

GEOSPATIAL PROGRAMMING AND WEB MAP DEVELOPMENT GRADUATE CREDIT CERTIFICATE PROGRAM

Graduate Program Head	Anthony C. Robinson
Program Code	GEOWBD
Campus(es)	University Park World Campus

The Graduate Certificate in Geospatial Programming and Web Map Development helps geospatial professionals become skillful developers of software for the GIS and mapping industries. These skills include the ability to script the automation of geospatial business processes, to develop custom user interface tools on top of existing desktop applications, and to author web-based mapping applications that support the exploration and analysis of geospatial datasets. Such skills are in high demand in the geospatial industry. This program is designed specifically for geospatial practitioners who seek formal education in geospatial programming and web mapping for the purposes of advancing their professional development or seeking a career change. It covers software development in the uniquely geospatial context using a mixture of proprietary and open source languages and technologies. The core learning objectives for students in this program are:

- Apply contemporary programming principles to automate geospatial analysis and mapping processes.
- Design and implement custom user interfaces to support mapping and spatial analysis.
- Create interactive web-based mapping applications that support spatial data exploration and analysis.

The certificate is offered online through Penn State's World Campus, and students earn the certificate by completing three prescribed courses and two elective courses. Students who successfully complete the program earn 15 academic credits. Students admitted to the Department of Geography's Master of GIS degree program may count up to 15 credits of certificate program courses toward the M.G.I.S. degree, subject to restrictions outlined in GCAC-309 Transfer Credit (<http://gradschool.psu.edu/graduate-education-policies/gcac/gcac-300/transfer-credit/>). Certificate students who wish to have certificate courses applied towards a graduate degree must apply and be admitted to that degree program. Admission to a graduate degree program is a separate step and is not guaranteed.

Effective Semester: Summer 2023

Expiration Semester: Summer 2028

Admission Requirements

Applicants apply for admission to the program via the Graduate School application for admission (<https://gradschool.psu.edu/graduate-admissions/how-to-apply/>). Requirements listed here are in addition to Graduate Council policies listed under GCAC-300 Admissions Policies (<https://gradschool.psu.edu/graduate-education-policies/>). International applicants may be required to satisfy an English proficiency requirement; see GCAC-305 Admission Requirements for International Students (<https://gradschool.psu.edu/graduate-education-policies/gcac/>

[gcac-300/gcac-305-admission-requirements-international-students/](https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-300/gcac-305-admission-requirements-international-students/)) for more information.

Intermediate-level experience with professional applications of geographic information systems is expected as pre-requisite knowledge. Course work to establish that pre-requisite knowledge is available through the related Postbaccalaureate Certificate in GIS (<http://bulletins.psu.edu/graduate/programs/certificates/geographic-information-systems-postbaccalaureate-credit-certificate-program/>) program.

Certificate Requirements

Requirements listed here are in addition to requirements listed in Graduate Council policy GCAC-212 Postbaccalaureate Credit Certificate Programs (<https://gradschool.psu.edu/graduate-education-policies/gcac/gcac-200/gcac-212-postbaccalaureate-credit-certificate-programs/>).

Code	Title	Credits
Required Courses		
GEOG 485	GIS Programming and Software Development	3
GEOG 863	Web Application Development for the Geospatial Professional	3
GEOG 585	Open Web Mapping	3
Electives		
Choose 6 credits from:		6
GEOG 486	Cartography and Visualization	
GEOG 489	Advanced Python Programming for GIS	
GEOG 868	Spatial Database Management for the Geospatial Professional	
GEOG 865	Cloud and Server GIS	
Total Credits		15

Courses

Graduate courses carry numbers from 500 to 699 and 800 to 899. Advanced undergraduate courses numbered between 400 and 499 may be used to meet some graduate degree requirements when taken by graduate students. Courses below the 400 level may not. A graduate student may register for or audit these courses in order to make up deficiencies or to fill in gaps in previous education but not to meet requirements for an advanced degree.

Learning Outcomes

1. Application - Apply contemporary programming principles to automate geospatial analysis and mapping processes.
2. Communication - Communicate the nuances of complex spatial relationships with text, voice, and visual products to broadly inform professional and non-technical audiences in a range of contexts.
3. Creation - Create interactive web-based mapping applications that support spatial data exploration and analysis.
4. Critical Thinking - Objectively analyze and evaluate a situation in the context of available geospatial programming techniques and technologies in support of problem solving and decision making.
5. Cultural Competence - Demonstrate knowledge of cultural norms that are respectful of diversity and inclusion to establish a positive and professional work environment.
6. Ethics - Demonstrate ethical conduct by producing quality work, contributing to the community, managing professional relationships

by establishing honest and respectful interactions among individuals and organizations.

7. Knowledge - Apply knowledge of programming technologies to design and implement custom user interfaces in support of mapping and spatial analysis to educate, solve problems and make decisions.
8. Professional - Demonstrate conduct in alignment with professional standards in interpersonal communication, mediation, and respect for diversity while recognizing appropriate team roles in professional, community and education-based activities.
9. Research - Combine accepted programming techniques and geospatial technologies to create new solutions for previously unencountered situations.

Contact

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Campus	World Campus
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