

# **GEOG 430 1001 / GEOL 630 1001 – GIS: Theory and Applications**

## **Spring 2023 TuesThurs 1:00-2:15pm, CBC C216**

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Office Hours: contact Alison directly

**Office Hours:** Monday 1:00pm, Tuesday 12:00pm and by appointment

**Course Format:** Traditional twice-weekly lectures (lab is required, graded separately and combined in the end)

**Required Textbook:** Geographic Information Systems and Science, 4<sup>th</sup> edition by Longley et al. (Lecture text)

**Prerequisites:** MATH 127 or 128

### **Purpose of this class:**

This course offers an advanced introduction to the field of Geographic Information Science (GISci), covering the basic geographic concepts of geospatial data, its manipulation, analysis and integration into a Geographic Information System (GIS). This course covers the foundational principles of GISci (representation, nature of geographic data, georeferencing and uncertainty), techniques (GIS software, geographic data modeling, GIS data collection, creating and maintaining geographic databases and the GeoWeb), analysis (cartography and map production, geovisualization, spatial data analysis and inference, and spatial modeling with GIS), and GIS management and policy. The lecture portion of the course will present topics in GIS manipulation and theory, while the required lab portion will focus on hands-on use of the industry-standard ArcGIS software.

### **Learning outcomes of this class:**

- Demonstrate foundational understanding of the basic concepts of geospatial data and its manipulation as part of a GIS through exam assessments covering the entire semester of materials
- Be able to articulate the distributed sources as well as types of geospatial data and discuss their potential and inherent limitations as well as the most common means for manipulating and analyzing these types of data

- Quantify the error that is inherent in most maps and selecting the best methods for minimizing those errors
- Be able to articulate the necessary components of a fully operational GIS inclusive of hardware, software, geospatial data, trained personnel and the necessary components of any GIS project
- All students will be required to display their mastery of these topics through the production of a GIS research poster in conjunction with their work in their applied GIS lab

**Grading Policy:** (Final grades are rounded to nearest whole number)

<u>Grade</u>	<u>Semester average</u>	<u>Grade</u>	<u>Semester average</u>
A	≥93	C	73-76
A-	90-92	C-	70-72
B+	87-89	D+	67-69
B	83-86	D	63-66
B-	80-82	D-	60-62
C+	77-79	F	less than 60

Three exams (expectations and questions will vary for graduate students vs. undergraduates)

Exam 1	150 pts	21%
Exam 2	150 pts	21%
Exam 3	150 pts	21%
Group research poster and presentation	250 pts	36%
<i>Points maybe reduced individually for lack of group participation, you must demonstrate your value to the group and contribute individually and collectively</i>		
GIS Methods and Analysis	(125 pts)	
Poster Mechanics	(50 pts)	
Oral Presentation	(50 pts)	
Written Description	(25 pts)	
Total Points	700 pts	100%

**Lecture and Exams:** Three non-cumulative exams will assess your understanding of the fundamental concepts and applications integral to the field of Geographic Information Sciences (GISci). Critical to your success on these exams will be **consistent attendance and active participation in lecture**.

*These are complicated topics that you might find quite different from the rest of your coursework. It is important to make the intellectual connections necessary for later application in your projects.*

To assist you in preparing for these lectures, you will have textbook **reading assignments to be completed prior to lecture**. Additional personal materials, as well as those pulled from other sources will round out the materials covered in this course. For this reason, your primary source of study materials will be your lecture notes. You are responsible for taking your own notes during

lecture, as I will only provide digital pdf lecture handouts that might not fully display all the content covered in class but will provide a great basis for note taking.

Given that this is an upper-division lecture, you will need to come to class ready to interact with me, ask questions, respond to prompts/questions and collaborate with your peers.

Exams are challenging and draw specifically from discussion of complex topics discussed in lecture. It is up to you to prepare adequately for each exam. I will provide a study guide to assist you in these preparations, but it is your responsibility to be familiar with all the content presented during the lectures for that exam and spend the necessary time studying the materials. Please recall that **this is a senior-level, capstone course.**

**Group Research Poster and Presentation:** As part of this course, all undergraduate students must participate in a group research poster project that will be presented by **all** members during the Spring Geosymposium of the Geoscience Department. Please **clear your calendars of any conflicts** that might keep you from participating in Geosymposium. Each student **must** register for this conference and be in attendance. All undergraduate students will be grouped into groups of around 4-5 students. Graduate students will each be required to develop their own research poster. The group aspect of this project is central to the course learning outcomes and while it might not always be convenient, it is critical for success. I reserve the right, based on observed performance and group feedback, to reduce any individual's grade as a result of a lack of participation in the group work. Group members need to commit themselves to the principles of:

**Accountability** (take responsibility for yourself and your group's success)

**Reliability** (be available to meet and do what you say you will do) and

**Communication** (be responsive and seek the advice and help of your group members).

The projects selected can be either exploratory or connected to ongoing research but must focus on the display of several GIS skills and processes learned during the semester. Please consult with the lab TA and professor in the selection and planning of the research poster project and get to work ASAP. In addition, you will need to submit a brief written description of your project. The document should be around five pages and focused on the GIS aspect (not the topic) of your project. Please describe your use of ArcGIS in completion of your project, including your data sources, georeferencing, data manipulations, and all analysis/display techniques employed. Explain your final data analysis and conclusions and offer reflective thoughts on what could have been improved and any major challenges to your success.

*This project will be challenging and does require you to learn to work effectively in groups and learn additional GIS techniques on the fly as you work to complete your project. Please use your textbook, lecture notes, lab book and the help menu of ArcGIS as resources. Additionally, I have small library of other GIS references for your short-term use.*

**Syllabus:** Should there need to be changes in the timing, order or subject of materials, I will do my best to use the announcement function to notify all the students of changes. Significant changes may require a revised syllabus.

## CLASS SCHEDULE

Date	Lecture
Week 1	
Jan. 17	Introduction to course and <i>Geospatial Revolution</i> (Episode 1) [Read <i>Introduction</i> , Price]
Jan. 19	Chapter 1: Science and Study and App. <i>Geospatial Revolution</i> (Episodes 2-4)
Week 2	
Jan. 24	Chapter 3: Representing Geography
Jan. 26	Chapter 3/Chapter 2: The Nature of Geographic Data
Week 3	
Jan. 31	Chapter 2/Chapter 4: Georeferencing
Feb. 2	Chapter 4: Georeferencing
Week 4	
Feb. 7	Chapter 5: Uncertainty
Feb. 9	Chapter 5: Uncertainty
Week 5	
Feb. 14	<b>Exam 1</b>
Feb. 16	Chapter 8: GIS Data Collection
Week 6	
Feb. 21	Chapter 8: GIS Data Collection
Feb. 23	
Week 7	
Feb. 28	Global Navigation Satellite Systems and Coordinate Surveying
Mar. 2	<b>In class GPS Field Exercise</b>
Week 8	
Mar. 7	Chapter 6: GIS System Software
Mar. 9	
Week 9	
Mar. 14	<b>Spring Break (No Class)</b>
Mar. 16	<b>Spring Break (No Class)</b>
Week 10	
Mar. 21	Chapter 7: Geographic Data Modeling
Mar. 23	Chapter 9: Creating and Maintaining Geographic Databases <b>(Draft abstracts due Friday)</b>
Week 11	
Mar. 28	Chapter 10: The GeoWeb
Mar. 30	<b>Exam 2</b>

Week 12	
Apr. 4	Chapter 11: Cartography and Map Production <b>(GIS “study area” map for poster is due)</b>
Apr. 6	Chapter 12: Geovisualization
Week 13	
Apr. 11	Chapter 12: Geovisualization
Apr. 13	Chapter 13: Spatial Data Analysis
Week 14	
Apr. 18	Chapter 14: Spatial Analysis and Inference
Apr. 20	Chapter 15: Spatial Modeling with GIS
Week 15	
Apr. 25	<b>Geosymposium Poster Work (No Class)</b>
Apr. 27	<b>Geosymposium Poster Work (No Class)</b>
Week 16	
May 2	Poster Submission and class discussions
May 4	<b>Exam 3</b>
Week 17	

**No Final Exam**

### Course Policies:

#### Public Health Directives

Face coverings are currently optional for all faculty and students in the classroom. Students must follow all active UNLV public health directives while enrolled in this class. UNLV public health directives are found at Health Requirements for Returning to Campus, <https://www.unlv.edu/coronavirus/health-requirements>. Students who do not comply with these directives may be asked to leave the classroom. Refusal to follow the guidelines may result in further disciplinary action according to the UNLV Student Conduct Code, [https://www.unlv.edu/sites/default/files/page\\_files/27/StudentConduct-Code.pdf](https://www.unlv.edu/sites/default/files/page_files/27/StudentConduct-Code.pdf), including being administratively withdrawn from the course.

[Academic Policies](https://catalog.unlv.edu/content.php?catoid=29&navoid=7326): <https://catalog.unlv.edu/content.php?catoid=29&navoid=7326>

[Student Services & Activities](https://catalog.unlv.edu/content.php?catoid=29&navoid=7331): <https://catalog.unlv.edu/content.php?catoid=29&navoid=7331>

[University Policies](https://catalog.unlv.edu/content.php?catoid=29&navoid=7332): <https://catalog.unlv.edu/content.php?catoid=29&navoid=7332>

[University Community & Libraries](https://catalog.unlv.edu/content.php?catoid=29&navoid=7322): <https://catalog.unlv.edu/content.php?catoid=29&navoid=7322>

The following are specific policies I have called out for your additional attention:

## Attendance

This course is an in-person course and attendance for **lecture is necessary for your success**. While pdfs of the lectures are provided ahead of time, they are meant to assist you during lecture, so you don't have to copy all the definitions provided. You still need to **be attentive, participate and take your own notes**. Combined with readings, these notes are your primary source of materials when preparing for each exam. It is my goal to help each student be successful in the course and gain an understanding of the materials through active engagement in lectures. Do not miss this opportunity to learn with me and your fellow students.

## Academic Misconduct

Academic integrity is a legitimate concern for every member of the University community. We all share in upholding the fundamental values of honesty, trust, respect, fairness, responsibility, and professionalism. By choosing to join the UNLV community, students accept the expectations of the Student Academic Misconduct Policy, and are encouraged to always take the ethical path whenever faced with choices. Students enrolling at UNLV assume the obligation to conduct themselves in a manner compatible with UNLV's educational mission. An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another person, from the Internet or any other source without proper citation of the source(s). See the Student Conduct Code, <https://www.unlv.edu/studentconduct/student-conduct>.

## Auditing a Course

Auditing a course allows a student to continue attending the lectures and/or laboratories and discussion sessions associated with the course, but the student will not earn a grade for any component of the course. Students who audit a course receive the same educational experience as students taking the course for a grade, but will be excused from exams, assessments, and other evaluative measures that serve the primary purpose of assigning a grade.

## Classroom Conduct

Students have a responsibility to conduct themselves in class and in the libraries in ways that do not interfere with the rights of other students to learn, or of instructors to teach. Use of devices such as cellular phones and pagers, or other potentially disruptive activities are only permitted with the prior explicit consent of the instructor.

Students are specifically prohibited to record classes without instructor authorization, including online/remote classes (either audio only, or video and audio). The instructor may rescind permission at any time during the class. If a student does not comply with established requirements or obstructs the functioning of the class, the instructor may initiate an administrative withdrawal of the student from the course.

Since the COVID-19 pandemic forced some instruction to be delivered remotely starting in Spring 2020, numerous students have asked instructors to record their synchronous classes, so that they can access them at their convenience. Instructors who agree to record their classes (audio only, or video and audio) should inform students in advance. Recorded lectures may not be broadly

released to anyone but made available exclusively to those students enrolled in the class during the particular academic term. Recorded lectures must be stored securely, and are subject to the Nevada System of Higher Education's Records Retention Policy, meaning that the recordings can only be deleted 120 days after the end of class (i.e., after grades are posted). Once this requirement is met, the recordings should be deleted. Class recordings are protected from disclosure, as they are deemed part of an educational record under the Family Educational Rights and Privacy Act (FERPA).

### Copyright

The University requires all members of the University Community to familiarize themselves with and follow copyright and fair use requirements. You are individually and solely responsible for violations of copyright and fair use laws. The University will neither protect nor defend you, nor assume any responsibility for student or employee violations of fair use laws. Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional copyright policy information is available at <https://www.unlv.edu/provost/copyright>.

### Disability Resource Center (DRC)

The UNLV Disability Resource Center (Campus Resource Center (CRC), across Harmon from the Lied Library, <https://www.unlv.edu/drc>, telephone 702-895-0866) provides resources for students with disabilities. Students who believe that they may need academic accommodations due to a permanent disability, temporary or permanent medical need, or academic support due to pregnancy are encouraged to contact the DRC as early as possible in the academic term. A Disabilities Specialist will discuss what options may be available to you. Students who are already registered with the DRC should request their accommodations online each semester, and make an appointment to discuss their accommodations with their instructors.

### Diversity Statement

As an institution of higher learning, UNLV represents a rich diversity of human beings among its faculty, staff, and students, and is committed to cultivating a campus environment that values diversity, practices inclusion, and actively promotes equitable experiences and outcomes. Accordingly, the University supports understanding and appreciation of all members of its community, regardless of race, sex, age, color, national origin, ethnicity, creed, religion, disability, sexual orientation, gender, gender identity, marital status, pregnancy, genetic information, veteran status, or political affiliation. Please see University Statements and Compliance, <https://www.unlv.edu/about/statements-compliance>.

A successful learning experience requires mutual respect and trust between the students and the instructor. Accordingly, the instructor asks that students be willing to listen to one another's points of view, acknowledging that there may be disagreements, keep discussion and comments on topic, and use first person, positive language when expressing their perspectives.

### Final Examinations and Study Week

The University requires that final exams given at the end of a course occur on the date and at the time specified in the Final Exam schedule. The general schedule is typically available at the start of the semester, and the classroom locations are available approximately one month before the end of the semester. See the Final Exam Schedule, <https://www.unlv.edu/registrar/calendars>.

### Identity Verification in Online Courses

All UNLV students must use their Campus-issued ACE ID and password to log in to WebCampus-Canvas. UNLV students enrolled in online or hybrid courses are expected to read and adhere to the Student Academic Misconduct Policy, <https://www.unlv.edu/studentconduct/misconduct/policy>, which states that “acting or attempting to act as a substitute for another, or using or attempting to use a substitute, in any academic evaluation or assignment” is a form of academic misconduct. Intentionally sharing ACE login credentials with another person may be considered an attempt to use a substitute, and could result in investigation and sanctions, as outlined in the Student Academic Misconduct Policy. UNLV students enrolled in online courses are also expected to read and adhere to the Acceptable Use of Computing and Information Technology Resources Policy, <https://www.it.unlv.edu/policies/acceptable-use-computing-and-information-technology-resources-policy>, which prohibits sharing university accounts with other persons without authorization. To the greatest extent possible, all graded assignments and assessments in UNLV online courses should be hosted in WebCampus-Canvas or another UNLV-managed platform that requires ACE login credentials for access.

### Incomplete Grades

The grade of “I” (Incomplete) may be granted when a student has satisfactorily completed three-fourths of course work for that semester/session, but cannot complete the last part of the course for reason(s) beyond the student’s control and acceptable to the instructor, and the instructor believes that the student can finish the course without repeating it. For undergraduate courses, the incomplete work must be made up before the end of the following regular semester. Graduate students receiving “I” grades in 500-, 600-, or 700-level courses have up to one calendar year to complete the work, at the discretion of the instructor. If course requirements are not completed within the period indicated, a grade of “F” will be recorded, and the student’s GPA will be adjusted accordingly. Students who are fulfilling an Incomplete grade do not register for the course, but make individual arrangements with the instructor who assigned the “I” grade.

### Library Resources

Librarians are available to consult with students on research needs, including developing research topics, finding information, and evaluating sources. To make an appointment with a subject expert for this class, please visit the Libraries’ Research Consultation website, <https://guides.library.unlv.edu/appointments/librarian>. You can also ask the library staff questions via chat and text message at <https://ask.library.unlv.edu/>.

### Missed Course Work

Any student missing class, quizzes, examinations, or any other class or laboratory work because



of observance of religious holidays will be given an opportunity during that semester to make up the missed work. The make-up opportunity will apply to the religious holiday absence only. It is the responsibility of the student to notify the instructor within the first 14 calendar days of the course for Fall and Spring courses (except for modular courses), or within the first 7 calendar days of the course for Summer and modular courses, of their intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit the Missed Classwork policy, under Registration Policies, on the Academic Policies webpage, <https://catalog.unlv.edu/content.php?catoid=39&navoid=10666>.

In accordance with the policy approved by the Faculty Senate regarding missed class time and assignments, students who represent UNLV in any official extracurricular activity will also have the opportunity to make up assignments, provided that the student submits official written notification to the instructor no less than one week prior to the missed class(es).

The spirit and intent of the policy for missed classwork is to offer fair and equitable assessment opportunities to all students, including those representing the University in extracurricular activities. Instructors should consider, for example, that in courses which offer a "Drop one" option for the lowest assignment, quiz, or exam, assigning the student a grade of zero for an excused absence for extracurricular activity is both contrary to the intent of the Faculty Senate's policy, and an infringement on the student's right to complete all work for the course.

This policy will not apply in the event that completing the assignment or administering the examination at an alternate time would impose an undue hardship on the instructor or the University that could be reasonably avoided. There should be a good faith effort by both the instructor and the student to agree to a reasonable resolution. When disagreements regarding this policy arise, decisions can be appealed to the Department Chair/School Director, College/School Dean, and/or the Faculty Senate Academic Standards Committee.

For purposes of definition, extracurricular activities may include, but are not limited to academic recruitment activities, competitive intercollegiate athletics, fine arts activities, liberal arts competitions, science and engineering competitions, and any other event or activity sanctioned by a College/School Dean, and/or by the Executive Vice President and Provost.

### Rebelmail

Rebelmail is UNLV's official email system for students and by University policy, instructors and staff should only send emails to students' Rebelmail accounts. Rebelmail is one of the primary ways in which students receive official University communications, information about deadlines, major Campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the University. Sending emails within WebCampus-Canvas is also acceptable.

### Title IX

UNLV is committed to providing an environment free of all forms of unlawful discrimination including sexual and gender-based discrimination, harassment, and violence like sexual assault,

intimate partner violence, and stalking. If you, or someone you know, has experienced or is experiencing these types of behaviors, know that you are not alone. Resources and support are available. To learn more or to report an incident, please visit the Office of Equal Employment and Title IX website at <https://www.unlv.edu/compliance>. Please be aware that as an instructor, I am not a confidential resource, and I will need to report incidents of sexual misconduct to UNLV's Title IX Coordinator. You can also report concerns directly using the online reporting form, at [https://cm.maxient.com/reportingform.php?UnivofNevadaLasVegas&layout\\_id=18](https://cm.maxient.com/reportingform.php?UnivofNevadaLasVegas&layout_id=18), or via email at [titleixcoordinator@unlv.edu](mailto:titleixcoordinator@unlv.edu) or 702-895-4055. For confidential support in matters of sexual violence, relationship/family violence, or stalking, contact the Care Center at <https://www.unlv.edu/carecenter> or 702-895- 0602.

### **Tutoring and Coaching**

The Academic Success Center (ASC), at the Claude I. Howard Building, provides tutoring, academic success coaching, and other academic assistance for all UNLV undergraduate students. For information regarding tutoring subjects, tutoring times, and other ASC programs and services, please visit the ASC website, <https://www.unlv.edu/asc>, or call 702-895-3177. The ASC is located across from the Student Services Complex (SSC). Academic success coaching is located on the second floor of SSC A, Room 254. Drop-in tutoring is located on the second floor of the Lied Library, and on the second floor of the College of Engineering building (TBE A 207).

### **UNLV Writing Center**

One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, <https://writingcenter.unlv.edu/>, located in the Central Desert Complex, Building 3, Room 301 (CDC 3–301). Walk-in consultations are sometimes available, but students with appointments receive priority assistance. Students may make appointments in person or by calling the Center, telephone 702-895-3908. Students are requested to bring to their appointments their Rebel ID Card, a copy of the instructions for their assignment, and two copies of any writing they have completed on their assignment.

### **988 FREE 24/7 SUICIDE & CRISIS LIFELINE**

In addition to campus resources such as the Counseling and Psychological Services (CAPS) website at <https://www.unlv.edu/caps>, visiting the YOU@UNLV website at <https://you.unlv.edu/>, and Early Alert (for graduate students, at <https://www.unlv.edu/graduatecollege/academy/early-alert>), you may now call or text 988 or chat at [988lifeline.org](https://988lifeline.org) if you or someone you know is in crisis and in need of support.