

BIOL 409/809 – Biological Studies using GIS 3 credit hours

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Office Hours: Tuesday 12-1, Wednesday 10-1, Thursday 10-12 and by appointment

This course is an introduction to many aspects of using Geographic Information Systems as a natural resources tool. The class introduces cartographic concepts, tools such as Global Positioning System tools, and natural resource databases at the state and federal levels. In addition to lectures and labs where the software and tools are used, students also have the opportunity to complete projects using GIS and data of their own choosing. The main objective of the class is to give students enough familiarity with GIS software, data resources, and project design to be able to effectively produce their own projects.

Objectives

1. To introduce and explain how the key concepts of location, direction, distance, space, and navigation are relevant to geography and geographic information systems (GISs).
2. To define and describe how a geographic information system (GIS) is applied, its development, and its future, with special attention paid to the biological sciences.
3. To learn to use GIS for spatial analysis.
4. To identify and evaluate key considerations when searching for data.
5. To understand and apply the basic properties of a relational database management systems.
6. To apply concepts and methods learned in class to an independent spatial analysis project utilizing ArcGIS Pro.

Reading

We will work through the [GIS Tutorial for ArcGIS Pro 3.1.](#) from esri. This is a GIS-focused tutorial aimed at teaching specific functions that can be applied to a wide-range of disciplines, including biology. Several of the exercises are biological in focus. You will also read peer-reviewed literature that is focused on biological applications of GIS. I will provide additional literature throughout the semester.

Software

You will receive student access to the latest version of ArcGIS Pro. We will not work with ArcGIS Desktop in this course. However, the two are related, similar and compatible. You will have transferrable skills, but like with any variation in software, you may have to teach yourself new skills as you go forward. This course will be foundational for those future scenarios.

Lecture

I will upload lectures on GIS concepts and demonstrations of ArGIS Pro. I may also upload relevant videos from other scholars if I come across anything.

Assignments

You will work through 2-3 ArcGIS Pro Assignments per module. I have set three due dates coinciding with exam dates. You are not required to submit assignments every week, but you need to make sure you are working consistently throughout the term, as you will not get it done on time. All modules are unlocked so you can work ahead on your assignments. You must complete one module before moving to the next.

Late Work Policy

There will be a 3% deduction each day work is submitted after the due date.

Student Help Chat

There is no discussion board component to this course, however, there is an open chat for asking and answering questions. Check in and participate. Assisting others will help to reinforce your skills.

Exams

There will be three exams during the regular term and one final exam. Exams are closed book, notes, no web searching and no use of AI.

Final Project

You will use your newly acquired KSA (knowledge, skills and abilities) to answer an original question using ArcGIS Pro. You should start thinking about your topic immediately. I encourage you to use your own research project topics in this course. There are several deliverables. No use of AI in your final project.

Graduate Student Components

Students enrolled in BIOL 809 will complete two additional assignments as part of this course. The first is a Yuja recording of a PowerPoint presentation of your Final Project. The second is an annotated bibliography of references focused on the use of GIS in the biological sciences.

Technical Support

[LoperTECH Service Desk](#)

Phone: 308-865-8363

Email: support@nebraska.edu

If you are having problems or technical issues with Canvas, please contact ITS. Note that Canvas is most compatible with Firefox or Google Chrome. If you are using a Mac and the Safari browser, try using one of the other two browsers to navigate Canvas first before contacting ITS.

Computer and Software

Access to a computer with internet access, presentation software (e.g. PowerPoint). MS Software can be purchased through UNK bookstore at a discount. The final presentation will require use of a webcam

Communication

Email is the best manner to communicate with me. In most cases, I should be able to respond within a few days. You should frequently check your UNK email and Canvas for course assignments or announcements. Seminars and other pertinent information will be posted on Canvas. I will use the Canvas Announcements and provide individual feedback on assignments to regularly communicate with you. Typically I only provide assignment feedback if points are deducted to help you understand how to improve moving forward in the class. Please do not hesitate to reach out any time you have questions.

Grading

You will earn points on assignments, exams and final project components.

Grades will be assigned using the Department of Biology standard grading scale: follows: A (93-100%), A- (90-92%), B+ (88-89%), B (83-87%), B- (80-82%), C+ (78-79%), C (73-77%), C- (70-72%), D+ (68-69%), D (63-67%), D- (60-62%), and F (below 60%).

UNIVERSITY POLICIES

ATTENDANCE POLICY:

Your instructor may have indicated on their syllabus an attendance policy specific to their class. If so, that is the policy with which you must comply. If no other policy is stated, the University-wide attendance policy will apply.

- Undergraduate Student Attendance
Policy: <https://catalog.unk.edu/undergraduate/academics/academic-regulations/student-attendance-policy-statement/>
- Graduate Student Attendance

<https://catalog.unk.edu/graduate/academics/academic-regulations/expectations-in-the-classroom/class-attendance/>

ACADEMIC HONESTY POLICY:

Academic honesty is essential to the existence and integrity of an institution of higher education. The responsibility for maintaining that integrity is shared by all members of the academic community. To further serve this end, the University of Nebraska at Kearney has a policy relating to academic integrity.

[Undergraduate Academic Integrity Policy](#)

[Graduate Academic Integrity Policy](#)

Use of Artificial Intelligence (AI) tools: Since writing, analytical, and critical thinking skills are part of the learning outcomes of this course, all writing assignments should be prepared by the student. Developing strong competencies in this area will prepare you for a competitive workplace. While AI is readily available and can be useful in some circumstances, it is essential that you learn basic skills to help you identify what good writing looks like before you'll be able to accurately and ethically employ their use. Use of any such tools (Grammarly, ChatGPT, BufferAI, etc) will be considered a violation of the academic honesty policy. If it is found that you have written your paper using AI, you will receive a zero for the assignment. A subsequent violation after receiving a zero for any assignment due to using AI will result

in failure of the course for the semester and/or referral to the Senior Vice Chancellor for Academic Affairs.

FINALS WEEK POLICY: The final exam will be administered in the time period scheduled during finals week in accordance with University policy ([Final Exam Schedule](#)). More information about UNK's Finals Week Policy, including when it is appropriate to ask for special accommodations to move a course's final exam, can be found here: [Finals Week Policy](#).

MENTAL WELLNESS: The UNK Counseling Center provides mental health services to support the academic success of students. The Counseling Center provides a full range of short-term professional mental health services.

Getting help is a smart and courageous thing to do. Contact the UNK Counseling Center at 308-865-8248 or visit their website for more information: https://www.unk.edu/offices/counseling_healthcare/counseling_care/index.php

MILITARY AND VETERANS SERVICES: Military and Veteran Services assist veterans, service members, and their dependents with education benefits and academic and supporting resources. They serve as a liaison between students and the Veterans Administration and branches of the military. Contact the UNK Military and Veteran Services office at 308-865-8677 or visit their website for more information: https://www.unk.edu/offices/financial_aid/veterans_services/index.php

REPORTING STUDENT SEXUAL HARASSMENT, SEXUAL VIOLENCE OR SEXUAL ASSAULT:

Reporting allegations of rape, domestic violence, dating violence, sexual assault, sexual harassment, and stalking enables the University to promptly provide support to the impacted student(s), and to take appropriate action to prevent a recurrence of such sexual misconduct and protect the campus community. Confidentiality will be respected to the greatest degree possible. Any student who believes she or he may be the victim of sexual misconduct is encouraged to report to one or more of the following resources:

Local Domestic Violence, Sexual Assault Advocacy Agency: 308-237-2599

Campus Police (or Security): 308-865-8911

Title IX Coordinator: 308-865-8655

Retaliation against the student making the report, whether by students or University employees, will not be tolerated.

STUDENTS WITH DISABILITIES:

It is the policy of the University of Nebraska at Kearney to provide flexible and individualized reasonable accommodation to students with documented disabilities. To receive accommodation services for a disability, students must be registered with the UNK Disabilities Services for Students (DSS) office, 175 Memorial Student Affairs Building, 308-865-8214 or by email unkdso@unk.edu.

STUDENTS WHO ARE PREGNANT:

It is the policy of the University of Nebraska at Kearney to provide flexible and individualized reasonable accommodation to students who are pregnant. To receive accommodation services due to pregnancy,

students must contact the Student Health office at 308.865.8218. The following links provide information for students and faculty regarding pregnancy rights. <https://thepregnantscholar.org/title-ix-basics/>

<https://nwlc.org/resource/faq-pregnant-and-parenting-college-graduate-students-rights/>

UNK STATEMENT OF DIVERSITY & INCLUSION:

UNK stands in solidarity and unity with our students of color, our Latinx and international students, our LGBTQIA+ students and students from other marginalized groups in opposition to racism and prejudice in any form, wherever it may exist. It is the job of institutions of higher education, indeed their duty, to provide a haven for the safe and meaningful exchange of ideas and to support peaceful disagreement and discussion. In our classes, we strive to maintain a positive learning environment based upon open communication and mutual respect. UNK does not discriminate on the basis of race, color, national origin, age, religion, sex, gender, sexual orientation, disability or political affiliation. Respect for the diversity of our backgrounds and varied life experiences is essential to learning from our similarities as well as our differences. The following link provides resources and other information regarding D&I: <https://www.unk.edu/about/equity-access-diversity.php>.

UNK Policy for Inclusive Excellence

At UNK, inclusive excellence is rooted in our values.

- **People matter.** The diversity of our students, faculty and staff is essential to our educational mission. Our backgrounds, identities, and lived experiences enrich our learning community.
- **The learning environment matters.** We are committed to an inclusive and equitable student-centered learning environment. In our classrooms we exchange ideas and opinions with respect for one another.
- **Learning matters.** Preparing students to value critical thinking, mutual respect, and open communication is essential for lifelong learning. We are building a community that protects and fosters intellectual inquiry and embraces diverse perspectives.

The following link provides information for students regarding UNK's commitment to inclusive excellence and procedures for improving classroom experience with inclusion and belonging: <https://www.unk.edu/about/dei/inclusive-excellence-in-the-classroom.php>.

Everything in this syllabus is subject to change at the discretion of the instructor. You will be notified in class and via Canvas when changes are made. See below for a tentative lab schedule. Welcome to class!

Tentative schedule

August 26	Module 1	Introduction to GIS
September 2	Module 2	Map Design
September 9	Module 3	Maps for End Users
September 16	Module 4	File Geodatabases
September 23	Module 5	Spatial Data
September 30	Exam 1	Modules 1-5
October 7	Module 6	Geoprocessing
October 14	Module 7	Digitizing
October 21	Module 8	Geocoding
October 28	Exam 2	Modules 6-8
November 4	Module 9	Spatial Analysis
November 11	Module 10	Raster GIS
November 18	Module 11	3D GIS
November 25	Exam 3	Modules 9-11
	Projects	Multiple Components
December 16	Final Exam	Comprehensive