on FOSS4G. Students work on integrating systems from desktop to Web/Cloud-based applications.		
GEOG 5091	Open Source Software for Geospatial Applications	
This course exposes students to the diversity of FOSS4G solutions that exist for each of the elements of geospatial information infrastructure. They acquire the necessary hands-on skills to effectively use one FOSS4G to address the needs of each of the levels of a geospatial information infrastructure.		
GEOG 5092	GIS Programming and Automation	
Students learn programming principles and techniques to automate processes and customize a geographic information system (GIS), and to integrate and coordinate the functions of diverse geospatial software (e.g. a database management system with a GIS).		
<b>Total Hours</b>		<b>12</b>

## Optional Courses

Students can choose to take one or more of the following courses that can complement their formation in specific topics. However, these course are not required as part of the certificate program.

Code	Title	Hours
BIOL 3763	Biostatistics	
BIOL 6764	Biological Data Analysis	

Both of these courses use the open source software R for environmental data analysis including spatial statistics and geostatistics.

GEOG 5050	Applied Spatial Statistics	
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This course is offered annually as part of the GES offerings. It also uses R for data analysis including spatial statistics and geostatistics.

GEOG 5095	Deploying GIS Functionality on the Web	
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This course uses FOSS4G for database analysis and creation of Web-based GIS systems.

To learn more about the Student Learning Outcomes for this program, please visit our website (<https://clas.ucdenver.edu/ges/programs/certificates/free-and-open-source-software-geospatial-applications-foss4g/>).