

# GEOSPATIAL DATA SCIENCE, CERTIFICATE

What happens when you combine the power of locational intelligence with the deep insight enabled by data science? You get Geospatial Data Science: an exciting, rapidly growing domain that sits at the intersection of geographic information science (GIS) and data science. The Geospatial Data Science Certificate prepares students to analyze and model our world through big data with a spatial lens. From predicting the spread of wildfires in real time, to modeling urban mobility patterns, to building machine learning tools to analyze satellite imagery, geospatial data scientists help us make sense of complex geospatial and locational problems.

This interdisciplinary certificate draws on the strengths of UW–Madison’s world-class programs in Cartography/GIS, Computer Sciences, and Statistics to equip students with both the geospatial foundations and data science skills needed to work in areas like geospatial artificial intelligence (geoAI), environmental predictive modeling, locational business intelligence, and disease-spread prediction.

You take a mix of courses in GIS, programming, and statistical data modeling, gaining hands-on experience with real-world data, cutting-edge tools, and industry-relevant workflows. Whether you’re a Cartography/GIS student looking to enhance your data skills, or a Data Science student looking to add a geospatial dimension to help stand out, the Geospatial Data Science Certificate offers a flexible and forward-thinking path into one of today’s most in-demand skillsets.

## HOW TO GET IN

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Students are eligible to declare the Geospatial Data Science Certificate at any time during their studies. Students who intend to declare the certificate must schedule an appointment with the Geography undergraduate academic advisor. See the contact information box for details.

## REQUIREMENTS

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The Geospatial Data Science Certificate requires a minimum of 17 credits.

Code	Title	Credits
<b>Introductory Statistics</b>		<b>3-4</b>
Complete one course from the following:		
STAT 240	Data Science Modeling I <sup>1</sup>	
STAT 301	Introduction to Statistical Methods	
STAT 324	Introduction to Statistics for Science and Engineering	
STAT 371	Introductory Applied Statistics for the Life Sciences	
B M E 325	Applied Statistics for Biomedical Engineers	

ECON 310	Statistics: Measurement in Economics	
I SY E 210	Introduction to Industrial Statistics	
<b>Core in GIScience</b>		<b>8</b>
Complete two courses from the following:		
GEOG 370	Introduction to Cartography	
GEOG/ CIV ENGR/ ENVIR ST 377	An Introduction to Geographic Information Systems	
GEOG 378	Introduction to Geocomputing	
<b>Core in Data Science</b>		<b>3-4</b>
Complete one course from the following:		
COMP SCI 220	Data Science Programming I	
COMP SCI 320	Data Science Programming II	
E C E 204	Data Science & Engineering	
STAT 240	Data Science Modeling I <sup>1</sup>	
<b>Elective</b>		<b>3-4</b>
Complete one course from the following:		
GEOG/ENVIR ST/ F&W ECOL/ G L E/GEOSCI/ LAND ARC 371	Introduction to Environmental Remote Sensing	
GEOG 379	Geospatial Technologies: Drones, Sensors, and Applications	
GEOG 560	Advanced Quantitative Methods	
GEOG 572	Graphic Design in Cartography	
GEOG 573	Advanced Geocomputing and Geospatial Big Data Analytics	
GEOG 574	Geospatial Database Design and Development	
GEOG 575	Interactive Cartography & Geovisualization	
GEOG 579	GIS and Spatial Analysis	
<b>Total Credits</b>		<b>17</b>

## RESIDENCE AND QUALITY OF WORK

- At least 9 certificate credits must be completed in residence.
- Minimum 2.000 GPA on all certificate courses.

## FOOTNOTES

<sup>1</sup> STAT 240 may satisfy both the Introductory Statistics and Core in Data Science requirements. Credit for the course will only count once toward the minimum needed to complete the certificate. Students must complete additional Elective courses to reach the minimum total credit required.

## CERTIFICATE COMPLETION REQUIREMENT

This undergraduate certificate must be completed concurrently with the student’s undergraduate degree. Students cannot delay degree completion to complete the certificate.

## LEARNING OUTCOMES

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1. Explain the fundamental concepts and principles of geospatial data science, such as spatial data models, spatial analysis methods, spatial statistics, and spatial machine learning.
2. Collect, process, analyze, visualize, and communicate geospatial data and information using a variety of geospatial data science tools and other geospatial platforms.
3. Develop a variety of geospatial data science models and tools to collect, process, analyze, discover, visualize, and communicate geospatial data and information.
4. Apply geospatial data science techniques to real-world spatial problems in interdisciplinary contexts, such as environmental science, public health, urban planning, geospatial mobility, transportation, and social justice, and evaluate the ethical and societal implications of their solutions.

## ADVISING AND CAREERS

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Students with questions about the certificate, courses, and careers are encouraged to contact the undergraduate academic advisor.

Data science is a critical skill for the 21st-century workforce. Similarly, geographic information science (GIS) is one of the fastest growing sectors globally. The global GIS market size is projected to reach \$681 billion in 2025, with an estimated rapid growth rate anticipated post-2025, culminating in a valuation of \$1.44 trillion by 2030. This growth is driven by strategic public policy reforms, industry acceleration strategies, and innovations in AI and data science technologies. In an era dominated by big data, students require expertise in specialized programming languages, technical hardware, and the continuously evolving algorithms, methods, and tools essential for acquiring, processing, utilizing, publishing, and preserving vast volumes of geospatial data. In response, the Geospatial Data Science curriculum helps prepare students to become the next generation of geospatial data scientists and professionals, equipped with essential skills in spatial data analysis, geovisualization, AI, critical thinking, and problem-solving to meet both the needs of industry and academia.

### SUCCESSWORKS

SuccessWorks (<https://successworks.wisc.edu/>) at the College of Letters & Science helps you turn the academic skills learned in your classes into a fulfilling life, guiding you every step of the way to securing jobs, internships, or admission to graduate school.

Through one-on-one career advising, events, and resources, you can explore career options, build valuable internship and research experience, and connect with supportive alumni and employers who open doors of opportunity.

- What you can do with your major (<https://successworks.wisc.edu/what-you-can-do-with-your-major/>) (Major Skills & Outcomes Sheets)
- Make a career advising appointment (<https://successworks.wisc.edu/make-an-appointment/>)
- Learn about internships and internship funding (<https://successworks.wisc.edu/finding-a-job-or-internship/>)

- Try “Jobs, Internships, & How to Get Them,” (<https://successworks.wisc.edu/canvas/>) an interactive guide in Canvas for enrolled UW–Madison students