CARTOGRAPHY AND GEOGRAPHIC INFORMATION SYSTEMS, B.S.

Cartography and GIS, also known more broadly as geographic information science, studies and develops digital technology and the theory behind it to help people work with geographic information. This broad area interfaces with work from the physical and social sciences. It is a field devoted to the acquisition, management, analysis, visualization, and representation of geospatial data. It is a relatively new discipline that incorporates geography, cartography, spatial analysis, and related fields such as geovisualization, geodesy, geocomputation, cognition, and computer science. At the present time professionals trained in geographic information science are very much in demand by federal agencies, state and local governments, and private firms.

HOW TO GET IN

Exploring the field of geographic information science at UW–Madison is easy. Interested students are strongly encouraged to take introductory courses in the field. The Department of Geography offers four introductory courses in geographic information science:

- GEOG 170 Our Digital Globe: An Overview of GIScience and its Technology (online);
- GEOG 370 Introduction to Cartography;
- GEOG/ENVIR ST/F&W ECOL/G L E/GEOSCI/LAND ARC 371 Introduction to Environmental Remote Sensing; and
- GEOG/CIV ENGR/ENVIR ST 377 An Introduction to Geographic Information Systems

Students who intend to declare their major as cartography and GIS need to schedule an appointment with the geography undergraduate advisor, Joel Gruley, at jgruley@wisc.edu.

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 (http://guide.wisc.edu/undergraduate/#requirementsforundergraduatetestudytext) section of the Guide.

General Education

- Breadth—Humanities/Literature/Arts: 6 credits
- 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
- Breadth—Social Studies: 3 credits
- Communication Part A & Part B
- Ethnic Studies
- Quantitative Reasoning Part A & Part B

* 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 BREADTH AND DEGREE REQUIREMENTS: BACHELOR OF SCIENCE (B.S.)

Students pursuing a bachelor of science 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. View a comparison of the degree requirements here. (https://pubs.wisc.edu/home/archives/ug15/images/babs2009.pdf)

BACHELOR OF SCIENCE DEGREE REQUIREMENTS

Mathematics

Two (2) 3+ credits of intermediate/advanced level MATH, COMP SCI, STAT

Limit one each: COMP SCI, STAT

Foreign Language

Complete the third unit of a foreign language

Note: A unit is one year of high school work or one semester/term of college work.

L&S Breadth

- Humanities, 12 credits: 6 of the 12 credits must be in literature
- Social Sciences, 12 credits
- Natural Sciences, 12 credits: must include 6 credits in biological science; and must include 6 credits in physical science

Liberal Arts and Science Coursework

108 credits

Depth of Intermediate/Advanced work

60 intermediate or advanced credits

Major

Declare and complete at least one (1) major

Total Credits

120 credits

UW-Madison Experience

30 credits in residence, overall

30 credits in residence after the 90th credit

Minimum GPA

2.000 in all coursework at UW–Madison

2.000 in intermediate/advanced coursework at UW–Madison

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 and do not need to complete the L&S breadth and
degree requirements above. Please note that the following special
degree programs are not considered majors so are not available to
non-L&S-degree-seeking candidates:

- Applied Mathematics, Engineering and Physics (Bachelor of Science–Applied Mathematics, Engineering and Physics)
- Journalism (Bachelor of Arts–Journalism; Bachelor of Science–Journalism)
- Music (Bachelor of Music)
- Social Work (Bachelor of Social Work)

REQUIREMENTS FOR THE MAJOR

BREADTH

3 courses, 1 each from these areas:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td><strong>Human Geography (1 course)</strong></td>
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<tr>
<td>GEOG 101</td>
<td>Introduction to Human Geography</td>
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<tr>
<td>GEOG 104</td>
<td>Introduction to Human Geography</td>
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<tr>
<td>GEOG 301</td>
<td>Geography of Social Organization</td>
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<td>GEOG 302</td>
<td>Economic Geography: Locational Behavior</td>
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<td>GEOG/URB R PL 305</td>
<td>Introduction to the City</td>
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<td>GEOG 307</td>
<td>International Migration, Health, and Human Rights</td>
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<td>GEOG 318</td>
<td>Introduction to Geopolitics</td>
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<td>GEOG 340</td>
<td>World Regions in Global Context</td>
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<td>GEOG 342</td>
<td>Geography of Wisconsin</td>
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<td>GEOG 348</td>
<td>Latin America</td>
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<td>GEOG 349</td>
<td>Europe</td>
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<td>GEOG 353</td>
<td>Russia and the NIS-Topical Analysis</td>
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<td>GEOG 355</td>
<td>Africa, South of the Sahara</td>
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<td>GEOG 358</td>
<td>Human Geography of Southeast Asia</td>
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<tr>
<td>GEOG/ENVIR ST/ HISTORY 469</td>
<td>The Making of the American Landscape</td>
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<td>GEOG 501</td>
<td>Space and Place: A Geography of Experience</td>
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<td>GEOG/URB R PL 503</td>
<td>Researching the City: Qualitative Strategies</td>
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<td>GEOG/URB R PL 505</td>
<td>Urban Spatial Patterns and Theories</td>
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<td>GEOG/URB R PL 506</td>
<td>Historical Geography of European Urbanization</td>
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<td>GEOG 508</td>
<td>Landscape and Settlement in the North American Past</td>
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<td>GEOG 510</td>
<td>Economic Geography</td>
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<td>GEOG 518</td>
<td>Power, Place, Identity</td>
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<tr>
<td>GEOG 566</td>
<td>History of Geographic Thought</td>
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<td><strong>People-Environment (1 course)</strong></td>
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<tr>
<td>GEOG/ENVIR ST 139</td>
<td>Living in the Global Environment: An Introduction to People-Environment Geography</td>
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<tr>
<td>GEOG/ENVIR ST 309</td>
<td>People, Land and Food: Comparative Study of Agriculture Systems</td>
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<td>GEOG/ATM OCN/ENVIR ST 332</td>
<td>Global Warming: Science and Impacts</td>
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<td>GEOG/ENVIR ST 337</td>
<td>Nature, Power and Society</td>
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<td>GEOG/BOTANY 338</td>
<td>Environmental Biogeography</td>
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<td>GEOG/ENVIR ST 339</td>
<td>Environmental Conservation</td>
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<td>GEOG 340</td>
<td>World Regions in Global Context</td>
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<td>GEOG 344</td>
<td>The American West</td>
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<td>GEOG/AMER IND/ENVIR ST 345</td>
<td>Managing Nature in Native North America</td>
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<td>GEOG 359</td>
<td>Australia: Environment and Society</td>
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<td>GEOG/C&amp;E SOC/ENVIR ST 434</td>
<td>People, Wildlife and Landscapes</td>
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<td>GEOG/ENVIR ST 439</td>
<td>US Environmental Policy and Regulation</td>
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<td>GEOG/ENVIR ST/HISTORY 460</td>
<td>American Environmental History</td>
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<td>GEOG/ENVIR ST/HISTORY 469</td>
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<td>GEOG/SOIL SCI 526</td>
<td>Human Transformations of Earth Surface Processes</td>
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<td>GEOG/ENVIR ST 534</td>
<td>Environmental Governance: Markets, States and Nature</td>
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<td>GEOG/ENVIR ST 537</td>
<td>Culture and Environment</td>
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<td>GEOG 538</td>
<td>The Humid Tropics: Ecology, Subsistence, and Development</td>
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<td>GEOG/ENVIR ST 557</td>
<td>Development and Environment in Southeast Asia</td>
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<td><strong>Physical Geography (1 course)</strong></td>
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<td>GEOG/ENVIR ST 120</td>
<td>Introduction to the Earth System</td>
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<td>GEOG/ENVIR ST 127</td>
<td>Physical Systems of the Environment</td>
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<td>GEOG/GEOSCI 320</td>
<td>Geomorphology</td>
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<td>GEOG 321</td>
<td>Climatology</td>
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<td>GEOG/ATM OCN 323</td>
<td>Science of Climate Change</td>
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<td>GEOG/ENVIR ST 325</td>
<td>Analysis of the Physical Environment</td>
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<td>GEOG/GEOSCI 326</td>
<td>Landforms-Topics and Regions</td>
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<td>GEOG 329</td>
<td>Landforms and Landscapes of North America</td>
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<td>GEOG/ATM OCN/ENVIR ST 332</td>
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<td>Introduction to Cartography</td>
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<td>GEOG/ENVIR ST/</td>
<td>Introduction to Environmental Remote Sensing</td>
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<td>F&amp;W ECOL/ G L E/GEOSCI/LAND ARC 371</td>
<td>An Introduction to Geographic Information Systems</td>
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<td>GEOG 378</td>
<td>Introduction to Geocomputing</td>
<td>4</td>
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<tr>
<td>GEOG 360</td>
<td>Quantitative Methods in Geographical Analysis (offered only in spring)</td>
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<td>GEOG 560</td>
<td>Advanced Quantitative Methods</td>
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<td>STAT 301</td>
<td>Introduction to Statistical Methods</td>
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<td>STAT 324</td>
<td>Introductory Applied Statistics for Engineers</td>
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<tr>
<td>STAT 371</td>
<td>Introductory Applied Statistics for the Life Sciences</td>
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<tr>
<td>MATH 112 &amp; MATH 113</td>
<td>Algebra and Trigonometry</td>
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<tr>
<td>MATH 114</td>
<td>Algebra and Trigonometry</td>
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**Total Credits: 24-25**

## RESIDENCE AND QUALITY OF WORK

- 2.000 GPA in GEOG and major courses
- 2.000 GPA on 15 upper-level credits, taken in residence
- 15 credits in GEOG, taken on the UW–Madison campus

2 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 GIS, 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

1. Broad spectrum of geographical knowledge and skills, as well as a degree of expertise in a specific sub-field of the discipline (Human, People-Environment, Physical, Cart/GIS).
2. Skills in developing and implementing research plans.
3. Critical reasoning and analytical skills.
4. Communication skills - both written and oral.

ADVISING AND CAREERS

ADVISING
Students with questions about the major, courses, and careers are encouraged to contact the geography undergraduate advisor, Joel Gruley, at jgruley@wisc.edu.

CAREERS
Cartography and GIS, and geography more broadly, are remarkably interdisciplinary fields that span the natural sciences, social sciences, and humanities. The types of careers that cartography and GIS can prepare students for thus reflect this diversity. Geographic information scientists work across the public, private, and nonprofit sectors, and commonly work in the following fields, where they acquire, manage, analyze, visualize, and represent geospatial data: environmental policy, conservation, and management; digital cartography; urban and transportation planning; economic and community development; geospatial intelligence; food security; historic preservation; environmental hazards management; demography and human health; human migration and displacement; journalism; international conflict resolution; tourism.

L&S CAREER RESOURCES
SuccessWorks at the College of Letters & Science helps students leverage the academic skills learned in their major, certificates, and liberal arts degree; explore and try out different career paths; participate in internships; prepare for the job search and/or graduate school applications; and network with professionals in the field (alumni and employers).

SuccessWorks can also assist students in career advising, résumé and cover letter writing, networking opportunities, and interview skills, as well as course offerings for undergraduates to begin their career exploration early in their undergraduate career.

- SuccessWorks (https://careers.ls.wisc.edu)
- Set up a career advising appointment (https://careers.ls.wisc.edu/make-an-appointment)
- INTER-LS 210 L&S Career Development: Taking Initiative (1 credit, targeted to first- and second-year students)—for more information, see Inter-LS 210: Career Development, Taking Initiative (https://careers.ls.wisc.edu/inter-ls-210-career-development-taking-initiative)
- Learn how we’re transforming career preparation: L&S Career Initiative (http://ls.wisc.edu/lsci)

PEOPLE

Professors Burt, Cadwallader, Cronon, Downey, Kaiser, Knox, Mason, Naughton, Olds, Ostergren, Turner, Williams, Zhu

Associate Professors Alatout, Dennis

Assistant Professors Baird, Gibbs, Marin-Spiotta, Ozdogan, Robertson, Roth, Schneider, Woodward, Young