

# ERSC 4421/5521 (GEOG 4300/5300)

## Introduction to GIS (Geospatial Information Science & Systems)

### Official Course Description:

This course introduces Geographic Information Systems (GIS) and the use of spatial data for problem-solving in science. The lecture portion of the course focuses on the different representations of spatial data and on the processes involved in acquiring, manipulating, analyzing, and displaying spatially-referenced information. The laboratory portion employs a project-based methodology to foster basic GIS software proficiency.

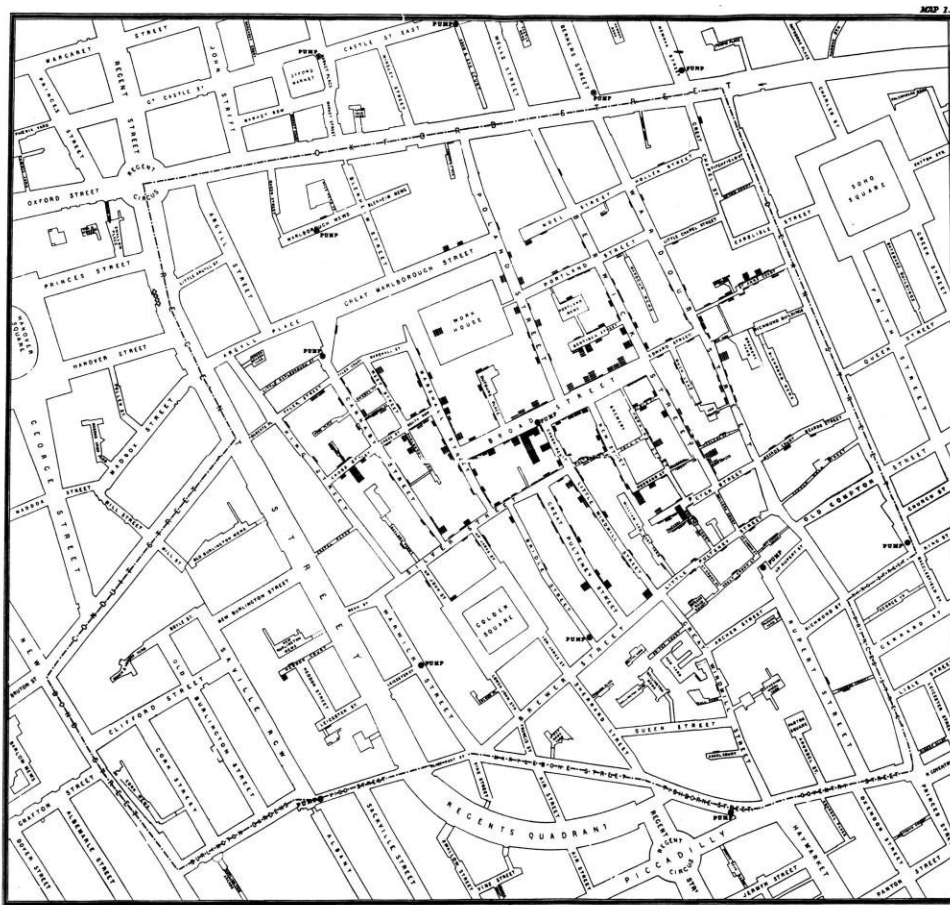
### Contact:

Dr. David Lee Baylis

**Email:** [dbaylis@ualr.edu](mailto:dbaylis@ualr.edu)

**Office:** Stabler Hall, Department of History, Room #604I

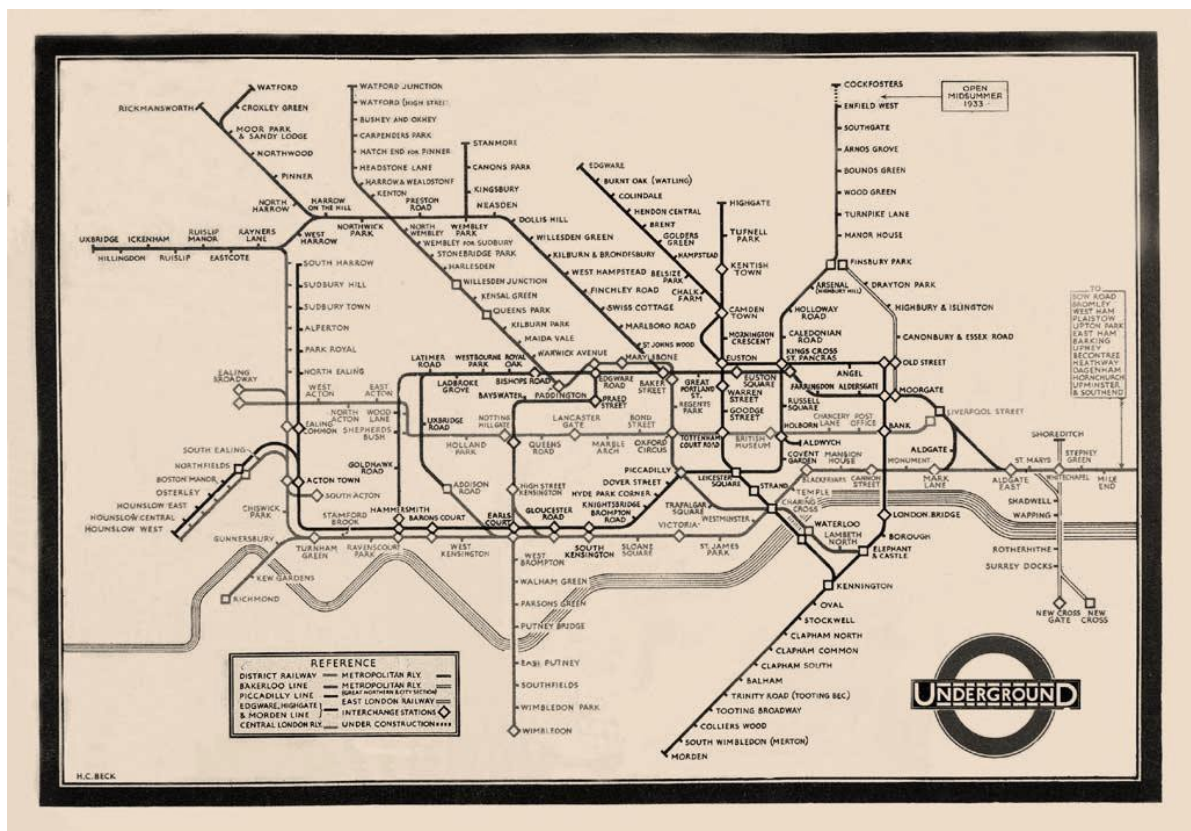
**Office Hours:** Mondays 11am-1pm, 6pm-8pm



*John Snow 1854*

## Course specific student learning outcomes:

- describe geographic information systems and use of GIS technology;
- identify and explain common GIS terminology, software, data structures, and file types;
- properly use critical thinking skills in spatial analysis and GIS problem-solving processes;
- use basic cartographic (map-making) principles such as scale and projections;
- discuss GIS data collection methods, including GPS, and basic data management and organization;
- demonstrate effective communications skills
- demonstrate critical thinking, quantitative reasoning and problem solving through data collection, data analysis, interpretation of results, hypothesis testing and making conclusions
- apply technical knowledge of relevant computer applications, laboratory methods, and field methods to solve spatial problems
- avoid plagiarism, cite correctly from reference sources, and follow the UALR policies on academic integrity
- demonstrate an awareness of the ethical guidelines for conducting and communicating scientific research
- demonstrate awareness of the ethical obligations of communicating uncertainty



Harry Beck, 1931

## **Textbook:**

**A. GIS 20 3<sup>rd</sup> Edition** by Clemmer (**Required**)

**B. GIS Fundamentals** by Bolstad (*Recommended for theoretical foundations*)

## **Software:**

To complete the Introduction to GIS class, you will need access to ArcGIS Desktop software. We will begin using this software by the end of week two so you will need to get your hands on the software **As Soon As Possible**. There are three ways to get access at UA Little Rock:

1. Come to campus and use one of our computers in the Department of Earth Sciences student computer lab (SCLB 386 or SCLB 165) – [your student ID card should allow you this access if a student in any of the affiliated departments];
2. Use the small GIS lab space in the main library. Instructions below on use of the library GIS lab. Additionally, I will hold my office hours in the library GIS lab.
3. Obtain a student version of the software from ESRI. To get your copy of the software, use authorization code sent to you in Blackboard. Follow directions sent with the code. If you obtain a student license, make sure that your personal computer is compatible with the software requirements. We will mostly be using version 10.5-10.6.1. ArcGIS Pro is a much more power-hungry program.  
<https://www.esri.com/en-us/store/arcgis-student-use/arcgis-for-student-use>

**NOTE: I have put in a request for multiple student licenses from ESRI. As soon as these are available, I will let you know.**

To check to see if your computer is compatible see the following system requirements:

<http://desktop.arcgis.com/en/arcmap/latest/get-started/setup/arcgis-desktop-system-requirements.htm>



## Hardware

You will need a USB flash drive or a portable external hard drive in order to create back-up copies of your work. Please come to class with this every day. If you are using on-campus computers in the lab or library, then you will need portable storage in order to transfer your files between computers.

During the second week of class we will go into detail about appropriate file structures in a spatial database.

## ESRI Training Access:

Most professional fields require practitioners to maintain their skillset via Continuing Education Credits (CECS). Many of these trainings provide certificates (and sometimes certifications) which can be applied to your resume. For example, I am working on additional online training in GIS programming and advanced analytic techniques during the course of the semester.

You are advised to complete frequent training (continuing education credits) via ESRI's training catalog outside of class time. ESRI offers numerous online training modules that may be of interest to you. You are NOT being graded on these trainings and are not required to turn anything in.

That training is accessible via the following link:

<https://www.esri.com/training/>

Prior to being able to enroll in any of the FREE courses you will need to create an ESRI account [here](#). I will walk everyone through these sites during the first week of class.

## Assignment Types and Grading Structure

**Tests:** There are 3 content tests and one final “map challenge exam”. The map challenge exam will be conducted in class during final exam week and will require you to recreate a map based on skills acquired in the course.

**Lab Exercises and Skill Building Exercises:** There are 5 lab exercises (L1 – L5) and 15 skill building exercises (SB1 -SB15). Lab submission requirements will be included in each separate set of lab instructions.

**Skill Building Exercises** will come from the required text (GIS 20). In order to receive credit for these skill building activities, you need to submit a PDF copy of the final map that you produce and submit a 2 paragraph synopsis of the skill(s) that you learned during the course of the training and how you might apply that skill to a practical problem. Both the map and written component need to be submitted as a PDF in order to receive credit.

The SB due dates are found in the schedule. Class time will be dedicated each week to working through SB activities and labs. **All labs and skill building assignments need to be submitted by the due date or they will be assessed an initial 25% late deduction (automatically).**

**GIS Project:** There is one class GIS final project. Students will work in small groups to complete aspects of the final project. The final project that the class selects to complete will be voted on in class.

Each student will submit a final report and pdf of a map they produce as part of the final project. More detail on the final project will be provided in a separate instructional from found that can be found on Blackboard.

**Attendance Policy with respect to Grades:** I will take daily attendance. Each student is allowed two absences with no direct grade penalty. After those first two absences, each additional absence will result in a 5% final grade reduction. Daily attendance is expected and students who attend regularly and actively engage in the course tend to do better in the class. It is as simple as that. The only valid excuse beyond the initial two absences is a medical emergency. I will require proof of the emergency. No reason is required for the two grace absences (e.g. there is no need to message me to tell me).

**Course points breakdown:**

Lab Exercises*	20 %	100 points
Skills Building Exercises (GIS 20)	15 %	75 points
GIS Class Project	15 %	75 points
Exam 1	10 %	50 points
Exam 2	10 %	50 points
Exam 3	15 %	75 points
Final Map Challenge Exam	15%	75 Points
<b>TOTAL</b>	<b>100%</b>	<b>500 points</b>

*\*Graduate students enrolled in ERSC 5421 or GEOG 5300* will be required to find and include a summary and discussion of a relevant GIS research article as part of each lab. Graduate students are also invited to explore in greater detail a GIS topic or application of interest and “teach” the class that application or topic during a session.

**Total: 500 points:**

A	450-500 pts	B	400-449 pts
C	350-399 pts	D	300-349 pts
F	< 500 pts		



## **Course Policies**

To avoid incidents that will affect your grade:

- Do not miss class.
- Take notes in class.
- Download lab exercises/data as soon as lab opens
- read all of the instruction information on homework assignments
- report problems to me immediately (NOT right before due date/time)
- complete your work well in advance of the deadlines
- DO NOT fall behind the schedule

**Computer problems:** This is a computer intensive course. You must be prepared to deal with computer related problems. You most likely will experience problems related to the software, internet access, or Blackboard access at some point during the term. IT services can assist with basic troubleshooting. ESRI has various support services for technical questions as well. Finally, as a burgeoning GIS professional you need to learn how to problem solve on your own – this means seeking out training and advice to assist with your specific research problems and areas of interest.

\*NOTE: ArcGIS is a windows based application. If using a Mac, it needs to have windows (via Bootcamp, etc). ArcGIS does not run on Chromebooks and works best on computers with at least 8GB of RAM.

## **Library GIS Space:**

### **GIS Availability:**

Monday-Thursday	9 am -10 pm
Friday	9 am-4 pm
Saturday	9 am-4 pm
Sunday	2 pm-10 pm

\*\*times set to accommodate building opening/closing routines\*\*

### **Access to 101B (main floor of the library in the back)**

Key to 101B available for checkout at the Operations desk; only UA Little Rock students/faculty. Computer use only for GIS-related assignments.

**Late Assignments:** Please keep track of due dates and try not to fall behind. I will assist you in whatever ways I can but ultimately this is your responsibility. Late assignments will automatically be assessed a 25% late penalty. Beyond that, for each week they are late they are subject to an additional 5% penalty per week.

**Email Policy:** Before contacting the course instructor, students should check the syllabus first and make sure that any questions they intend to ask are not addressed in the syllabus. Students should not use email (for example) to ask: what is on the next test, will I “miss anything important if I don’t come to class,” questions that require detailed or more personal responses, etc. Students should use discretion and be courteous. In general, I encourage students to use email “netiquette”.

**Name and Pronoun Policy:** Students should feel completely comfortable contacting me prior to the start of class to let me know what name and gender pronouns they would like to be identified by. Presently, Registrar only provides instructors with students’ legal names and identifying characteristics.

**Attendance Policy:** As discussed above in the grading section, attendance in this course is mandatory. Students are allowed two automatically excused absences during the semester. Beyond that, an automatic 5% reduction of the final grade will be applied for each additional absence without proof of a medical emergency.

**Plagiarism:** See university policies. Don't plagiarize – I will automatically fail the first plagiarized assignment and initiate the university procedures for academic probation in the event of a second event of plagiarism.

**Classroom Decorum:** People don't always agree, and that is ok. However, at all times use respect and professional decorum in this course. Disagree but don't be rude and avoid all ad hominem attacks. In addition, if you make an argument, have facts to support it and be prepared to share sources. Everyone is entitled to an opinion but that does not mean that all opinions are equally valid. Statements and arguments without factual support and empirical evidence to back it up are useless, at least in this classroom.

## **UNIVERSITY POLICIES:**

**Academic Integrity:** For the full University Academic Integrity Statement, see policy 501.13: <https://ualr.edu/policy/home/student/academic-integrity-and-grievance/>

As UALR student, you should make sure to review the student handbook to make sure that you understand both your rights and responsibilities at UALR. For this class, let me emphasize one key academic integrity matter: plagiarism (see below). (UA Little Rock Policy 510.13)

**Attendance:** Each faculty member has the prerogative of setting specific attendance requirements for classes. In some courses, active student participation is an integral part of the course, and the instructor may base a portion of the students' grades on attendance and participation. In general, students are expected to attend class regularly. Students who miss class are responsible for finding out about the material covered, homework assignments, and any announcements or examinations.

On the 10th day of classes, students who have not attended in class will be administratively withdrawn by the instructor. Students may be administratively withdrawn from a class by the instructor for excessive absences during the semester (UA Little Rock Policy 404.4).

**Inclement Weather Policy:** During inclement weather, UA Little Rock will decide whether or not to close based on all available information:

1. The chancellor will decide whether conditions warrant canceling classes and activities and closing the campus or whether classes and activities will be canceled but with specified campus offices open. Online or web-enhanced classes will continue as scheduled at the discretion of the faculty member.
2. The [UA Little Rock website](#), UA Little Rock email, the university's main telephone number (501.569.3000), and the Rave campus alert notification system are the official means of communicating information concerning weather-related closings.
3. When necessary, the university will announce a separate decision about canceling night classes (those classes starting at 4:20 p.m. or later) by 2 p.m., if possible.
4. Ordinarily, sites remote from campus such as the the Bowen Law School, the Arkansas Studies Institute, and the Benton Center will close or cancel classes and activities

whenever the university does so. In some circumstances, however, a separate decision may be made whether or not a site remote from campus will be open or closed, and this decision will be announced through the university's official means of communicating weather-related closings. Vice chancellors are responsible for seeing that necessary services are provided in their respective areas when the university is closed. Employees required to provide such services will be identified by their supervisors. Classified employees who must report to work when the university is closed due to inclement weather will be allowed compensation time of 1.5 hours for one hour worked. Persons who are not required to work when the university is closed will be granted authorized absence. Employees who do not report to work when the campus is open will be charged annual/compensatory leave or leave without pay. The Payroll Department will prescribe payroll reporting and timekeeping.

5. The Policy Advisory Council of the University Assembly will recommend to the chancellor if and when missed undergraduate and graduate class days should be made up. In the event that the university is closed during a final examination day, the provost, in consultation with the Faculty Senate president, will reschedule any missed graduate or undergraduate final examinations with the exception of online exams which will continue as scheduled.
6. Weather and road conditions vary from place to place. Employees and students are expected to exercise good judgment regarding the safety of travel when road conditions are affected by the weather. (UA Little Rock Policy 215.1)

**Non-Discrimination:**

UA Little Rock adheres to a policy that enables all individuals, regardless of race, color, gender, national origin, age, religion, sexual orientation, veteran's status, or disability, to work and study in an environment unfettered by discriminatory behavior or acts. Harassment of an individual or group will not be condoned, and any person (student, faculty, or staff member) who violates this policy will be subject to disciplinary action.

Harassment that is considered discriminatory includes actions or conduct (verbal, graphic, gestural, or written) directed against any person or group with the intent to demean or create a hostile or threatening environment. It is not the intent of this policy to infringe upon or limit educational, scholarly, or artistic expression. Any person who believes he or she has been discriminated against should contact the Office of Human Relations to obtain assistance and information concerning the filing of a complaint.

At the same time the university prohibits discriminatory practices, it promotes equal opportunity through affirmative action. Non-discriminatory affirmative action equal opportunity policies apply to recruitment, hiring, job classification and placement, work conditions, promotional opportunities, demotions/transfers, terminations, training, compensation, choice of contractors and suppliers of goods and services, educational opportunities, disciplinary action, recreational and social activities, use of facilities, housing and university-sponsored programs.

**Plagiarism:** Plagiarism has various forms but is essentially the unattributed use of someone else's ideas (in writing or otherwise): <https://ualr.edu/writingcenter/plagiarism/>

Passing off someone else's work as one's own is a serious academic offense. In addition, it is the fastest way to lose my respect. I want to see each individual student's own ideas. As such, avoid plagiarism at all costs or face the consequences (starting with an automatic zero on that



assignment and ending with the filing of an official report). If you have questions about what does or does not constitute plagiarism, the University Writing Center is a great place to start:

<https://ualr.edu/writingcenter/>

**Students with Disabilities:** If you have a documented disability (or need to document a disability) and need an accommodation, please contact me privately as soon as possible so that we can discuss with the Disability Resource Center (DRC) how to meet your specific needs and the requirements of the course. The DRC offers resources and coordinates reasonable accommodations for students with disabilities. Reasonable accommodations are established through an interactive process among you, your instructor(s) and the DRC. Thus, if you have a disability, please contact me and/or the DRC, at 501-5693143 (V/TTY) or 501-683-7629 (VP). For more information, please visit the DRC website at [ualr.edu/disability](http://ualr.edu/disability). (UA Little Rock Policy 404.9)

## Intro to GIS

Fall 2019

Week	Date	Day	Topic	Labs and Activities	Skill Building	Reading
1	19-Aug	M	Introduction	Esri Accounts/ArcGIS Download		
	21-Aug	W	Spatial Thinking and Reasoning		SB 1	GIS 20 Ch 1: Downloading Shapefiles and Using Essential ArcMap Tools
2	26-Aug	M	Conceptual Spatial Data Models: Raster & Vector	L1 File Organization/Navigating ArcGIS		
	28-Aug	W	<b>No Class Meeting</b>		SB2	GIS 20 Ch 2: Creating Basic Maps & Layouts
3	2-Sep	M	<b>Labor Day - No Class Meeting</b>	L2 Raster and Vector Data in ArcGIS		
	4-Sep	W	Map Anatomy and GIS Infrastructure		SB3	GIS 20 Ch 3: Projecting Shapefiles
4	9-Sep	M	Datums, Ellipsoids, Projections	L3 Working with Projections in ArcGIS		
	11-Sep	W	Geographic & Projected Coordinate Systems		SB4	GIS 20 Ch 4: Preparing Data for ArcMap
5	16-Sep	M	GIS Data Portals: SHP, GPKG, KML, CSV, etc.			
	18-Sep	W	<b>Exam 1</b>	<b>Exam 1</b>		<b>Review: Ch 1-3; SB1-4; L 1-3</b>
6	23-Sep	M	Attributes and Databases	<i>SQL Activity</i>	SB 5	GIS 20 Ch 5: Joining Data to Maps
	25-Sep	W	Attributes and Databases		SB 6	GIS 20 Ch 7: Working with Data Tables
7	30-Sep	M	Data Acquisition and Creation	<i>Add XY/GPS Activity</i>	SB 7	GIS 20 Ch 8: Address Mapping/Geocoding
	2-Oct	W	Data Acquisition and Creation		SB 8	GIS 20 CH 11: Editing
8	7-Oct	M	GIS Exploration Research and Project Design	L4: Editing and Georeferencing	SB 9	GIS 20 Ch 12: Attribute Queries
	9-Oct	W	GIS Exploratory Research and Project Design		SB 10	GIS 20 Ch 13: Location Queries
9	14-Oct	M	Base Maps and Terrain Analysis	<i>Hillshade and Contour Activity</i>		
	16-Oct	W	<b>Exam 2</b>	<b>Exam 2</b>		<b>Review: Ch 5, 7, 8, 11-13; SB5-10; L 4</b>
10	21-Oct	M	<b>Class Project Discussion</b>	<i>Class Project Discussion - Data Sources?</i>	SB 11	GIS 20 Ch 14: Geoprocessing Tools
	23-Oct	W	Geoprocessing and Spatial Analysis		SB 12	GIS 20 Ch 15: Creating Geodatabases
11	28-Oct	M	Topology	L5 Vector Data Analysis (3/31)		
	30-Oct	W	<b>No Class Meeting</b>		SB 13	GIS 20 Ch 16: Joining Boundaries
12	4-Nov	M	Thematic Mapping	<i>Class Project Connection - How to Visualize?</i>	SB 14	GIS 20 Ch 6: Creating Thematic Maps
	6-Nov	W	Thematic Mapping		SB 15	GIS 20 Ch 9: Categorical Mapping
13	11-Nov	M	GIS Ethics	<i>Class Project Discussion - Ethical Obligations?</i>		
	13-Nov	W	<b>Exam 3</b>	<b>Exam 3</b>		<b>Review: Ch 14-16, 6, 9; SB11-15, L5</b>
14	18-Nov	M	Final Project Work Session	Final Project Work		
	20-Nov	W	<b>No Class Meeting - NCGE</b>	Final Project Work		
15	25-Nov	M	Thanksgiving/Fall Break			
	27-Nov	W	Thanksgiving/Fall Break			
16	2-Dec	M	Final Project Work Session	Final Project Work		
	3-Dec	T	<b>Consultation Day</b>			
	6-Dec	F	<b>Final Map Challenge Exam, 8am - 10am</b>			