Course Staff and Schedule

Instructor: Prof. Robert Goodspeed (rgoodspe@umich.edu)
Office: 2223C Art & Architecture Building
Office Hours: T/Th 2:30 – 4PM (sign up via Canvas link)

GSI: Drew Phillips (dphilli@umich.edu)
Office Hours: By Appointment

Lectures: T&Th 4:00 – 5:00 PM, Room 2108, Art & Architecture Building
Labs:
   004  Th 5:30–8:00 PM
   002  Fr 8:30–11:00 AM All labs in Advanced Training Lab 1, Duderstadt Center
   003  Fr 1–3:30 PM

Summary and Learning Objectives

This course is designed to introduce students to the dynamic field of geographic information systems (GIS). The 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, QGIS, and other software applications 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. Students will learn the basic principles of GIS, practice mapping spatial data, study examples GIS analysis, and develop and implement simple analysis models.

Note on Labs: Students should enroll in one of the three lab sessions, which will meet in Advanced Training Lab 1 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

- Law, Michael and Amy Collins. 2015. Getting to Know ArcGIS. 4th ed. Redlands, Calif.: ESRI Press. ISBN: 9781589483828 (Referred to below as “GTK”) Available at the North Campus Bookstore. It is important ensure your copy is the correct edition, and is accompanied by the data CD.
- Chang, Kang-Tsung. 2013. Introduction to Geographic Information Systems. 7th Ed. New York: McGraw-Hill Science/Engineering. ISBN: 978-0077805401 Available at the North Campus Bookstore. This textbook also has a data CD, which will be useful but is not needed for class assignments. Note that there is an 8th edition available we are not using.
Additional Texts (Available from the Art, Architecture & Engineering Library)
- Monmonier, Mark S. 1996. How to Lie With Maps. 2nd ed. Chicago: University of Chicago Press. *Assigned chapters are posted to Canvas, however the entire book is recommended to interested students.*

Readings
- All required readings not from the course textbooks will be posted to CTools. Many of the "Additional Readings" are also available online. While not required, they are recommended for doctoral students, or students interested in exploring the topics further.

Other
- USB Drive, minimum 2 GB
- *See course Canvas website for links to a variety of GIS resources.*

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

Lab Assignments – 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 Exam – The midterm is based on the lecture presentations and readings. It will be a bluebook exam completed in-class. Students should provide their own bluebook, a blank exam booklet available from all campus bookstores.

Module 2 & 3 Reading Response Posts – After the midterm exam, students should post a 300-500 word reading responses to the class website each week before the Monday lecture. These responses should address the article(s) assigned for that week, and optionally also respond to other students’ posts. **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., Oct. 27th, and a detailed project proposal is due Tues., Nov. 17th. Posters will be displayed at fairs held on Thurs., Dec. 10th (draft, class only), and Wed., Dec. 23rd (public).
Resources

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 with limited shared knowledge. 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:

- Classmates
- Class Canvas forum
- Online help files, FAQs, listservs, and other resources (get started at http://resources.arcgis.com/en/help/ or http://gis.stackexchange.com/)
- Course instructors
- SAND Lab Librarians

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

Spatial and Numeric Data Services (SAND) Lab
The University Library's Spatial and Numeric Data Services (SAND) provides assistance with spatial data, numeric data, and statistics for the University of Michigan community. One of the two UM SAND labs is located at Taubman College in room 2207 of the Art & Architecture building. The lab supports students from Taubman College, in addition to those from other North Campus programs including the Schools of Engineering and Information. SAND provides advanced computers and software to help students and researchers work with spatial and numeric data and access to data only available from within our labs. These labs are equipped with ArcGIS, ArcView, ERDAS, SAS, SPSS, StatTransfer, Stata, Adobe Creative Suite (Photoshop, Illustrator, InDesign, Dreamweaver), and other software. SAND also provides access to and assistance with data from the Inter-university Consortium for Political and Social Research (ICPSR), Roper Center for Public Opinion Research, Europa World Plus, Global Insight, Geolytics, the U.S. Census Bureau, the U.S. Geological Survey, and other sources.

UP 506 Sand Lab Use Guidelines: Students with questions arising from course assignments should inquire with classmates and course instructors before visiting the SAND Lab. After reviewing the provided Canvas links and conducting preliminary explorations, students are encouraged to consult with the SAND Lab librarians about data sources for the final project. There are two ways to utilize the SAND Lab:

- For smaller issues or general questions, consult with the graduate student during drop-in hours;
- For more complex requests, set up an appointment with one of the data librarians.

For more information or to book an appointment, see: https://taubmancollege.umich.edu/labs-workshops/spatial-and-numeric-data-services-sand-lab

Course Policies

In addition to those specified here, policies which apply to students in this class include those of the Urban and Regional Planning Program, Taubman College, students' home academic units, and the University.
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 appropriately 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.

Grading
The following scale will be used for grading in this course.

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Schedule

Module 1: Introduction to GIS

**Week 1 - Introduction and Course Overview**

Tues., Sept. 8: Introduction & Geographic Orientation

Thurs., Sept. 10: Geographic Orientation & GIS Applications in Urban and Regional Planning

Lab 1: GTK 3

Readings:
1. Chang, Ch. 1

Additional Readings:

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

Tues., Sept. 15: Concepts 1

Thurs., Sept. 17: Concepts 2

Lab 2: GTK 4 & 6

Readings:
1. Chang, Ch. 2
2. Monmonier, Ch. 2

**Week 3 - Spatial Data Formats**

Tues., Sept. 22: Overview and Vector Data

Thurs., Sept. 24: Raster Data

*Sat., Sept. 26th: Urban Informatics Ann Arbor Unconference, 9:30 AM – 4:00 PM, A&AB*

Lab 3: GTK 7-10

Reading:
1. Chang, Ch. 3 & 4

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

Tues., Sept. 29: Symbology & Cartography
Thurs., Oct. 1: Thematic Mapping

Lab 4: Cartography Assignment

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

**Week 5 – U.S. Census**

Tues., Oct. 6: U.S. Census – Introduction, Census Geography & Data Products

Thurs., Oct. 8: U.S. Census – Neighborhood Scale Analysis & Examples

Lab 5: 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 – Database Concepts and Data Sources**

Tues., Oct. 13: Database Concepts

Thurs., Oct. 15: GIS Ethics

Lab 6: GTK 15a, 15b, 16 & 17

Reading:
1. Chang, Ch. 8 & 10
Additional Reading:

**Week 7 – Midterm Exam**

*Tues., Oct 20: No Class - Fall Study Break*

*Thurs., Oct. 22: Midterm Exam*

**Module 2: Analysis in GIS**

**Week 8 – Creating Data**

*Tues., Oct. 27: Creating Data: Digitizing, GPS & Metadata*  
- Project Paragraph Due

*Thurs., Oct. 29: Geocoding and SAND Lab Librarian*

*Lab 7: GTK 12, 13 & Geocoding Assignment*

**Reading:**
1. Chang, Ch. 5, 7, & 16

**Week 9 – Spatial Analysis**

*Tues., Nov. 3: Spatial Analysis 1: Select, Dissolve, Clip*

*Thurs., Nov. 5: Spatial Analysis 2: Model Builder*

*Lab 8: GTK 18-19*

**Reading:**
1. Chang, Ch. 11

**Additional Reading:**

**Week 10: Spatial Analysis, Cont.**

*Tues., Nov. 10: Spatial Analysis 2: Buffer & Overlay*
Thurs., Nov. 12: Spatial Analysis 3 & Equity Mapping

Lab 9: Metropolitan Detroit Equity Analysis

Reading:
1. Chang, Ch. 17

Additional Reading:

Week 11: Raster Analysis

Tues., Nov. 17: Raster Data Model & Map Algebra
   • Project Proposal Due


Thurs., Nov. 19: Raster Analysis & Modeling: Time and 3D Space

Lab 10: GTK 20

Reading:
1. Chang, Ch. 12

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

Week 12: Spatial Modeling

This week we will meet in a computer lab for a short "desk crit" to see your work so far and answer any questions. Each individual or group should check in with the instructor during the session.

Tues., Nov. 24, 4:00 - 7:00 PM: Working Session

Thurs., Nov. 26: Thanksgiving (No Class)
Module 3: Emerging Applications and Final Projects

Week 13: Open Source GIS, Web Mapping, and Participatory GIS

Tues., Dec. 1: Open Source GIS & Web Mapping PPGIS & Volunteered Geographic Information

Thurs., Dec. 3: Guest Speaker: Renee Sieber, McGill University

Lab 11: Web Mapping Assignment

Readings:

Additional Resources:

Week 14: Final Project Working Sessions

Tues., Dec. 8: Planning Support Systems (PSS), and the Future of GIS in Planning

Thurs., Dec. 10: Draft Poster Fair (class only)

Reading:

Additional Resources:
- Holway, Jim, C.J. Gabbe, Frank Hebbert, Jason Lally, Robert Matthews, and Ray Quay. 2012.

Wed., Dec. 23 8:00 am - 10:00 am: Final Poster Fair