

**Advanced GIS**  
**M-W-F 12:00 – 1:00 GRG 316**

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<b>Labs:</b> Tue 11-12:30 (DM) OR Th 11:00-12:30 (LL) GRG 206	

**Book:** Instead of a hardcopy textbook, we will use the on-line book: [Geospatial Analysis, http://www.spatialanalysisonline.com/](http://www.spatialanalysisonline.com/). Several other books are recommended but will be optional. Additional readings will be available on Blackboard.

**Online resources:** Class assignments, lecture outlines, and additions/modifications to the class schedule will be posted on the class Blackboard site and it is your responsibility to check it **weekly!** Additional required and recommended readings that supplement the course material will also be provided here. We will also use the **discussion board** on the course Blackboard site for questions or comments about both the lecture and the labs

**Prerequisites:** GRG 360G. Students **must** be familiar with GIS fundamentals and ESRI ArcGIS software.

**Course description:** In this course we will explore in greater depth and breadth many concepts introduced in GRG 360G (or similar intro GIS course). The course addresses ‘spatial problem solving’ by focusing on both the theoretical/conceptual and practical aspects of GIS modeling and spatial analysis.

**Grading Policies:**

- Grades will be based on an exam (20%), lab assignments (20%), an article report (15%), a final project (40%) and class interaction (5%).
- Final grades will be calculated using the following thresholds: 90.0 (A), 80.0 (B), 70.0 (C), 60.0 (D), below 60.0 (F).

<b>Task</b>	<b>Percentage of Final Grade</b>
Exam I	20
Lab assignments	20
Article assignment	15
Final project	40
Class interaction	5

**Tentative class schedule** (Chapters listed refer to the on-line book, TBA refers to additional readings that will be distributed in class or made available on Blackboard)

*Geography 470 C*

Week	Topic	Readings	Deliverable
1	Class overview, Data Models review		
2	Basic concepts in Spatial Analysis	Ch. 2	
3	<i>[No class Monday, Sep. 6]</i> Spatial Analysis research process	Ch. 3	
4	TBA	TBA	
5	Pitfalls/potential of Spatial data; Spatial Analysis I: Points	Ch. 4-5	Project prospectus due Sep. 22
6	Points, cont'd; Oct. 1: Exam #1		Exam #1 on Oct. 1
7	Spatial Analysis II: Lines; Spatial Analysis III: Polygons	Ch. 4-5, 7	
8	Polygons, cont'd.		
9	Spatial Analysis IV: surfaces	Ch. 4-6	Article report due Oct. 22
10	Surfaces, cont'd		Updated prospectus due Oct. 29
11	Implementing models in GIS I	Ch. 8	
12	Implementing models in GIS II		
13	Cont'd		Student presentations start Nov. 19
14	Student presentations <i>[No class Wed, Nov. 24 and Fri, Nov. 26]</i>		Student presentations Nov. 22
15	Student presentations, wrap-up		Student presentations Nov. 29- Dec 3
Exams	---		Final project due Friday Dec. 10 by 5 pm

**Notes on conduct in a college classroom:** *Every student has the right to learn as well as the responsibility not to deprive others of their right to learn.* To that end, please follow these guidelines:

- Be on time to class and don't leave early. Late arrivals and early departures are very disruptive to other students and the instructor.
- Please let me know if there are any distractions or other issues that I may not be unaware of that are preventing you from performing satisfactorily in this class.
- Please turn off cell phones. Please turn off cell phones. **Please turn off cell phones.**

**Notes on internet use:**

- The internet can be a great source of information, but there is no quality control, as there is with books and journals. You should examine internet sources very critically before using them. Generally, the most reliable sources for data and information are large government agencies or recognized professional organizations (and not wikipedia). Obviously personal web pages and those produced by special-interest organizations should be treated with caution.
- The internet has also made plagiarism very easy. Make sure you cite any sources you use in assignments, and re-phrase information that you use. If you copy something directly from the internet (or any other source), it is plagiarism, and will not be accepted.

**Official UT stuff:**

**Documented Disability Statement**

Students with disabilities who require special accommodations need to get a letter that documents the disability from the Services for Students with Disabilities area of the Office of the Dean of Students (471-6259 voice or 471-4641 TTY for users who are deaf or hard of hearing). This letter should be presented to the instructor in each course at the beginning of the semester and accommodations needed should be discussed at that time. Five business days before an exam the student should remind the instructor of any testing accommodations that will be needed.

See website below for more information: <http://deanofstudents.utexas.edu/ssd/providing.php>

**Religious Holidays**

Religious holy days sometimes conflict with class and examination schedules. If you miss an examination, work assignment, or other project due to the observance of a religious holy day you will be given an opportunity to complete the work missed within a reasonable time after the absence. It is the policy of The University of Texas at Austin that you must notify each of your instructors at least fourteen days prior to the classes scheduled on dates you will be absent to observe a religious holy day.

**The University of Texas Honor Code**

The core values of The University of Texas at Austin are learning, discovery, freedom, leadership, individual opportunity, and responsibility. Each member of the university is expected to uphold these values through integrity, honesty, trust, fairness, and respect toward peers and community.

Basic information on final project for GRG 470C: Advanced GIS

Each student will work on an individual project that addresses several topics in advanced GIS. The components of the project (with relevant dates) are:

- Project prospectus: Must have a **research question**, expected **spatial information product (SIP)**, study area, *draft* flowchart (with data and methods), and include 4-6 key references. **Due Sep. 22.**
- Project must incorporate at least two of the following advanced GIS **techniques**:
  - Suitability analysis
  - Regression (regular or GWR)
  - Spatial autocorrelation description
  - Surface analysis: Kriging/interpolation, viewshed analysis, etc.
  - Change detection
  - Point pattern analysis
  - Optimization: Path analysis, location-allocation etc.
  - Network analysis
  - Map algebra
- Project must use at least two datasets.
- Project update: Update prospectus with *firm* flowchart (with data sources 'in hand' and methods) and at least 10 references. **Due Oct. 29**
- Student presentations: Each student will describe their project to the class in a ~8-10 minute PowerPoint (or similar) presentation. Presentations **start Nov. 19** (and continue through the last week of class) and will consist of:
  - Introduction/Research question
  - Data and Methods, including flowchart
  - Results, including SIP
  - Conclusions, problems, recommendations
- Written Project is **due by 5 pm on Friday, Dec. 10**. Project should be ~12-17 pages, double-spaced and contain the following (grading rubric will be available soon):
  - Background/lit review
  - Research question and its significance
  - Methodology (data details, methods used—be specific!)
  - Results, including SIP, and supplementary maps, charts, tables...
  - Discussion, including conclusions, recommendations
  - References cited (including data sources)

**Recommended Advanced GIS Resources:**

**Books:**

Bailey, T.C. and Gatrell, A. C. (1995). *Interactive Spatial Data Analysis*. John Wiley and Sons, New York, NY.

Burrough, P., and R. McDonnell. (1998). *Principles of Geographical Information Systems*. Oxford: Oxford University Press.

Fortin, M. J., and M. Dale. (2005). *Spatial Analysis: A Guide for Ecologists*. Cambridge: Cambridge University Press.

Franklin, J. (2010). *Mapping Species Distributions: Spatial Inference and Prediction*. Cambridge: Cambridge University Press.

Hastie, T., R. Tibshirani, and J. Friedman. (2001). *The Elements of Statistical Learning: Data Mining, Inference and Prediction*. New York: Springer-Verlag.

O'Sullivan, D. and D. J. Unwin. (2003). *Geographic Information Analysis* Wiley: Hoboken, NJ.

**Software:**

GME (Geospatial Modeling Environment): <http://www.spataleecology.com/gme/>

GeoDa: <http://geodacenter.asu.edu/software>

SAM (Spatial Analysis in Macroecology): <http://www.ecoevol.ufg.br/sam/>

R libraries: <http://www.r-project.org/>

CRIME-STAT: <http://www.icpsr.umich.edu/CRIMESTAT/download.html>

DIVA-GIS: <http://www.diva-gis.org/>