GEOG 482/582: GIScience II - Winter 2019

Pedestrian network analysis on the UO campus

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Office Hour: Wednesdays 10:30 to 11:30am in Condon 107e, or by appointment

Lab Instructor: Weicheng Wang | wwang7@uoregon.edu
Office Hour: TBA

Classroom Schedule
Lecture: M **and** W, 9 – 9:50 am in 106 Condon;
Lab: Friday 8:00 am – 9:50 am or 10-11:50am in McKenzie 442

Textbook: ***Geographic Information Science and Systems***, Fourth Edition (2015) by Longley, Goodchild, Maguire and Rhind.

Description and Learning Outcomes:

This course builds upon the foundations of Geographic Information Science you've learned in GEOG 481/581 (or somewhere else) and explores new ways of collecting, handling, and analyzing geographic information. We address how GIScience is facilitating new forms of business and science, and topics such as data and modeling uncertainty, engaging in GIScience as a profession, and ethical issues involved in using GIS.

The course exposes you to various GIS tools and spatial analysis methods including:
spatial overlays; data table joins; raster surface analysis and multi-criteria evaluation;
spatio-temporal modeling; and network distance analysis and location-allocation modeling.
Geospatial data relating to both the cultural and physical environment is used in the class, including census demographic and property tax lot information, digital elevation models, satellite imagery, and other sources.

The course consists of weekly lectures and labs. In both of these students are expected to interact with each other to utilize GIS to solve geographic problems. Lectures and in-class exercises cover data modeling, spatial analysis and GIS project design, as well as exploring the uses and implications of geospatial data in modern society. Labs focus on applied geospatial analysis, visualization, and problem-solving with GIS, using ArcGIS Desktop and open-source software.

By the end of this course, you will be able to:

- evaluate and integrate spatial datasets for spatial problem solving
- visualize 2- and 3-dimensional geospatial datasets
- conduct analysis with vector and raster data
- solve location-based problems
- conduct a GIS project and find appropriate data
- understand how GIScience is informing emerging paradigms in science
- comprehend the professional aspects of GIS use and appreciate the ethical issues involved with this data and analysis.

It is important that for this course that you also 'learn how to learn' in the field of geospatial analysis, be able to solve geographic problems, and critically evaluate the use of GIS.

'Active learning' is encouraged in the course in both lecture and lab session. This requires the students to engage with each other and the course instructors while exploring the course topics through problem solving, group work, and interaction with each other. This helps to encourage the development of spatial reasoning and the ability to interpret new information, to find and evaluate content, and to solve problems in the application of spatial analysis.

Syllabus and Workload

Lecture and Readings	Labs
Monday, Jan 7 Review – GIS and GIScience, Spatial Data Models, and Coordinate Systems **Online:** GIS Foundations [A quick tour of ArcMap ; A quick tour of ArcCatalog ;What is ArcMap? ; What is geoprocessing?] Map Projections [What are map projections? ; Projection basics for GIS professionals ; What are geographic coordinate systems?]	**Week 1** ***Lab 1*** Census Data Mapping - Deschutes County, Oregon **Due**: At the beginning of lab, Week 3
Wednesday, Jan 9 Census Data; GIS Overview continued, with reference to Lab 1 **Reading:** Text Chapters 1-4	
Monday, Jan 14 *Spatial Data Analysis* Heatmaps, and other things *Map Design* Making Visually Appealing Maps Reading: Buckley, A. (2012) Make Maps People Want to Look At: Five Primary Design Principles for Cartography	**Week 2** ***Work on Lab 1***
Wednesday, Jan 16 Geographic Data Modeling Reading: Ch. 7 Creating and Maintaining Geographic Databases Reading: Ch. 9	
Monday, Jan 21 *No Class - MLK Jr. Day*	**Week 3** ***Lab 2*** Network Distance Analysis and Taxlot Data - Deschutes OR
Wednesday, Jan 23 Lecture: ***Location Analysis with Vector Data*** Reading: Chapter 13.1 -13.2 Lecture: ***Distance Analysis with Vector Data***	

Reading: Chapter 13.3 *Network Analysis* Reading: Chapter 14.4 What is the ArcGIS Network Analyst extension? ; What are geometric networks? ; What is a network dataset? ; Types of network analysis layers	**Due**: At the beginning of lab, Week 5
Monday, Jan 28 Network Analysis exercise; Classification and Mapping Exercise	**Week 4** ***Work on Lab 2***
Wednesday, Jan 30 Test Review, Vector Analysis Exercise, Map Design discussion	
Monday, Feb 4 *In-class Test 1 - Vector data, Vector Analysis of location and distance, Map Design*	**Week 5** ***Lab 3*** **-** Raster analysis - Cost distance and Surface Analysis **Due**: At the beginning of lab, Week 7
Wednesday, Feb 6 Lecture: Analysis with Raster Data - Cell Calculations; Surface Analysis Reading: Chapter 14.1-14.3	
Monday, Feb 11 Distance Analysis with raster data How cost distance tools work	**Week 6** ***Work on Lab 3*** **Choose final project topic**
Wednesday, Feb 13 Spatial Modeling Reading: Chapter 15	
Monday, Feb 18 Lecture: Location Modeling with GIS Graduate Reading: Church, R. L. (1999). Location modelling and GIS. Geographical information systems, 1, 293-303.	**Week 7** - ***Lab 4*** Modeling and Suitability Analysis with Boolean Evaluation and Multi-Criteria Evaluation **Due**: At the beginning of lab, Week 9
Wednesday, Feb 20 Test 2 Review Suggestions and Worksession	
Monday, Feb 25 *Test 2: Raster Modeling and Surface Analysis*	**Week 8** Work on Lab 4

Wednesday, Feb 27 Lecture: Modeling overview - MCE Modeling examples. Lecture: Multi-criteria Modeling Reading: Chapter 15, Eastman, J. R. (1999). Multi-criteria evaluation and GIS. Geographical information systems, 1, 493-502.	
Monday, Mar 4 GIS Data Sources Ch. 8 - Geographic Data Collection	**Week 9 -** ***Assignment 5 - Final Project*** **Due**: Week 11
Wednesday, Mar 6 GIS Data sources continued Grad Presentations	
Monday, Mar 11 Lecture: Error and Uncertainty with GIS Reading: TBA Graduate Reading: Fisher, P (1999). Models of uncertainty in spatial data. Geographic information systems, 191-205 Grad Presentations	**Week 10** ***Final Project Work*** Take-Home writing assignment due Friday, March 15
Wednesday, Mar 13 Reading: TBA Graduate Reading: Campbell, H.J. (1999). Institutional Consequences of the Use of GIS, 621-631 Lecture: GIS in Professional Environments Grad Presentations	
Final Project Write-ups and Data Due **By Noon, Friday, March 22**	

Workload

Course work outside of class includes readings and work on the materials assigned in lab. You are expected to do work on labs outside of scheduled lab time - this can be done in the SSIL facilities or on your own computer (talk to the GTF or instructor for more information on getting the software used in lab for yourself)

Workload distribution over the term (undergraduate)…

Lecture Attendance:	20 hours (20 x 1 hour meetings)
Lecture assignments:	25 hours (average)
Readings:	25 hours (@ 25-60 pages per week, average)
Lab Attendance:	20 hours (10 weeks X 2 hours per week)
Lab work - unsupervised:	30 hours (average)
Total	120 hours (40 required attendance, 80 average remaining)

Grading

482 Grading
Lab Assignments: 50%; Tests and Exercises: 50%

582 Grading
Lab Assignments: 35%; Final Lab Project, Literature Review and Presentation: 15%; Tests and Exercises: 50%

Grading Rubric
A+ (98% and greater) Only used when a student's performance significantly exceeds all requirements and expectations for the class. Typically very few to no students receive this grade.
A (90% to <98%) Excellent grasp of material and strong performance across the board, or exceptional performance in one aspect of the course offsetting somewhat less strong performance in another. Typically no more than a quarter of the students in a class receive this grade, fewer in lower-division classes.
B (80% to <90%) Good grasp of material and good performance on most components of the course. Typically this is the most common grade.
C (70% to <80%) Satisfactory grasp of material and/or performance on significant aspects of the class.
D (60% to <70%) Subpar grasp of material and/or performance on significant aspects of the class.
F (<60%) Unacceptable grasp of material and/or performance on significant aspects of the class.

Late work policy

- Lecture and lab assignments: 10% off per day late until 50% maximum credit
- In-class exams and assignments: make arrangements or zero credit if not taken on time.
- Final Lab 30% off per day late

Expectations

Do not plagiarize your work. Make sure that you give credit where credit is due.

Please visit UO's Plagiarism website for more details:
https://researchguides.uoregon.edu/citing-plagiarism

Accommodations

The University of Oregon provides individuals with disabilities reasonable accommodations to participate in educational programs, activities, and services. Students with disabilities requiring accommodations to participate in class activities or meet course requirements should first contact the Accessible Education Center (164 Oregon Hall, 346-1155), and then contact the instructor as soon as possible.