Course description

The goal of the course is to introduce students to principles and methods of analysis and visualization of geographic information. The course explores sources and types of geographic data used in urban and regional studies and planning with an emphasis on Census data, and discusses data quality and compatibility. Students learn about Geographic Information Systems (GIS) as a primary tool of spatial (geographic) analysis. Principles of graphic design and spatial data visualization are discussed, as well as GIS uses and limitations. Attention is given to practical applications of GIS in urban and regional planning and to developing essential skills in desktop mapping and spreadsheet software.

The course consists of lectures and exercises to be completed through an independent work in the computer laboratory. The latter includes completing exercises from Getting to Know ArcGIS Desktop manual and three assignments developed to help students build skills in retrieving, manipulation, analysis and effective presentation of geographic information. In addition to the lectures and labs, the course utilizes WebCT, an online educational tool, to support the instruction (URL http://www.webct.pdx.edu/).

Instructor:
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Office hours: 1:00 to 3:00 PM on Mondays and Wednesdays, and by appointment.

Required reading
- Course pack “Geographic Data Analysis and Display” – at PSU Bookstore
- Online and other digital sources as assigned

Evaluation Method
Final grades will be established on the basis of:
- Assignments (3) 60% (20% each)
- Exercises from Getting to Know ArcGIS Desktop 8%
- Presentation (1) 7%
- Participation (daily) 7%
- Leading a discussion 3%
- Final exam 15%

Special needs
If you have a disability and are in need of academic accommodations, please notify the instructor immediately to arrange needed supports.

**Topical Outline and Weekly Agenda**

**Week 1.**
Course introduction. Geographic data and its users.

2. Data and information. Types of data.
3. Primary and secondary data. Geographic (spatial) and categorical data.
5. Using geographic data, maps and GIS in planning and other disciplines.

**Reading materials for Week 2**

**Week 2.**
US decennial Census and other governmental data sources. Analysis with local Census data.

3. American Community Survey and other data sources.
4. Geographic hierarchy of Census data.
5. Data available for local area analysis.

**Reading materials for Week 4**

**Week 3.** Martin Luther King, Jr. Day – University closed

**Week 4.**

1. Derived variables and descriptive statistics.
2. Comparing areas: index of dissimilarity; normalization of numerical data.
4. Presenting tabular data.
5. Creating effective charts and graphs.
6. Formulas and charts in Excel.

Reading materials for Week 5
- Chrisman, N. Exploring Geographic Information Systems, Introduction; Chapters 1 and 2.

Week 5.
GIS: concepts, principles, components.

1. Geographic (spatial) phenomena; their types and characteristics.
2. GIS database concepts. Vector and raster GIS data models.
5. TIGER/Line files: a major source of geographic data.

Reading materials for Week 6
- Chrisman, N. Exploring Geographic Information Systems, Ch. 3.
- Mark Monmonier. How to Lie with Maps. Chs. 6 and 10;

Week 6.
Geographic data visualization. Thematic Mapping, Classification Types

1. Map as a model of geographic data. Map goals, users and types.
2. Thematic maps: portraying distribution, count, magnitude.
3. Joining tabular and geographic data.
4. Methods of data classification for choropleth maps.
5. Other methods of geographic data visualization.

Reading materials for Week 7
- Chrisman, N. Exploring Geographic Information Systems, Ch. 4.

Week 7.
Map elements. Controls on map design.

1. Map elements, informative titles, creative labeling.
2. Map design process and controls.
3. Scale and projections.
4. Generalization.
5. Dasymetric mapping and its uses.

Reading materials for Week 8

Week 8.
Spatial Analysis in GIS (Part 1)

1. Locating and identifying spatial objects.
2. Defining spatial characteristics.
3. Simple queries; reclassification.
4. Measuring length, perimeter, area, distance.
5. Spatial overlay and buffers.

Reading materials for Week 9
- Chrisman, N. Exploring Geographic Information Systems, Chs. 7, 8, and 9.

Week 9.
Spatial Analysis in GIS (Part 2)

1. Statistical surfaces.
2. Analysis with raster GIS: neighborhood operations.
5. Political redistricting.

Reading materials for Week 10
- Chrisman, N. Exploring Geographic Information Systems, Chs. 10 and 11.

Week 10.
Social and cultural context of GIS. Public Participation GIS.
2. Error, accuracy and precision.
3. GIS and community. Public Participation GIS.
4. GIS and society: legal and other issues.

**Week 11.** Final exam.
<table>
<thead>
<tr>
<th>Week/ Date</th>
<th>TOPICS (see corresponding REQUIRED READING in WebCT)</th>
<th>EXERCISES &amp; Due dates</th>
<th>ASSIGNMENTS</th>
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</thead>
<tbody>
<tr>
<td>Week 1 1/6</td>
<td>Course introduction. Geographic and categorical data, its types and uses. Sources of geographic and categorical data.</td>
<td>See Week 1 in WebCT (Weekly course materials) by Monday, 1/13, 4:00 PM</td>
<td>n/a</td>
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<tr>
<td>Week 2 1/13</td>
<td>US decennial Census. 1990 and 2000 Census data. Summary files. Analysis with local Census data. Geographic hierarchy of Census data.</td>
<td>Submit your research proposal via WebCT email (see Week 2) by Friday, 1/17, 4:00 PM</td>
<td>Assignment 1 due Friday, January 31, by 4:00 PM in URBN 570M</td>
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<td>Week 3 1/20</td>
<td>Martin Luther King, Jr. Day – University closed</td>
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<td>Week 4 1/27</td>
<td>Derived variables; descriptive statistics; index of dissimilarity; normalizing numerical data. Principles of data visualization. Designing tables and charts.</td>
<td>GTKAGD: Ch. 1, 2, 3, 4 by Wednesday, 2/5, 4 PM</td>
<td>Assignment 2 due Friday, February 21, by 4:00 PM in URBN 570M</td>
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<td>Week 5 2/3</td>
<td>GIS: concepts, principles, components. GIS data models. Data development. GIS data sources. TIGER. Student Presentations (5)</td>
<td>GTKAGD: Ch. 5, 6, 7, 9 by Wednesday, 2/12, 4 PM</td>
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<td>Week 6 2/10</td>
<td>Geographic data visualization. Thematic mapping. Linking tabular and geographic data. Classification methods for mapping. Student Presentations (5)</td>
<td>GTKAGD: Ch. 13, 18, 19 by Wednesday, 2/19, 4 PM</td>
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<td>Week 7 2/17</td>
<td>Controls on map design. Scale and projections. Dasymetric mapping. Student Presentations (5)</td>
<td>GTKAGD: Ch. 8, 10, 11, 12 by Wednesday, 2/26, 4 PM</td>
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<td>Week 8 2/24</td>
<td>Spatial analysis in GIS (Part1): simple queries; reclassification; overlays; distance &amp; buffers. Student Presentations (5)</td>
<td>GTKAGD: Ch. 14, 15, 16, 17 by Wednesday, 3/5, 4 PM</td>
<td>Assignment 3 due Wednesday, March 12, by 4:00 PM in URBN 570M</td>
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<td>Week 9 3/3</td>
<td>Spatial analysis in GIS (Part 2): surfaces, advanced analysis, geocoding. Student Presentations (5)</td>
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<td>Week 10 3/10</td>
<td>Geographic data quality, accuracy and precision. Social and cultural context of GIS. Public participation GIS. Student Presentations (5)</td>
<td>Take-home final exam is given in class</td>
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<td>Week 11 3/17</td>
<td>Final exam turned in; Student presentations (5) 15:30-17:20, room CH 250, Monday, March 17th</td>
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