

Master Syllabus
Department of Geography

GEOG 448: Geographic Information System Design

Course Description

Geographic information technologies continue to drive the representation and management of complex as well as everyday spatial information. As a result, increasing numbers of for-profit and non-profit organizations have recognized the need to transform their information into a spatial format. The demand for collaborative and participatory skills in the use of these mapping tools has, of course, been furthered by this general trend. Therefore, the goal for this course is that each student will become an independent and effective GIS user while developing their collaborative skills in the use of GIS for spatial analysis and representation. To meet this goal, this course follows a participatory workshop model, drawing on Elwood (2009) -- an intensive, hands-on experience in which student teams use GIS in collaboration with community partners. These partnerships will involve students in a full range of collaborative GIS: working with team members and project partners to identify project goals, acquiring and preparing spatial data for GIS analyses, communicating with clients to assess progress, managing spatial data, and producing necessary maps and analyses. The lecture, reading, and seminar discussion components of the course will focus on topics important to collaborative development -- to be prepared to implement, manage, and apply in a variety of research and applications areas, and in multiple geographical and institutional contexts. (Prerequisite: GEOG 344)

Course Objectives

This course will expose students to the technical, critical, and collaborative skills necessary to analyze the consequences of human/environment interactions within a geographic information system. The workshop model will allow students to develop and apply these skills in partnership with community organizations. This course is designed to help students:

- Extend their skills in digital data preparation and handling in a GIS environment,
- Gain experience across the full range of steps and tasks that comprise GIS applications,
- Practice skills that will help them navigate the 'human' side of successful GIS applications,
- Become an independent and ethical GIS practitioner who is prepared to work in a diversity of institutional, geographical, and political contexts, and
- Produce an applied GIS project from start to finish that may be used to showcase their GIS abilities to future employers or academic programs.

Course Rationale

This course is a capstone for Geography majors who are pursuing an emphasis in Geographic Information Science (GIS). This course will expose students to the technical, critical, and collaborative skills necessary to analyze the consequences of human-environment interactions within a geographic information system. The workshop model will allow students to develop and apply these skills in partnership with community organizations.

Course Format

This course will be composed of lecture and laboratory sessions. Lecture sessions will be discussion based, and will cover the majority of the conceptual material. There will be assigned readings, and part of students' assessments will be based on their contributions to in-class discussions. In laboratory sessions, students will be expected to work constructively with their fellow classmates and community partners in the use of ArcGIS software.

An example of a potential outline of topics of this course, with time allotment for each topic at the discretion of the instructor:

1. GIS project management
 - Assessment of needs
 - Cost/benefit analysis
 - System requirements and design
2. Data acquisition
 - Data models
 - Data pre-processing
3. GIS implementation
 - Vector data operations
 - Raster data operations
4. Grassroots GIS
 - USA case studies
 - International case studies
5. Web-based Public Participation
6. Neogeography
7. Qualitative GIS

8. Ethics in GIS practice
9. Critical GIS
10. Public Participation GIS and the University

The following assignments will be required in this course. Other assignments may be added at the instructor's discretion:

1. Examination

Students will complete at least one examination that covers assigned readings, lab material, discussions, lectures, and in-class activities. At minimum, the exam(s) should require students to:

- Identify and describe methods in GIS project management
- Explain the importance of different forms of knowledge in community-based GIS work
- Demonstrate their knowledge of challenges in collaborative GIS projects

2. Journal exercise

Students will be asked to read selected articles from the literature in GIS. Each week, members of the class will be asked to lead discussion of a particular reading in conjunction with the themes of the course. In preparation for this, students will be asked to complete a review of their assigned journal article, which should answer the following four questions:

- What key concepts are needed to understand this article?
- What is the argument of the article?
- What evidence is provided to support this argument?
- What is the significance of this article

3. Laboratory exercise

To evaluate students individual laboratory abilities, students will be asked to complete one comprehensive, laboratory exercise. This exercise will draw on advanced GIS competencies, and will prepare students for designing and implementing the collaborative project.

4. Needs assessment report

As a team, students will produce a report assessing the needs for the project and the steps required to implement the project. The report will have five main sections:

- Project background information
- Description of the project goals and objective
- Data acquisition and development steps
- List of maps and analysis
- A series of steps of work tasks to be completed

5. Progress report

As a team, students will produce a progress report with the following:

- Description of the tasks completed
- Description of any problems that need resolved
- Summary of mid-project meeting with community partners
- Explanation of any changes to project goals
- Preliminary maps or outline of database design

6. Portfolio

As a team, students will produce a project portfolio that will be shared with their community partners. In addition to a project summary and a project conclusion, the portfolio will include a revised draft of the needs assessment, the mid-project progress report, the data dictionary, the final maps and other outputs, and the digital files (CD-ROM, DVD-ROM, or iLocker).

7. Oral Presentation

As a team, students will produce a presentation that will be delivered at the end of the semester. Project partners and others from the university community will be invited to attend.

Course Texts

Recommended texts include:

Chrisman, Nicholas R. 1999. What does 'GIS' mean? *Transactions in GIS* 3 (2):175-186.

Crampton, Jeremy W. 1995. The Ethics of GIS. *Cartography and Geographic Information Systems* 22 (1):84-89.

Crampton, Jeremy W. 2009. Cartography: maps 2.0. *Progress in Human Geography* 33 (1):91-100.

Elwood, Sarah A. 2009. Integrating participatory action research and GIS education: Negotiating methodologies, politics and technologies. *Journal of Geography in Higher Education* 33 (1):51-65.

- Esnard, Ann-Margaret. 1998. Cities, GIS, and Ethics. *Journal of Urban Technology* 5 (3):33-45.
- Goodchild, Michael F. 2007. Citizens as sensors: the world of volunteered geography. *GeoJournal* 69:211-221.
- Haklay, Mordechai, Alex Singleton, and Chris Parker. 2008. Web Mapping 2.0: The Neogeography of the GeoWeb. *Geography Compass* 2 (6):2011-2039.
- Henry-Nickie, Makada, Haydar Kurban, Rodney D. Green, and Janet A. Phoenix. 2008. Leveling the playing field: Enabling community-based organizations to utilize geographic information systems for effective advocacy. *URISA Journal* 20 (2):33-41.
- Knigge, LaDona, and Meghan Cope. 2006. Grounded visualization: integrating the analysis of qualitative and quantitative data through grounded theory and visualization. *Environment and Planning A* 38:2021-2037.
- Merrick, Meg. 2003. Reflections on PPGIS: A view from the trenches. *URISA Journal* 15 (APA II):33-39.
- O'Sullivan, David. 2006. Geographical information science: critical GIS. *Progress in Human Geography* 30 (6):783-791.
- Parker, Brenda. 2006. Constructing Community Through Maps? Power and Praxis in Community Mapping. *The Professional Geographer* 58 (4):470-484.
- Rattray, Nicholas. 2006. A user-centered model for community-based web-GIS. *URISA Journal* 18 (2):25-34.
- Schlossberg, Marc, and Darren Wyss. 2007. Teaching by doing: PPGIS and classroom-based service learning. *URISA Journal* 19 (1):13-22.
- Weiner, Daniel, and Trevor M. Harris. 2003. Community-integrated GIS for Land Reform in South Africa. *URISA Journal* 15 (APA II):61-73.
- Williams, Craig, and Christine E. Dunn. 2003. GIS in Participatory Research: Assessing the Impact of Landmines on Communities in North-west Cambodia. *Transactions in GIS* 7 (3): 393-410.
- Wilson, Matthew W. 2009. Towards a genealogy of qualitative GIS. In *Qualitative GIS: A Mixed Methods Approach*, edited by M. Cope and S. A. Elwood. London: Sage. p. 156-170.
- Wilson, Matthew W., Barbara S. Poore, Francis Harvey, Mei-Po Kwan, David O'Sullivan, Marianna Pavlovskaya, Nadine Schuurman, and Eric Sheppard. 2009. Theory, Practice, and History in Critical GIS: Reports on an AAG Panel Session. *Cartographica* 44 (1):5-16.

Wong, Sidney, and Yang Liang Chua. 2001/2004. Data Intermediation and Beyond: Issues for Web-Based PPGIS. *Cartographica* 38 (3/4):63-80.

Evaluation of the course

Students will have an opportunity to participate in a formal evaluation of the course and the instructor's teaching performance at the end of the semester.