Geography 473, Spring 2019 University of Maryland College Park

GIS and Spatial Analysis

Lecture: M W 10-10:50am, 2166 LeFrak Hall

Lab: F 11am-12:50pm (0101), F 1-2:50pm (0102), 1138 LeFrak

Instructor: Naijun Zhou, Ph.D., 1159 LeFrak, njzhou@umd.edu. Office hours: M W 11-11:50am

Teaching Assistant: Diyang Cui, dcui@terpmail.umd.edu. Office hours: F 3-5pm, 1113 LeFrak

Course Website: ELMS (http://elms.umd.edu)

Course Objectives

This advanced GIS course introduces the analytical use of geospatial information. Students will develop an understanding of spatial analysis methods, and learn practical skills of using GIS and spatial analysis to discover features of spatial distribution. The class covers the methods of spatial analysis including

1) creating and querying geospatial databases by attribute and by location,
2) measuring geometric features and identifying the spatial patterns of geospatial objects that are represented as point, line, network and polygon data, and
3) generating and analyzing 3-D surfaces.

As an important component of this class, labs are designed closely related to lectures and provide hands-on experiences of spatial analysis using GIS software ArcGIS 10.

Prerequisites

GEOG373 (Introduction to GIS) or equivalent, which covers GIS data models, map projections, coordinate systems, computer cartography, basic geodatabases, data collection, data standard and quality, and basic spatial analysis (buffering, geocoding, overlay, classification and dissolve).

Textbooks

There are no required textbooks. The following books are used for some lectures and can be checked out at library:

Andy Mitchell, 2005. *The ESRI Guide to GIS Analysis Volume 2: Spatial Measurements & Statistics*. ESRI Press. ISBN: 158948116X. Call number: G70.212 .M58 1999.

Paul Bolstad, 2005. *GIS Fundamentals: A First Text on Geographic Information Systems*, 2nd Edition. Eider Press, White Bear Lake, Minnesota, 2005. ISBN: 0971764719. Call number: G70.212 .B64 2008.

David O'Sullivan, David Unwin, 2003. *Geographic Information Analysis*, John Wiley & Sons. ISBN: 0471211761. G70.212.O85 2003.

Andy Mitchell, 1999. *The ESRI Guide to GIS Analysis Volume 1: Geographic Patterns & Relationships*. ESRI Press. ISBN: 1879102064. Call number: G70.212. M58 1999.

Course Requirements and Important Information

- **FIVE** topics are covered: geodatabases, point data analysis, line and network analysis, area data analysis, and surface analysis.
- **ELEVEN** labs that are grouped into the above **five** topics**.**
- **FIVE** homework assignments, each for one topic. Each includes findings from lecture materials and lab exercises. A hardcopy of completed homework must be turned in at the beginning of the lab at which they

are due. Each homework assignment will be distributed during labs, will include lab exercise result and/or discussion questions. **You are expected to start the work early. Never underestimate the time you will spend on the assignments**.

- **TWO** in-class, non accumulative, close-book, close-note exams. The exams include the materials covered in **lectures**. The exam format is a combination of short answers, essay, and multiple choice.
- **Late homework penalty**. The late homework penalty is: 2 points for every 12 hours (time stamped by ELMS). That is, if your homework is late for less than 12 hours, the final numerical score will be the score less 2. The penalty is 4 points if the work is late for 12 to 24 hours, etc., and 0 point after 60 hours even if you do the homework correctly.
- Materials including lecture slides, lab instruction and data, homework assignments, announcements and others will be posted on Canvas. Check Canvas frequently.
- The instructor will make every effort to accommodate students who are registered with the Disability Support Services (DSS) Office and who provide the instructor with a University of Maryland DSS Accommodation form. This form must be presented to the instructor as soon as possible.
- **E-mail**: for efficient communication, please put "GEOG473" in email subject and your full name in email body, and **contact Dr. Zhou via njzhou@umd.edu instead of ELMS message**.
- **COMMUNICATE**! Feel free and do not hesitate to contact the instructor and the TA if you have any concerns, critiques and suggestions. They are ALWAYS welcome, and the earlier the better.
- Bring a CALCULATOR to each lecture.

Course Schedule

Date	Lecture (M W)	Lab (F)	Assignment Due
1/28, 1/30	Introduction	No LAB	
2/4, 2/6	Databases: Design	Lab 1.1 Geodatabases I	
2/11, 2/13	Databases: Query	Lab 1.2 Geodatabases II	
2/18, 2/20	Point data analysis I: Geometric measurements	Lab 2.1 Point data analysis I	Homework 1: 2/22
2/25, 2/27	Point data analysis II: Density & cluster	Lab 2.2 Point data analysis II	
3/4, 3/6	Point data analysis III: Autocorrelation	Lab 2.3 Point data analysis III	
3/11, 3/13	**Exam 1: 10-10:50am, 2166 LEF**	NO LAB	Homework 2: 3/8
3/18, 3/20	**Spring Break**		
3/25, 3/27	Line data analysis	Lab 3.1 Line data analysis	
4/1, 4/3	Network analysis	Lab 3.2 Network analysis	
4/8, 4/10	Area data analysis I: Geometric measurements	Lab 4.1 Area data analysis I	Homework 3: 4/12
4/15, 4/17	Area data analysis II: Autocorrelation	Lab 4.2 Area data analysis II	
4/22, 4/24	Surface analysis I: Interpolation	Lab 5.1 Surface analysis I	Homework 4: 4/26
4/29, 5/1	Surface analysis II: Operation	Lab 5.2 Surface analysis II	
5/6, 5/8	Advanced Topics	NO LAB	Homework 5: 5/3
5/13	Conclusion	NO LAB	
TBA	**EXAM 2: TBA**		

Note: the date of Exam 2 will be determined by the University until mid-semester.

Grading

My baseline grade for the course, which assumes that you complete the work in good faith, on time, with serious effort, and with a certain degree of success, is a "B." To do better, you need to give something extra; to do worse, you need to give something less.

The numeric points of student's work will be evaluated as:

Assignment Type	Number of Assignments	Points Per Assignment	Total Points (100)
Homework 1, 2, 3, 4, 5	5	10	50
Exam I, II	2	23	46
Lab attendance (taken for every lab)	11	N/A	4

The final letter grade is based on the calculated numeric points in the above table, and will be graded as (with variations): A: 85.0-100%, B:75.0-84.9%, C:60.0-74.9%, D:55.0-59.9%, F:<55.0%.

Academic Honesty

Within our class, students may work together on homework assignments, however, each student absolutely must turn in their own work, and any work must be theirs alone. The University of Maryland, College Park has a nationally recognized **Code of Academic Integrity**, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student you are responsible for upholding these standards for this course. For more information on the Code of Academic Integrity or the Student Honor Council, please visit http://www.shc.umd.edu.