FRS 125: The Science and Art of Mapping the World

Instructor: Dr. Catherine Riihimaki
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Office hours: Mondays 11:30-12:30, Fridays 12:30-1:30 & by appointment
Meeting: Tuesdays, 1:30 - 4:20 pm

Description:
From the navigation apps on your cell phone to ancient drawings of an earth not yet fully explored, maps demonstrate the fundamental ways in which we understand and interact with our world. They can be beautiful pieces of art, but they also represent the collection, analysis, and presentation of rich datasets related to politics, populations, commerce, ecosystems, and the environment. Almost every discipline deals with geographic information, from sociologists who may track demographic patterns, economists who may map the flow of goods and services from one place to another, ecologists who may document the distribution of species, and landscape designers who may create new spaces that foster community building. This seminar is designed to bring together students with a wide range of interests to learn practical skills of modern, digital geographic analysis and graphic design—skills that will be applied in diverse ways to the big problems of many fields—and to discuss the advances and challenges of mapping in the 21st century. How do maps help and hinder our understanding of the world? How do free and widely available tools like Google Maps change our interactions with geographic data? How can mapping skills transform your education and future career path? Weekly assignments, readings, and discussions will prepare students to contribute original research in their field of interest by the end of the semester.
Learning Goals:

- Explore fundamental concepts of geography, including coordinate systems, data organization systems, and data interpretation strategies.
- Apply basic graphic design concepts to create compelling maps and graphics for presenting spatial data.
- Apply quantitative spatial analyses to applied projects in a variety of fields, including public health, political science, environmental science, and economics.
- Become proficient with ArcGIS software capabilities and limitations, and discuss the benefits and limitations of freeware mapping applications.

Text:
Geographic Information Systems and Science, Third Edition by Longley, Goodchild, Maguire, and Rhind, 2010

Additional Readings and Multimedia:


This American Life (2010), The bridge, This American Life episode broadcast 5/7/2010 and now available at http://www.thisamericanlife.org/radio-archives/episode/407/the-bridge.


Weekly map critiques

Course Requirements: Performance in this course will be evaluated based on 1 exam, a midterm project, a final project, a semester-long portfolio, weekly homework assignments, and class participation.
The final grade breakdown is:

- Mid-term exam: 15%
- Mid-term project: 15%
- Final Project: 25%
- Homework: 25%
- Class participation: 10%
- Semester-long portfolio: 10%

The goal is to provide ample feedback on your progress in the course leading up to the final project, in which you have the chance to show off your new skills. Except for the mid-term exam, I encourage discussion with classmates on assignments and projects, because this is an excellent way to get feedback and brainstorm project ideas and technical challenges. The mid-term exam will be an entirely individual effort.

I reserve the right to consider trends, class participation, and attendance for anyone on the cusp of two grades. Late assignments have a half-life of two weeks (i.e., if you turn it in two weeks late, your maximum grade is 50%).

**Mid-term exam:** The mid-term exam will be an in-class hour-long test of your understanding of foundational geographic and graphic design concepts covered in the first 1/3 of the semester. It will include a practical component to ensure that everyone can create a basic map and do initial analyses from a given dataset.

**Mid-term project:** This project is designed to help you gain experience creating a full project layout for a general audience, covering not just the production of a map but all of the elements that make for a compelling infographic. You will be applying many of the skills learned in the first half of the semester to produce a strong, professional product. We will each choose a state to map, with the goal of welcoming new residents to that state. Students will have to decide what data would be appropriate for new residents, and then find, analyze, and display the data for the chosen audience. The more narrow scope of this project will provide scaffolding for the more open final project.

**Final project:** A large chunk of the final grade will be based on a final project that demonstrates many of the skills learned in the course. The topic will be of the student’s choosing, with guidance from me and any other relevant faculty, and can relate to environmental, social, economic, health, or business issues, among other issues, provided that the question you are addressing is spatial. All projects must include a significant proportion of original datasets; in other words, students cannot rely completely on pre-packaged data from commercial, governmental or non-profit sources. The submitted project will consist of a poster presentation and the project document and datasets. The evaluation criteria will be
- Effective communication of overall project in poster
- Effective design and layout of poster and each map
- Effective use of symbology and text in poster and each map
- Effective use of color in poster and each map
- Originality of project
- Accuracy/detail of analyses
- Quality of project conclusions
- Appropriate spatial analyses done
- Mapping tools used correctly

**Homework:** Students will complete two mapping assignments each week: a guided, ungraded assignment that is done primarily in class, and a graded homework assignment that will apply the skills learned in class. These assignments will address bite-sized research questions that could serve as inspiration for the final project.

**Class participation:** Each class will include about an hour of discussion and lecture about fundamental concepts of geography and critiquing published mapping projects. Attendance and active participation in discussions will be encouraged.

**Portfolio:** One of the important goals of this course is to have you create a personal mapping portfolio that will be useful to you in the future, either for projects at Princeton or in a job after graduation. Mapping techniques, data sources, and other resources are so numerous and varied that, even if you’re doing mapping work regularly, you find yourself saying, “Now how did I do that last time?” or “Where did I get that data?” Your portfolio will be absolutely invaluable to you in the future.

**Academic Accommodations:** Students must register with the Office of Disability Services (ODS) (ods@princeton.edu; 258-8840) for disability verification and determination of eligibility for reasonable academic accommodations. Requests for academic accommodations for this course need to be made at the beginning of the semester, or as soon as possible for newly approved students, and again at least two weeks in advance of any needed accommodations in order to make arrangements to implement the accommodations. Please make an appointment to meet with me in order to maintain confidentiality in addressing your needs. No accommodations will be given without authorization from ODS, or without advance notice.

**Academic Integrity:** I expect all students to abide by the Princeton Honor Code. Although you may discuss course topics and exercises together, any work that you turn in should represent your own intellectual efforts unless we are specifically working on group projects. Your work in this course must be your own, including downloading your own data. Sharing files or copying and using someone else’s files is plagiarism. Please ask me for clarification if you are unsure of what constitutes plagiarism and/or cheating.
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<tr>
<th>Day</th>
<th>Topic</th>
<th>Text Chapters</th>
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<tr>
<td>9/16</td>
<td>What are the technical, methodological, and philosophical challenges of the modern geographer?</td>
<td>Sec. 1.1, 1.3, 1.7-1.8, 2.3.5 Bad latitude</td>
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<td>9/23</td>
<td>How do computer science ideas impact spatial data storage, analysis, and presentation?</td>
<td>Ch. 3 The power of maps</td>
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<td>9/30</td>
<td>How can graphic design ideas improve spatial data presentation? Visit University Art Museum</td>
<td>Technical boxes 4.1-4.3, 4.6; Ch. 12 Make maps people want to look at</td>
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<td>10/7</td>
<td>How do we align, analyze, and display data from a round earth on flat maps?</td>
<td>Ch. 5; Sec. 11.2 The visual display of quantitative information</td>
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<td>10/14</td>
<td>What data are available for free, and how can you use them?</td>
<td>Lying with maps</td>
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<td>10/21</td>
<td>Creating new data from location information: how have Walmart and Target stores spread across the US?</td>
<td>Midterm Exam</td>
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<td>11/4</td>
<td>Creating new data from modifying old data: how can you map water resources in dry regions?</td>
<td>Sec. 6.1-6.2; Ch. 9 Portfolio due</td>
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<td>11/11</td>
<td>Peer Review of Midterm Project Visit Historic Maps Collection</td>
<td>Rough draft due</td>
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<td>11/18</td>
<td>Midterm Project Presentations How have freeware programs changed the field of geography?</td>
<td>Midterm project due</td>
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<td>11/25</td>
<td>Spatial analysis: what are the social costs of city ordinances?</td>
<td>Ch. 14 Cartonerd blog This American Life: The bridge</td>
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<td>12/2</td>
<td>Spatial analysis: how can elevation data help predict natural disasters?</td>
<td>Ch. 15</td>
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<td>12/9</td>
<td>Peer Review of Final Projects Spatial analysis: what are some innovative ways to visualize the world?</td>
<td>Rough draft due</td>
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<td>January</td>
<td>Final Project Presentations</td>
<td>Final project due Portfolio due</td>
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