

Geog 4553/5553 Spring 2008
GIS Applications
M-W 3:00- 4:15 PM SEC N106

INSTRUCTOR: **Dr. Tarek Rashed**, SEC 680 (rashed@ou.edu; 325-5104)
OFFICE HOURS: M-W 2:00 PM– 3:00 PM or by appointment

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OFFICE HOURS: M-W 4:15 PM– 5:15 PM or by appointment

OVERVIEW:

This course emphasizes technical and application practices in GIS. As in many fields of scientific research, investigations into geographic phenomena require individuals to practice their skills of observing, defining, classifying, analyzing, inferring, reasoning, and integrating a wide variety of data and facts to solve a problem or answer a given question. In many respects, applications are the most important aspect of GIS since the only real reason of working with GIS is to solve substantive real-world problems. The sophistication of GIS applications in a wide range of areas has increased significantly over the past decade. The today's volume of GIS applications is overwhelmingly huge and the detail of practice is as fast-changing as the technology of GIS itself. Instead of exposing students to specific GIS applications that could be obsolete in few years from now, this course aims at instilling problem-solving skills pertaining to the strategic use of GIS in social and environmental applications, with an eye on helping students expand their basic GIS knowledge to work more effectively and critically when they apply GIS to solve real world problems. Topics will cover a range of methods and techniques for transforming and linking geographic data through relatively sophisticated models, notably in the context of surface modeling, multicriteria evaluation, spatial statistics and visualization. Throughout the course, students are asked to apply knowledge and skills acquired in lab assignments and projects to be conducted either on a group or individual basis.

PURPOSE:

By completing this course, you will be able to:

- (1) assess the scope of GIS contribution to emergent spatial problems within a variety of application domains;
- (2) speculate on the methodological and technical issues involved in conducting spatial analysis to solve geographic problems;
- (3) design and implement a successful GIS project in an application area of your choice; and
- (4) become up-to-date with the latest development in GIS software and expand your practical experience using ArcGIS™ and one or more of its specialized extensions.

PREREQUISITE:

GEOG 4453/5453 GIS or equivalent. Otherwise, permission from the instructor is required. Junior or senior level students wish to receive graduate credits for this course must file a petition form. Please check with the Graduate College on the deadline for such applications. The petition forms are available in the Graduate College Office, Room 313, Buchanan Hall or on the Graduate College web page at <http://gradweb.ou.edu/>

TEXT:

There is NO required text book for this class. The instructor will assign specific readings prior to related lectures.

Reference Books:

- 1- Paul A. Longley, Michael F. Goodchild, David J. Maguire, David W. Rhind (2005). ISBN: 0-470-87000-1. Geographic Information Systems and Science, 2nd edition. John Wiley & Sons
- 2- Burrough and McDonnell (1998). Principles of Geographic Information Systems (reprinted with correction - 2000), Oxford Press – ISBN 0-19-823365-5
- 3- DeMers, M. N. (2002). GIS Modeling in Raster, John Wiley & Sons - ISBN 0-471-31965-1
- 4- DeMers, M. N., (2003). Fundamentals of Geographic Information Systems, 2nd edition (updated version), John Wiley & Sons - ISBN 0-471-42609-1
- 5- Longely *et al.* (1999). Geographical Information Systems (2nd ed.), Volume 2: Management Issues and Applications. John Wiley & Sons. ISBN: 0-471-32182-5.

COURSE FORMAT:

This course consists of lectures, lab exercises, student-led discussions, and a term-project investigations.

Lectures: The emphasis of the lecture sessions is placed on introducing students to the emergent issues in relation to one or more of the spatial methodological topics the course is structured around. Each topic will have materials and assigned readings that will be made available on **D2L** (learn.ou.edu) prior to the class meeting under the belief that (1) students will read the materials before the class meets and (2) the instructor's responsibility is to enrich the learning experiences by providing additional information and exercises.

Because significant benefit will come from the outside materials and experiences brought to the discussion by the students, it is essential that you take all reading assignments seriously and come ready to ask questions and participate in the discussion each week. All classes should be viewed as interactive and participatory regardless of who is leading the discussion. THAT IS, EVERYONE IS EXPECTED TO PARTICIPATE.

Labs and Term Project: A number of lab assignments will be given to provide opportunities for geographic thinking and problem solving. These will NOT be hands-on cook-book exercises. Rather, assignments will take the form of geographic investigations, the purpose of which is two-fold: (1) to expose students to the way geographical thinking is beneficial in multiple application domains, and (2) to explore the use of GIS methods in carrying out geographic investigations. The skills students will acquire from these assignments will help them formulate quality GIS solutions to the given problems they will deal with during their term projects.

The major emphasis of this course (particularly during the second half of the semester) will be term projects. Term projects are to be carried out on individual basis (for graduate students) and on group basis (for undergraduate students) such that students by the end of the course become experienced in how to carry out a GIS project from A to Z.

Lab is not a competition, and everyone will benefit from a cooperative attitude. Therefore, although students work individually, you are strongly encouraged to discuss the lab exercises with others in the class. Although you will have access to lab at other times, your lab period is the only time-slot during the week you are guaranteed access to the computers. **You are expected to attend all pre-scheduled labs.**

EXAMS, STUDENT PRESENTATIONS and GRADUATE ESSAYS:

A practical mid-term exam will be held between **5-14 March** and will cover lectures and labs taken to the respective dates. No extension of deadlines without medical proofs.

In order to ensure steady progress in **the term projects**, students will submit and present a number of project deliverables during the semester on periodic basis, exactly as what happens in real world projects. **These deliverables include:**

- (1) a project initiation document describing the scope of the investigation (**due 13 February**);
- (2) a detailed proposal describing the geographic question(s) the student will tackle in his/her term project, a review of the literature, a summary of the data to be used in the project, and a comprehensive synthesis of the spatial analytical methods proposed for the project (**due 24 March**);
- (3) two one-page reports documenting progress in project (**due 7 and 28 April**) and
- (3) a final paper reporting on the findings and results from the term project (**due 7 May**).

Each deliverable should build on the previous one and should incorporate any feedback from the instructor. The format of the final report should conform to the requirements of the International Journal of Geographic Information Science. **A 20-minute conference-quality presentation** for every project will take place during the final exams week (time and location TBA).

Finally, those individuals enrolled in the class for graduate credits will need to choose **either option** of **two graduate essays** (8-12 pages each) on advanced GIS related topics. Each essay will be an open book format and will include 3 to 5 questions. Students may not take longer than two weeks to turn in their essays.

GRADING

- **Geog 4553 (undergraduate credits – see also “grading rules” below):**
 - Lab assignments: 45% (3 labs)
 - Mid-term exam: 20%
 - Term project: 35%
- **Geog 5453 (graduate credits – see also “grading rules” below):**
 - Lab assignments: 40% (3 labs)
 - Mid-term exam: 15%
 - Term project: 35%
 - Graduate essay: 10%
- **Grading scheme:** **A:** 90% or more, **B:** 80-89.99%, **C:** 70-79.99%, **D:** 60-60.99%, and **F:** less than 60%.
- **Grading rules:**

- Grades are determined at absolute scale based on accumulative points.
- Lab assignments should be submitted by the due dates. Late submission penalty is 5% per day
- No make-up exam or quiz will be allowed without a legitimate excuse such as proof of a medical condition or religious holidays.
- The final grade of the term project will be determined as follows: 0-5 points for the first deliverable (concept paper), 0-20 points for the second deliverable (proposal), 0-10 points for the third & fourth deliverables (project progress reports); 0-50 points for the fifth

deliverable (final report); and 0-15 points for the two presentations made during the semester.

- For students enrolled for graduate credits, penalty of late submission of the graduate essays is 10 points per day.

IMPORTANT POLICY INFORMATION:

Academic Honesty: Academic honesty is a cornerstone of the development and acquisition of knowledge. The instructor has zero tolerance to cheating and plagiarism and will take proper actions against academic misconduct. The instructors assume that all students are aware of all forms of academic misconduct related to plagiarism, multiple-submissions of a single paper to different classes, and any form of “collaboration” during exams. If not, you must take a moment and make sure you read and understand the OU academic conduct code (<http://www.ou.edu/studentcode/OUStudentCode.pdf>).

Integrity Pledge: OU Honor Council, which is a new initiative shared by the OU Student Association and the Office of the Provost (www.ou.edu/honorcouncil), has asked that students be asked to sign an Integrity Pledge, which reads ***"On my honor, I affirm that I have neither given nor received inappropriate aid in the completion of this exercise."*** on each single piece or work submitted, whether labs, quizzes, exams, or even a report. Any submitted work may not be accepted without signing this pledge at the end of the work. It's your responsibility as a student to make sure of this.

Students with Disabilities: Any student in this course who has a disability that may prevent him or her from fully demonstrating his or her abilities should contact any of the instructors personally as soon as possible so we can discuss accommodations necessary to ensure full participation and facilitate your education opportunities.

Religious Holidays: It is the policy of the University to excuse the absences of students that result from religious observances and to provide without penalty for the rescheduling of examinations and additional required class work that may fall on religious holidays.

SUMMARY SCHEDULE (VERY SUBJECT TO CHANGE): items indicated by ** are project deliverables that count toward your project grade

Day	Class Activity	Remarks
1 1/17 W	Syllabus/Course Introduction Problem Solving with GIS	
2 1/21 M	<u>No CLASS</u>	<i>Martin Luther King Jr. Day</i>
1/23 W		
3 1/28 M	Planning for GIS Applications <u>Lab 1: The Geodatabase Model/ArcGIS</u>	
1/30 W	<u>Model Builder</u>	
4 2/4 M		
2/6 W	<i>Working in Lab 1</i>	
5 2/11 M	Spatial Statistics, Point Pattern Analysis, and Surface Modeling	<u>Lab 1 due</u>
2/13 W	<u>Lab 2: Pattern Analysis and Surface Modeling</u>	<i>** submit one page concept paper about the scope of your project</i>
6 2/18 M		
2/20 W		
7 2/25 M	<i>Working in Lab 2</i>	
2/27 W		
8 3/3 M	Discussion of project ideas	<u>Lab 2 due</u>
3/5 W		
9 3/10 M	Mid-Term Exam Project	
	(Mid-Term is Due 5 PM Friday 3/14)	
3/12 W		Start of Graduate Essay (Option 1)
10 3/17 M	Spring Break	
3/19 W		
11 3/24 M		<i>** submit your project proposal</i>
	<u>Project proposal presentations</u>	
3/26 W		End of Graduate Essay (Option 1)
12 3/31 M	Suitability Modeling	
4/2 W		

13	4/7	M	Network Analysis & Optimization	** submit your first project progress report
	4/9	W	<u>Lab 3: Suitability Modeling (or Network Analysis)</u>	
14	4/14	M		
	4/16	W	<i>Working in lab 3</i>	Start of Graduate Essay (Option 2)
15	4/21	M		
	4/23	W		<u>Lab 3 due</u>
16	4/28	M	<i>Working in the term project</i>	** submit your second project progress report
	4/30	W		End of Graduate Essay (Option 2)
17			Presentation of project results	Time and Location of the <u>presentation to be scheduled prior to the final exams week.</u> <u>Final paper due 5 PM, Wed 5/7</u>