GEOG 482/582: GIScience II - Winter 2016

Instructor: Dr. Nick Kohler | nicholas@uoregon.edu
Office Hour: Thursday, 1-2:30pm in Condon 107e, or by appointment

Teaching Assistant / Lab Instructor: Dongmei Chen| dongmeic@uoregon.edu
Office Hour: 2:30 -3:30 pm Monday, in McKenzie 444 (Advanced Lab)

Classroom Schedule
Lecture: M and W, 9:00am – 9:50am pm in Lillis 185; **Lab:** M or W 10:00 pm – 11:50 pm 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 another introductory GIS class) and explores new ways of collecting, handling, analyzing and modeling geographic information.

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, network distance analysis and location-allocation modeling. 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 consists of weekly lectures and labs. 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 and problem-solving with GIS, using ArcGIS Desktop software. In both of these students are expected to interact with each other to utilize

GIS to solve geographic problems.

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

- evaluate and integrate spatial datasets for spatial problem solving
- 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 is intended 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.

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.

Syllabus and Workload (Draft as of Jan. 4)

Lecture and Readings	Labs
Monday, Jan. 4 Lecture 1: ***Review – GIS and GIScience, Spatial Data Models*** Reading: Chapters 1-3 (3rd Edition: 1, 3, 4) **Online:** GIS Foundations [A quick tour of ArcMap ; A quick tour of ArcCatalog ;What is ArcMap? ; What is geoprocessing?]	**Week 1** **Assignment 1** Projections, Classification, Simple Query Assigned: January 04/06 Due: January 10/12 by midnight
Wednesday, Jan. 6 Lecture 2: ***Representation, Projections, Coordinates*** Reading: Chapter 4 (3rd Edition: 5) ; What are map projections? ; Projection basics for GIS professionals ; What are geographic coordinate systems? PART II: Making Visually Appealing Maps	

Reading: Buckley, A. (2012) Make Maps People Want to Look At: Five Primary Design Principles for Cartography. Esri, Redlands CA.	
Monday, Jan. 11 Lecture 3: ***Location Analysis with Vector Data*** Reading: Chapter 13.1 -13.2 (3rd Edition: 14.1-14.2) Task: Search and Share Location-based Analytics	**Week 2** **Assignment 2** Crimes on Campus - vector overlay and GPS data collection. Assigned: January 11/13 Due: January 24/26 by midnight
Wednesday, Jan. 13 Lecture 4: ***Distance Analysis with Vector Data*** Reading: Chapter 13.3 (3rd Edition: 14.3) Task: Clustering in the News	
Monday, Jan. 18 *Martin Luther King Day - No Class*	**Week 3** *No lab - holiday*
Wednesday, Jan. 20 Exam 1 - Coordinate Systems and Vector Data Analysis	Work on Lab 2 M and W students welcome in lab, optional attendance.
Monday, Jan. 25 Lecture 5: Distance Analysis with Raster Data Reading I: How Cost Distance Works Reading II: Collischonn, W., & Pilar, J. V. (2000). A direction dependent least-cost-path algorithm for roads and canals. International Journal of Geographical Information Science, 14(4), 397-406. Task: Friction Worksheet	**Week 4** **Assignment 3** Search and Rescue - help find a missing person in the wilderness. Surface and cost distance Assigned: January 25/27 Due: Friday February 7/9 by midnight
Wednesday, Jan. 27 Lecture 6: Analysis with Raster Data - Cell Calculations Reading: How Cell Statistics Work Chapter 14 (3rd Edition: 15) Task: Cell Statistic Worksheet	
Monday, Feb. 1 Lecture 7: Surface-Based Analysis with Raster Data Reading: Chapter 14 (3rd Edition: 15)	**Week 5** Work on lab 3
Wednesday, Feb. 3 Lecture 8: Modeling with GIS Reading: Chapter 15 (3rd Edition: 16)	
Monday, Feb. 8 Lecture 9: Multi-criteria Modeling Reading: Eastman, J. R. (1999). Multi-criteria evaluation and GIS. Geographical information systems, 1, 493-502.	**Week 6** **Assignment 4** There's a Tsunami. Where

<table>
<tr><td>Wednesday, Feb. 10
Lecture 10: MCE Continued</td><td>should I go? MCE modeling and route analysis
Assigned: February 8/10
Due: Friday February 21/23 by midnight</td></tr>
<tr><td>Monday, Feb. 15
Exam 2 - MCE, surface analysis, Raster distance and map algebra</td><td rowspan="2">Week 7

work on lab 4</td></tr>
<tr><td>Wednesday, Feb. 17

Lecture 11: Location Modeling with GIS
Reading: Church, R. L. (1999). Location modelling and GIS. Geographical information systems, 1, 293-303.
What is the ArcGIS Network Analyst extension? ; What are geometric networks? ; What is a network dataset? ; Types of network analysis layers</td></tr>
<tr><td>Monday, Feb. 22
Lecture 12: Developing GIS Models</td><td rowspan="2">Week 8

Final Project
Assigned: February 22/24
Due: Tuesday, March 15 by Noon</td></tr>
<tr><td>Wednesday, Feb. 24
Lecture 13: Final Project / Time and GIS
Reading: Peuquet, D. J. (1999). Time in GIS and geographical databases. Geographical information systems, 1, 91-102.</td></tr>
<tr><td>Monday, Feb. 29
Lecture 14: Error and Uncertainty with GIS
Reading: Fisher, P (1999). Models of uncertainty in spatial data. Geographic information systems, 191-205</td><td rowspan="2">Week 9

work on final project

lab questions due at end of lab</td></tr>
<tr><td>Wednesday, March 2
Lecture 15: Error and Uncertainty Continued</td></tr>
<tr><td>Monday, March 7
Lecture 16: GIS in Professional Environments
Reading: Campbell, H.J. (1999). Institutional Consequences of the Use of GIS, 621-631</td><td rowspan="2">Week 10

work on final project

lab questions due at end of lab</td></tr>
<tr><td>Wednesday, March 9
Exam 3: GIS Modeling</td></tr>
<tr><td colspan="2">Tuesday, March 15
Final projects and write up due by Noon</td></tr>
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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)

Work load distribution over the term…

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)
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Total	120 hours (40 required attendance, 80 average remaining)

Grading

482 Grading
4 Lab Assignments: 40%; Final Lab Project: 15%; Tests and Exercises: 45%

582 Grading
4 Lab Assignments: 30%; Final Lab Project: 15%; Literature Review and Presentation: 10%; Tests and Exercises: 45%

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
- In-class exams and assignments: make arrangements or zero credit if not taken on time.
- Final Exam and 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:
http://library.uoregon.edu/guides/plagiarism/students/index.htm

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.