

# CARTOGRAPHY AND GEOGRAPHIC INFORMATION SYSTEMS, BA

Hasn't everything already been mapped? Cartographers are not explorers charting borders in an ancient time. We are artists, community organizers, data scientists, visual storytellers, and full-stack web developers visualizing our world. In an era of massive data sets and location-based applications, maps and geospatial data have never been more important to assist in decision-making and envisioning our future.

The Cartography and Geographic Information Systems (GIS) major covers the conceptual foundations and technical skills needed to harness maps and geospatial data. Courses range from graphic design and web mapping to big-data analytics and mobile application development: all have important laboratory components working with industry-standard cartography and GIS technology. So, yes, everywhere has been mapped in some form, but in a dynamic world driven by information and technology, cartographers and GIS professionals are needed now more than ever to help us understand our changing planet.

## HOW TO GET IN

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Requirements	Details
How to get in	No application required. All students who meet the requirements listed below are eligible to declare. For information on how to declare, visit Advising & Careers.
Courses required to get in	None
GPA requirements to get in	None
Credits required to get in	None
Other	None

## REQUIREMENTS

### UNIVERSITY GENERAL EDUCATION REQUIREMENTS

All undergraduate students at the University of Wisconsin–Madison are required to fulfill a minimum set of common university general education requirements to ensure that every graduate acquires the essential core of an undergraduate education. This core establishes a foundation for living a productive life, being a citizen of the world, appreciating aesthetic values, and engaging in lifelong learning in a continually changing world. Various schools and colleges will have requirements in addition to the requirements listed below. Consult your advisor for assistance, as

needed. For additional information, see the university Undergraduate General Education Requirements (<https://guide.wisc.edu/undergraduate/#requirementsforundergraduatetext>) section of the Guide.

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| General Education | <ul style="list-style-type: none"> <li>• Breadth–Humanities/Literature/Arts: 6 credits</li> <li>• Breadth–Natural Science: 4 to 6 credits, consisting of one 4- or 5-credit course with a laboratory component; or two courses providing a total of 6 credits</li> <li>• Breadth–Social Studies: 3 credits</li> <li>• Communication Part A &amp; Part B *</li> <li>• Ethnic Studies *</li> <li>• Quantitative Reasoning Part A &amp; Part B *</li> </ul> |
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\* The mortarboard symbol appears before the title of any course that fulfills one of the Communication Part A or Part B, Ethnic Studies, or Quantitative Reasoning Part A or Part B requirements.

## COLLEGE OF LETTERS & SCIENCE DEGREE REQUIREMENTS: BACHELOR OF ARTS (BA)

Students pursuing a bachelor of arts degree in the College of Letters & Science must complete all of the requirements below. The College of Letters & Science allows this major to be paired with either a bachelor of arts or a bachelor of science curriculum.

### BACHELOR OF ARTS DEGREE REQUIREMENTS

Mathematics	Complete the University General Education Requirements for Quantitative Reasoning A (QR-A) and Quantitative Reasoning B (QR-B) coursework.
Language	<ul style="list-style-type: none"> <li>• Complete the fourth unit of a language other than English; OR</li> <li>• Complete the third unit of a language and the second unit of an additional language other than English.</li> </ul>
L&S Breadth	<ul style="list-style-type: none"> <li>• 12 credits of Humanities, which must include 6 credits of literature; and</li> <li>• 12 credits of Social Science; and</li> <li>• 12 credits of Natural Science, which must include one 3+ credit Biological Science course and one 3+ credit Physical Science course.</li> </ul>
Liberal Arts and Science Coursework	Complete at least 108 credits.
Depth of Intermediate/Advanced work	Complete at least 60 credits at the intermediate or advanced level.
Major	Declare and complete at least one major.
Total Credits	Complete at least 120 credits.
UW-Madison Experience	<ul style="list-style-type: none"> <li>• 30 credits in residence, overall; and</li> <li>• 30 credits in residence after the 86th credit.</li> </ul>

Quality of Work	<ul style="list-style-type: none"> <li>• 2.000 in all coursework at UW–Madison</li> <li>• 2.000 in Intermediate/Advanced level coursework at UW–Madison</li> </ul>
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## NON–L&S STUDENTS PURSUING AN L&S MAJOR

Non–L&S students who have permission from their school/college to pursue an additional major within L&S only need to fulfill the major requirements. They do not need to complete the L&S Degree Requirements above.

## REQUIREMENTS FOR THE MAJOR BREADTH

3 courses, 1 each from these areas:

Code	Title	Credits
<b>Human Geography (1 course)</b>		<b>3</b>
GEOG 101	Introduction to Human Geography	
GEOG 104	Introduction to Human Geography	
GEOG/ART HIST/ ENVIR ST/ HISTORY/ LAND ARC 239	Making the American Landscape	
GEOG 300	Weird Geographies	
GEOG 301	Revolutions and Social Change	
GEOG 302	Economic Geography: Locational Behavior	
GEOG/ URB R PL 305	Introduction to the City	
GEOG 307	International Migration, Health, and Human Rights	
GEOG/CHICLA/ GEN&WS 308	Latinx Feminisms: Women's Lives, Work, and Activism	
GEOG/ INTL ST 311	The Global Game: Soccer, Politics, and Identity	
GEOG/ INTL ST 315	Universal Basic Income: The Politics Behind a Global Movement	
GEOG 318	Introduction to Geopolitics	
GEOG 340	World Regions in Global Context	
GEOG 342	Geography of Wisconsin	
GEOG 355	Africa, South of the Sahara	
GEOG 358	Human Geography of Southeast Asia	
GEOG/ AMER IND 410	Critical Indigenous Ecological Knowledges	
GEOG 501	Space and Place: A Geography of Experience	
GEOG/ URB R PL 503	Researching the City: Qualitative Strategies	
GEOG/ GEN&WS 504	Feminist Geography: Theoretical Approaches	
GEOG/ URB R PL 505	Urban Spatial Patterns and Theories	
GEOG 507	Waste Geographies: Politics, People, and Infrastructures	

GEOG 510	Economic Geography	
GEOG 511	Critical Social Theory	
GEOG 513	Queer Geographies	
GEOG/ GEN&WS 514	Feminist Geography: Methodological Approaches	
GEOG 515	Trans Autotheories	
GEOG 518	Power, Place, Identity	
GEOG 566	History of Geographic Thought	
<b>People–Environment (1 course)</b>		<b>3</b>
GEOG/ ENVIR ST 139	Global Environmental Issues	
GEOG/ART HIST/ ENVIR ST/ HISTORY/ LAND ARC 239	Making the American Landscape	
GEOG/ ENVIR ST 309	People, Land and Food: Comparative Study of Agriculture Systems	
GEOG/ ATM OCN/ ENVIR ST 332	Global Warming: Science and Impacts	
GEOG/ ENVIR ST 333	Green Urbanism	
GEOG/ ENVIR ST 337	Nature, Power and Society	
GEOG/ BOTANY 338	Environmental Biogeography	
GEOG/ ENVIR ST 339	Environmental Conservation	
GEOG 340	World Regions in Global Context	
GEOG 344	Changing Landscapes of the American West	
GEOG/ AMER IND/ ENVIR ST 345	Caring for Nature in Native North America	
GEOG 359	Australia: Environment and Society	
GEOG/ AMER IND 410	Critical Indigenous Ecological Knowledges	
GEOG/C&E SOC/ ENVIR ST 434	People, Wildlife and Landscapes	
GEOG/ ENVIR ST 439	US Environmental Policy and Regulation	
GEOG/ENVIR ST/ HISTORY 460	American Environmental History	
GEOG/ SOIL SCI 526	Human Transformations of Earth Surface Processes	
GEOG/ ENVIR ST 534	Environmental Governance: Markets, States and Nature	
GEOG/ ENVIR ST 537	Culture and Environment	
GEOG 538	The Humid Tropics: Ecology, Subsistence, and Development	
GEOG/ ENVIR ST 557	Development and Environment in Southeast Asia	
<b>Physical Geography (1 course)</b>		<b>3</b>

GEOG/ ENVIR ST 120	Introduction to the Earth System
GEOG/ ENVIR ST 127	Physical Systems of the Environment
GEOG/ GEOSCI 320	Geomorphology
GEOG/ ATM OCN/ ENVIR ST 322	Polar Regions and Their Importance in the Global Environment
GEOG/ ATM OCN/ ENVIR ST 332	Global Warming: Science and Impacts
GEOG/ ATM OCN/ ENVIR ST/ GEOSCI 335	Climatic Environments of the Past
GEOG/ BOTANY 338	Environmental Biogeography
GEOG 342	Geography of Wisconsin
GEOG 344	Changing Landscapes of the American West
GEOG/ GEOSCI 420	Glacial and Pleistocene Geology
GEOG 523	Advanced Paleocology: Species Responses to Past Environmental Change
GEOG/ SOIL SCI 525	Soil Geomorphology
GEOG/ SOIL SCI 526	Human Transformations of Earth Surface Processes

**Total Credits** 9

### SKILLS, TECHNIQUES & METHODOLOGY

Code	Title	Credits
<b>Core Cartography/GIS</b>		
GEOG 370	Introduction to Cartography	4
GEOG/ENVIR ST/ F&W ECOL/ GLE/GEOSCI/ LAND ARC 371 or GEOG 379	Introduction to Environmental Remote Sensing	3
GEOG/CIV ENGR/ ENVIR ST 377	Geospatial Technologies: Drones, Sensors, and Applications	4
GEOG 378	An Introduction to Geographic Information Systems	4
<b>Quantitative Methods (1 course)</b> 3-4		
GEOG 560	Introduction to Geocomputing	4
STAT 240	Advanced Quantitative Methods	
STAT 301	Data Science Modeling I	
STAT 324	Introduction to Statistical Methods	
STAT 371	Introduction to Statistics for Science and Engineering	
	Introductory Applied Statistics for the Life Sciences	
<b>Mathematics Proficiency</b> 6		

Complete one of the following by Placement or by completing the course

MATH 112 & MATH 113	College Algebra and Trigonometry
MATH 114	Precalculus

**Total Credits** 24-25

### DEPTH

Code	Title	Credits
Complete two of:		
GEOG/ENVIR ST/ LAND ARC/ URB R PL 532	Applications of Geographic Information Systems in Planning	7-8
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 576	Geospatial Web and Mobile Programming	
GEOG 578	GIS Applications	
GEOG 579	GIS and Spatial Analysis	

**Total Credits** 7-8

### CAPSTONE

Code	Title	Credits
Complete one of:		
GEOG 565	Colloquium for Undergraduate Majors	3-6
GEOG 681 & GEOG 682	Senior Honors Thesis and Senior Honors Thesis	
GEOG 691 & GEOG 692	Senior Thesis and Senior Thesis	

**Total Credits** 3-6

### RESIDENCE AND QUALITY OF WORK

- 2.000 GPA in GEOG and major courses
- 2.000 GPA on 15 upper-level credits, taken in residence<sup>2</sup>
- 15 credits in GEOG, taken on the UW-Madison campus

<sup>2</sup> GEOG courses designated Intermediate/Advanced are upper level in this major.

### HONORS IN THE MAJOR

Students may declare Honors in the Cartography and GIS Major in consultation with the Geography undergraduate advisor.

### HONORS IN THE CARTOGRAPHY AND GEOGRAPHIC INFORMATION SYSTEMS MAJOR REQUIREMENTS

To earn Honors in the Major in Cartography and Geographic Information Systems, students must satisfy both the requirements for the major (above) and the following additional requirements:

- Earn a 3.300 overall university GPA
- Earn a 3.300 GPA for all GEOG courses, and all courses accepted in the major
- Complete GEOG 578: GIS Applications with a grade of B or better
- Complete at least one advanced-level course OR 6 credits of honors credits in the major at the 300 level or above
- Complete a two-semester Senior Honors Thesis in GEOG 681 Senior Honors Thesis and GEOG 682 Senior Honors Thesis, a piece of original research composition, for a total of 6 credits.

## UNIVERSITY DEGREE REQUIREMENTS

**Total Degree** To receive a bachelor's degree from UW–Madison, students must earn a minimum of 120 degree credits. The requirements for some programs may exceed 120 degree credits. Students should consult with their college or department advisor for information on specific credit requirements.

**Residency** Degree candidates are required to earn a minimum of 30 credits in residence at UW–Madison. "In residence" means on the UW–Madison campus with an undergraduate degree classification. "In residence" credit also includes UW–Madison courses offered in distance or online formats and credits earned in UW–Madison Study Abroad/Study Away programs.

**Quality of Work** Undergraduate students must maintain the minimum grade point average specified by the school, college, or academic program to remain in good academic standing. Students whose academic performance drops below these minimum thresholds will be placed on academic probation.

## LEARNING OUTCOMES

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1. Apply cartographic design principles and visual storytelling to transform geospatial data into actionable insights.
2. Apply appropriate technologies and methods, including geographic information systems (GIS) and informed geodatabase design, to analyze qualitative and quantitative geospatial data.
3. Use appropriate geographic concepts, methods, and technologies to interpret the dynamic interactions among human and natural characteristics of place and space.
4. Combine geospatial theories, methodologies, and project management strategies to design and conduct ethical cartographic and geographic research and development.
5. Utilize appropriate GIS-based spatial decision tools to inform discussions of social, economic, and environmental issues that confront policymakers and citizens.
6. Discuss complex geospatial data, concepts, and technologies using written, oral, and visual forms of communication appropriate for technical, non-technical, and community-based audiences.

## FOUR-YEAR PLAN

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This Four-Year Plan is only one way a student may complete an L&S degree with this major. Many factors can affect student degree planning, including placement scores, credit for transferred courses, credits earned by examination, and individual scholarly interests. In addition, many students have commitments (e.g., athletics, honors, research, student organizations, study abroad, work and volunteer experiences) that necessitate they adjust their plans accordingly. Informed students engage in their own unique Wisconsin Experience by consulting their academic advisors, Guide, DARS, and Course Search & Enroll for assistance making and adjusting their plan.

#### First Year

Fall	Credits Spring	Credits
MATH 112	3 MATH 113	3
Communication A	3 Ethnic Studies	4
Foreign Language	4 Foreign Language	4
Humanities Breadth	3 Literature Breadth	3
Elective	2	
	<b>15</b>	<b>14</b>

#### Second Year

Fall	Credits Spring	Credits
STAT 301	3 GEOG/CIV ENGR/ ENVR ST 377	4
GEOG 370	4 Communication B	4
INTER-LS 210	1 Biological Science Breadth	3
Literature Breadth	3 Elective	4
Elective	4	
	<b>15</b>	<b>15</b>

#### Third Year

Fall	Credits Spring	Credits
GEOG 378	4 500-level Cartography/ GIS Elective	4
Major course: Human Geography	3-4 Biological Science Breadth	3
Electives	9 Humanities Breadth	3
	Major course: People- Environment Geography	3-4
	<b>16</b>	<b>14</b>

#### Fourth Year

Fall	Credits Spring	Credits
GEOG/ENVR ST/ F&W ECOL/G L E/ GEOSCI/LAND ARC 371	3 500-level Cartography/ GIS Elective	4
Major course: Physical Geography	4 Electives	12
GEOG 565	3	
Electives	5	
	<b>15</b>	<b>16</b>

**Total Credits 120**

## ADVISING AND CAREERS

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#### DECLARE OR CANCEL THIS MAJOR

Please follow the process described on the Geography website (<https://geography.wisc.edu/undergraduate/geography-major/#advising-and-declaring-the-major>).

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

#### CAREERS

Cartography and GIS is a booming profession, but remains one of the biggest secrets on campus because of the limited treatment of geography in K-12 education. The Department of Labor reported that there were 425,000 U.S. residents working in the geospatial industry (<http://www.esri.com/news/arcnews/summer12articles/strengthening-the-gis-profession.html>) in 2010, and the National Research Council estimates this could exceed 2 million by 2020. Cartography and GIS recently was rated the #1 profession in engineering, in part due to its extremely low unemployment rate (less than 1% of students with degrees!), strong future growth of the job market, and relatively low stress rating. Our alumni work in local, national, and international government positions, as well as in private industry, including firms such as Apple, Google, Facebook, and Uber, and media outlets such as *National Geographic*, *The New York Times*, and *The Wall Street Journal*.

#### 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