

Geography 473, Winter 2020 University of Maryland College Park

GIS and Spatial Analysis

Lectures & Labs: MTuWTh 6:30-9:40pm, online. See the course schedule (next page) for details.

Instructor: Naijun Zhou, Dr. 1159 LeFrak Hall, njzhou@umd.edu, Office hours: by appointment

Course Website: ELMS @ <http://elms.umd.edu/>

WebEx Live Classrooms: see [Online Learning in Page 3](#)

Students are encouraged to attend the live online classroom, and optionally they can also watch the archived lecture/lab videos after the classes. All lectures and labs use the same classroom. The live classroom may not be available until half hour before a class starts.

Course Objectives

GEOG473 will pick up what are left in GEOG373 (Introduction to GIS), and aim to provide the complete coverage of the GIS body of knowledge. GEOG373 introduces GIS data models (vector, raster), map projection, data collection, database (SQL), spatial analysis (geocoding, buffering, overlay, dissolve, classification), raster analysis, computer cartography, and the use of ArcGIS.

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) 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 10.3.

Course Prerequisites

GEOG373 or equivalent. Under special circumstance, students willing to learn and catch up are acceptable.

Recommended Textbooks

There are no required textbooks. The following books may be useful for optional readings:

- 1) Andy Mitchell, 2005. *The ESRI Guide to GIS Analysis Volume 2: Spatial Measurements & Statistics*. ESRI Press. ISBN: 158948116X.
- 2) Paul Bolstad, 2005. *GIS Fundamentals: A First Text on Geographic Information Systems*, 2nd Edition. Eider Press, White Bear Lake, Minnesota, 2005. ISBN: 0971764719.
- 3) David O'Sullivan, David Unwin, 2003. *Geographic Information Analysis*, John Wiley & Sons.
- 4) Andy Mitchell, 1999. *The ESRI Guide to GIS Analysis Volume 1: Geographic Patterns & Relationships*. ESRI Press. ISBN: 1879102064.

Course Requirements

- 1) 6 topics are covered: geospatial databases, point data analysis, line and network data analysis, area data analysis, and surface analysis.
- 2) 6 labs that are grouped into the above five topics.

- 3) **3** homework assignments, each for one topic. Each homework includes findings from lab exercises and discussion questions. A digital copy completed homework must be turned in on ELMS (details to be provided with homework questions). You can also do the homework by hand, scan or take a picture of the work and submit it on ELMS. **You are expected to start the work early, particularly for winter course. Never underestimate the time you will spend on the assignments.**
- 4) **1** “take-home” exam. The format is a combination of short answers, calculation, and multiple choice questions. The exam will be open book, open notes, take home. During the Jan 22 lecture, the Exam will be released on ELMS. Students will complete and submit the exam on ELMS within 2.5/3 hours.
- 5) Although the class is online, attendance at lectures and labs is highly recommended (although not required) because no texts perfectly cover the lecture materials and the lab exercises are essential to learning practical skills. Archived lecture/lab videos are provided on ELMS.
- 6) As winter courses are intensive, late work and make-up exams are given for University approved excused absences, and students must notify the Instructor and make arrangement at least 24 hours **BEFORE** the due date. Students need to provide valid documents for late work and make-ups. Otherwise, **no late work and make-up requests will be accepted.**
- 7) Materials including lecture slides, lab materials (instruction, data), announcements, homework assignments, archived lecture and lab videos will be posted on ELMS. Check ELMS frequently.
- 8) **E-mail:** for efficient communication, instead of ELMS messages, **please email Naijun Zhou at njzhou@umd.edu.**
- 9) **COMMUNICATE!** Feel free and do not hesitate to contact the instructor if you have any concerns, critiques and suggestions. They are ALWAYS welcome, and the earlier the better.

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 (sum to 100)
Homework 1	1	15	15
Homework 2, 3	2	30	60
Exam	1	25	25

The final letter grade is based on the calculated numeric points in the table, and will be graded as:
 A: 85.0- 100, B: 75.0-84.9, C: 65.0-74.9, D: 55.0-64.9, F: <55.0

Tentative Schedule

Date	Lecture	Lab	Homework Due
1/2 (Th)	Network Analysis	Network Analysis	
1/6, 7 (MTu)	(Geo)databases	Geodatabases	Homework 1 due: 1/6, 5pm, ELMS
1/8, 9 (WTh)	Point Data Analysis	Point data analysis	
1/13, 14 (MTu)	Surface analysis	Surface Analysis	Homework 2 due: 1/13, 5pm, ELMS
1/15, 16 (WTh)	Polygon data analysis	Polygon Data Analysis	
1/20 (M)	<i>Dr. Martin Luther King Holiday, NO CLASS</i>		
1/21 (Tu)	Line data Analysis	Network Analysis	Homework 3 due: 1/21, 5pm, ELMS
1/22 (W)	Conclusion, Review, Take-home Exam		

Online Learning

1. We will meet online for a live audio/video lecture and lab. The online classrooms can be accessed with the following information:

Meeting link:
<https://umd.webex.com/umd/j.php?MTID=mf5e0cda15e3676f625c4cb4ddf1d24fe>
Meeting number: 737 111 358
Password: geog473
Host key: 292204

More ways to join

Join by video system

Dial 737111358@umd.webex.com

You can also dial 173.243.2.68 and enter your meeting number.

Join by phone

+1-202-860-2110 United States Toll (Washington D.C.)

+1-415-655-0002 US Toll

Access code: 737 111 358

2. You should download (and ideally print out) the lecture slides, lab instruction and data before each lecture/lab (unless you have dual screens).
3. During the lectures, the instructor will introduce the materials, and students are welcome to ask questions. During the labs, the instructor will demo the use of ArcGIS; students can follow the lab instruction to do the lab exercises and ask questions.
4. The lectures and labs videos will be archived for anyone who absolutely must miss the class, but I encourage you to login at the appointed time so that you can participate in the class and ask questions.
5. **Hardware:** The online live lecture and lab classroom is a web conferencing software. Your computer must be equipped with **Internet** and **speaker** (or earphone).
6. **Software:** This course will use ArcGIS for labs and some homework questions (see the documents on ELMS for how to access ArcGIS via VMWare and/or installing ArcGIS on your computer). The 1-year free education ArcGIS license will be distributed.