University of Michigan  
Taubman College of Architecture & Urban Planning  
UP 506: Introduction to Geographic Information Systems  
Winter 2014

Course Staff and Schedule

Instructor:  Prof. Robert Goodspeed (rgoodspe at umich.edu)  
Office:  2223C Art & Architecture Building  
Office Hours:  T&Th 4 – 5:20 PM

GSI:  Cheng Wang (wacheng@umich.edu)  

Lectures:  T&Th. 2:30-3:30PM, Room 2213, Art & Architecture Building  
Labs:  003  Th 4:30 – 7 PM – Windows Training Room 2  
       002  F 1 – 3:30 PM – Windows Training Room 3  
       All labs held in the Duderstadt Center

Summary and Learning Objectives

This course is designed to introduce students to the dynamic field of geographic information systems (GIS). This course has three interrelated objectives: (1) provide a foundation in concepts from cartography, spatial analysis, and computer science used in GIS applications, (2) develop specific skills using ESRI's ArcMap through a set of hands-on exercises, and (3) allow students to apply these skills through a mapping project on a topic of their choosing. Although urban planning topics will be emphasized, the course is intended to serve as a general introduction to GIS.

Through this course, students will learn the basic principles of GIS, how to frame spatial questions, and how to answer these question using GIS functions, including project and overlay map data, query and conduct spatial analysis, geocoding, and develop simple models using raster data.

Note on Labs: Students should enroll in one of the three lab sessions, which will meet in the Windows Training Rooms located on the second floor of the Duderstadt Center. If for some reason a student cannot attend their own session for a given week, please ask the GSI to assign you to another session.

Materials

Textbooks

  Available at the North Campus Bookstore. It is important to purchase this textbook new, since it is revised for the newest version of ArcGIS and comes with a software and data CD.
  Available at the North Campus Bookstore. This textbook also has a data CD.

Additional Texts (Available on reserve at the Art, Architecture & Engineering Library)

  Textbook with useful cases on environmental, health, crime, and other planning topics.
  Assigned chapters are posted to CTools, however the entire book is recommended to interested students.
  *Social critique of GIS use.*

**Other**

• USB Drive, minimum 2 GB
• See course CTools website for links to a variety of GIS resources.

**Assignments**

• Class Participation and Discussion (5%)
• Lab Assignments (30%)
• Midterm Exam (15%)
• Module 2 & 3 Reading Response Posts (15%)
• Final Project Paragraph (5%), Proposal (10%), Poster and Presentation (20%)

**Labs** - Lab assignments are due at the beginning of the lab session the following week. The course content is cumulative and there are many assignments, so it is particularly important for students to keep up with the pace of the course. Late labs will be penalized 10% for each day late.

**Midterm** – The midterm is based on lecture presentations and readings. It will be a bluebook exam completed in-class.

**Module 2 & 3 Reading Response Posts** – After the midterm exam, students should post 200-500 word reading responses to the class website each week before the Monday lecture. These responses should address the second reading assignments for these weeks, which describe GIS applications. **Responses are due for a minimum of 4 of the 6 weeks.** The grade is the percent of required posts completed (maximum of 100%).

**Final Project** – Additional details on the final project will be provided separately. A short paragraph is due at the start of class on Tues., March 11, and a project proposal is due Tues., March 25.

**Course Suggestions**

**Getting Help**
GIS is professional software, meaning it is used by a community of expert users who are already familiar with its interface, specialized functions, and underlying concepts. This makes it different than most of the software applications you have used before, which are designed for use by broad audiences of general users. **As a consequence, you may find GIS software to be buggy, confusing, and frustrating.** When you encounter problems, there are several resources available to you:

• Class Colleagues
• Class Website Forum
• Help files, FAQs, listservs, and other online resources
• Course instructors
• SAND Lab

Corrupted files, error messages, missing menus, and other challenges you may encounter are not problems, but learning opportunities along the path of becoming a professional GIS user.

**Academic Integrity**
Taubman College Policy on Plagiarism:

*"Plagiarism is knowingly presenting another person's ideas, findings, images or written work as one's own by copying or reproducing without acknowledgement of the source. It is intellectual theft that violates basic academic standards. In order to uphold an equal evaluation for all work*
submitted, cases of plagiarism will be reviewed by the individual faculty member and/or the Program Chair. Punitive measures will range from failure of an assignment to expulsion from the University."

Students will be provided guidance in class about academic integrity norms in GIS, including how to cite data sources and document analyses. Students with additional questions should contact the course instructor.

**Accommodations for Students with Disabilities**

It is Taubman College policy to "meet the educational needs of all persons, including those with physical or perceptual limitations, who are interested in the study of architecture, urban planning and/or urban design." If you think you need an accommodation for a disability, please let me know at your earliest convenience. Some aspects of this course, the assignments, the in-class activities, and the way the course is usually taught may be modified to facilitate your participation and progress. As soon as you make me aware of your needs, we can work with the Services for Students with Disabilities (SSD) office to help us determine appropriate academic accommodations. SSD (734-763-3000; http://ssd.umich.edu) typically recommends accommodations through a Verified Individualized Services and Accommodations (VISA) form. Any information you provide is private and confidential and will be treated as such.

**Schedule**

**Module 1: Introduction to GIS**

**Week 1 - Introduction and Course Overview**

Thurs., Jan. 9: Introduction

Lab: GTK 3

Readings:

1. Chang, Ch. 1

Additional Readings:


**Week 2 - Geographic Concepts: Coordinate Systems & Projections**

Tues., Jan. 14: Concepts 1

Thurs., Jan 16: Concepts 2

Lab: GTK 6

Readings:

1. Chang, Ch. 2.
2. Monmonier, Ch. 2
**Week 3 - Spatial Data Formats**

Tues., Jan. 21: Overview and Vector Data

Thurs., Jan. 23: Raster Data

Lab: GTK 4

Reading:
1. Chang, Ch. 3 & 4.

**Week 4 - Thematic Mapping, Symbology & Cartography**

Tues., Jan. 28: Thematic Mapping

Thurs., Jan. 30: Symbology & Cartography

Lab: GTK 7-10

Readings:
1. Chang, Ch. 9.
2. Monmonier, Ch. 10 & 11.

**Week 5 – U.S. Census**

Tues., Feb. 4: U.S. Census – Introduction, Census Geography & Data Products

Thurs., Feb. 6: U.S. Census – Neighborhood Scale Analysis & Examples

Lab: Census Assignment

Reading:
5. Hodges, K. and E. Christopher. Webinar: “Using the ACS to Measure Trends Over Time.” American Community Survey Data Users Group. Available online at: [https://www.youtube.com/watch?v=Bvl2sZo1PNY#t=5](https://www.youtube.com/watch?v=Bvl2sZo1PNY#t=5)

Additional Reading:
Week 6 – Spatial Databases & Data Sources

Tues., Feb. 11: Database Concepts & Data Sources


Lab: GTK 15a, 15b & 16

Reading:
1. Chang, Ch. 5.

Additional Reading:

Week 7 – Creating Data

Tues., Feb. 18: Creating Data and Digitizing

Thurs., Feb. 20: Geocoding

Lab: GTK 11, 12 & 14

Reading:
1. Chang, Ch. 7, 8, & 16.

Week 8 – Midterm

Tues., Feb. 25: GIS Ethics

Reading:
1. GISP Code of Ethics and Rules of Conduct

Thurs., Feb. 27: Midterm Exam

Week 9 – No Class Spring Break

Module 2: Analysis in GIS

Week 10 – Spatial Analysis

Tues., March 11: Spatial Analysis 1: Select, Dissolve, Clip
  • Project Paragraph Due

Thurs., March 13: Spatial Analysis 2: Model Builder

Lab: GTK 17 & 18
Reading:
1. Chang, Ch. 10.

**Week 11 – Spatial Analysis, Con’t**

Tues., March 18: Spatial Analysis 2: Buffer & Overlay

Thurs., March 20: Guest Lecture – GIS Analysis Applications

Lab: GTK 19

Reading:
1. Chang, Ch. 11.
2. Ackerson, Kristopher. "In the Right Place: Iowa City uses GIS to Site Affordable Housing." Planning, March 2013: 33-35

**Week 12: Introduction to Raster Analysis**

Tues., March 25: Raster Data Model & Map Algebra

• Project Proposal Due

Thurs., March 27: Raster Analysis & Modeling

Lab: GTK 20

Reading:
1. Chang, Ch. 12.

Additional Reading:
1. Chang, Ch. 13 (Terrain Mapping) and Ch. 14 (Viewshed and Watershed Analysis)

**Module 3: Emerging Applications and Final Projects**

**Week 13: Web Mapping and Open Source GIS**

Tues., April 1: Open Source GIS & Web Mapping

Thurs., April 3: PPGIS & Volunteered Geographic Information

Lab: Web Mapping Assignment

Readings:

Additional Resources:

**Week 14: Project Work Session**

*This week we will meet in a computer lab for a short "desk crit" to see your work so far and answer any questions. Attendance on Monday and Wednesday is required and the location will be announced.*

Tues., April 8: Project Work Session (Angel Hall Classroom A)

Thurs., April 10: Project Work Session (Angel Hall Classroom A)

Labs: Work Sessions

**Week 15: PSS and Presentations**

Tues., April 15: Planning Support Systems (PSS), and the Future of GIS in Planning

Thurs., April 17: Presentations (Location TBA)

Reading:


Additional Resources:


**Week 16: Final Presentations**

Tues., April 22: Presentations (Location TBA)

**Week 17: Final Presentations**

Tues., April 29, 4:00 pm - 6:00 pm (Final Exam Window): Presentations if Needed (Location TBA)

Wed., April 30, 5PM – Project Posters Due at Instructor’s Office (2223C A&AB)