

# GEOGRAPHIC INFORMATION SCIENCE, CERTIFICATE

Requirements for an undergraduate certificate may be completed at any campus location offering the specified courses for the certificate.

## Program Description

The 12-credit Geographic Information Science (GIS) certificate is aimed at students who wish to be current in geographical representation and geospatial analysis. Through courses for the GIS certificate, students will understand and know how to apply various GIS and geospatial analysis tools to represent, analyze, and advise on the geospatial dimensions of natural and social phenomena. Students will gain firsthand experience using the most up-to-date tools and techniques available in the field of GIS today. Areas of study include cartography, remote sensing, and geographic information systems.

Learning objectives: Describe the conceptual foundations on which geographic information science and systems are based, use geospatial tools to perform spatial analysis and mapping tasks, and create solutions to geographic problems using geographic information science and technology.

## What is Geographic Information Science?

Geographic Information Science (GIScience) is one of four key subdisciplines within Geography (along with human geography, physical geography, and environment-society geography). Its primary areas of study include cartography (map-making), remote sensing, and geographic information systems. Students who study GIScience learn how to use the latest tools and techniques to visually represent and analyze spatial data in order to understand and address real-world environmental and social problems. Applications of geographic information science range from emergency response to natural resource management to social policy analysis to location intelligence for business.

## You Might Like This Program If...

- You like technology and maps, and want to acquire skills using a spatial perspective to differentiate yourself in the workforce after graduation.
- You would like to apply spatial science and technology to solve social, environmental, and industrial problems. You want to apply the geographic perspective through science and technology to enhance the knowledge, skills, and abilities developed in your major program of study.

## Program Requirements

To earn an undergraduate certificate in Geographic Information Science, a minimum of 12 credits is required.

Code	Title	Credits
<b>Required Courses</b>		
GEOG 260	Geographic Information in a Changing World: Introduction to GIScience	3
Select 9 credits from:		9
GEOG 361	Cartography—Maps and Map Construction	
GEOG 362	Image Analysis	
GEOG 363	Geographic Information Systems	

GEOG 365 Introduction to GIS Programming

### Non-Course Requirements

Per University policy, all credit courses for a certificate require a grade of 'C' or higher, and at least two-thirds (2/3) of the credits used to complete a certificate must be earned at Penn State. If student is completing multiple certificates in Geography, no more than one (1) course may double-count for each.

## Certificate Learning Objectives

- Majors in Geography will demonstrate knowledge of fundamental geographic skills and concepts and apply them to complex spatial relationships (interactions, patterns, processes) within the human socio-cultural and natural environments at global, regional, and local scales.
- Majors in Geography will engage in spatial and environmental critical thinking by analyzing, discussing and synthesizing geographical information that may include professional/technical documents, primary data, maps, graphics, and/or archival data.
- Majors in Geography will communicate geographic information utilizing oral, written, and visual formats to effectively process and integrate facts, ideas, and research results.
- Majors in Geography will develop research skills by locating, understanding, and explaining geographic challenges and opportunities related to human socio-cultural and/or environmental phenomena at global, regional, and local scales.

## Academic Advising

The objectives of the university's academic advising program are to help advisees identify and achieve their academic goals, to promote their intellectual discovery, and to encourage students to take advantage of both in-and out-of class educational opportunities in order that they become self-directed learners and decision makers.

Both advisers and advisees share responsibility for making the advising relationship succeed. By encouraging their advisees to become engaged in their education, to meet their educational goals, and to develop the habit of learning, advisers assume a significant educational role. The advisee's unit of enrollment will provide each advisee with a primary academic adviser, the information needed to plan the chosen program of study, and referrals to other specialized resources.

READ SENATE POLICY 32-00: ADVISING POLICY (<https://senate.psu.edu/policies-and-rules-for-undergraduate-students/32-00-advising-policy/>)

## University Park

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## Career Paths

There are many potential careers for graduates with GIScience backgrounds. Students earning the Geographic Information Science certificate learn a wide-range of technological, research, and analytical skills that are highly valued by employers. GIS geography undergraduates find jobs in all levels of government, nonprofit organizations, and in industry. This is one of several geography-related certificates that students can use to tailor their educational experience in preparation

for the job market. In addition to Geographic Information Science, the Department of Geography offers certificates in Environment and Society Geography, Geospatial Big Data Analytics, Human Geography; Justice, Ethics and Diversity in Space; Landscape Ecology; and Physical Geography.

## Careers

Students earning the certificate in Geographic Information Science are well-positioned to find employment with diverse organizations spanning business, government, and nonprofit sectors. Such organizations may include (but are not limited to): American Red Cross, Amnesty International, BAE Systems, Boeing, Esri, Federal Emergency Management Agency, NASA, National Geographic, National Park Service, United Nations, U.S. Army Corps of Engineers, U.S. Census Bureau, U.S. Environmental Protection Agency, local, regional, and state planning agencies, environmental and engineering consulting firms, State Department and humanitarian organizations.

MORE INFORMATION ABOUT POTENTIAL CAREER OPTIONS FOR GRADUATES WITH A CERTIFICATE IN GEOGRAPHIC INFORMATION SCIENCE (<https://www.geog.psu.edu>)

## Opportunities for Graduate Studies

A certificate in Geographic Information Science is useful for students who are interested in pursuing graduate degrees in the computational, environmental, and social sciences. Alumni enter graduate and professional studies in a variety of programs, including (but not limited to) geography, planning, urban studies, environmental sciences, ecology, geographic information sciences, information technology, environmental informatics, geodesign, business administration, supply chain management, emergency management, and law. They sometimes begin graduate or professional programs directly after finishing undergraduate studies, but often get several years' work experience before returning to school, either full or part-time.

MORE INFORMATION ABOUT OPPORTUNITIES FOR GRADUATE STUDIES (<https://www.geog.psu.edu>)

## Professional Resources

- American Association of Geographers (AAG) (<https://www.aag.org>)
- North American Cartographic Information Society (NACIS) (<https://nacis.org>)
- ASPRS: The Imaging & Geospatial Information Society (<https://www.asprs.org>)
- Urban and Regional Information Systems Association (URISA) (<https://www.urisa.org/>)
- International Cartographic Association (ICA) (<https://icaci.org/>)

## Contact

### University Park

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