POINT 1902 LOMA
NAZARENE UNIVERSITY

Department of Biology, School of STEM

BIO 4083 | Introduction to Geographic Information Systems | Fall 2025

3 units (3 hours of lecture/computer lab, weekly)

Class Meeting Times: Tuesdays and Thursdays | 11:00 am – 12:15 pm | Ryan Library 213 (Computer Lab)
Final Exam: Thursday, December 18, 2025 | 10:30 am – 1:00 pm | Ryan Library 213 (Computer Lab)

Instructor:	Dr. Andrew Nosal (he/him)
Phone:	619-849-2656
Email:	anosal@pointloma.edu
Office location and hours:	Rohr Science 140* Mondays and Fridays | 9:00 – 10:00 am (no appointment needed), and also other days and times as needed (please e-mail Dr. Nosal to make an appointment) **Note that Rohr Science (across from Sator and Latter Halls) is not the same as Rohr Hall (other side of campus).*

PLNU Mission

To Teach ~ To Shape ~ To Send

Point Loma Nazarene University exists to provide higher education in a vital Christian community where minds are engaged and challenged, character is modeled and formed, and service is an expression of faith. Being of Wesleyan heritage, we strive to be a learning community where grace is foundational, truth is pursued, and holiness is a way of life.

Course Description

Geographic Information Systems (GIS) involves the analysis and management of geospatial data. This course is designed to introduce the basic principles and techniques of GIS (including spatial data sources, data structures, projections, and coordinate systems), the essential skills of operating a functional GIS (including data creation, data editing, and geospatial analysis), and the different applications of GIS technology. Students will become proficient in using ArcGIS software. This course will use a combination of lectures and computer lab activities to explore aspects of this growing and important field.

Program and Course Learning Outcomes

By the end of this course, you will be able to:

1. Describe the components of a GIS, and the importance of scale, projection, and coordinate systems in a GIS
2. Articulate the differences between vector and raster data structures and demonstrate the appropriate use of each
3. Identify uses of GIS in multiple fields including environmental science and ecology
4. Compile, analyze, and present geospatial data using various GIS tools, including ArcGIS software
5. Analyze the spatial distribution of phenomena and provide meaningful analysis of spatial attributes
6. Construct aesthetically pleasing maps that effectively convey information

Required Texts and Equipment

Introduction to Geographic Information Systems (Ninth Edition), by Kang-Tsung Chang

You may purchase (new or used) or rent a hard copy of the textbook, or the online e-book. Because we will be doing computer tasks from the textbook, you may find it most convenient to have it with you in class as a hard copy, or as an e-book on a tablet or laptop that you bring with you to class. It will be difficult to refer to the textbook on the same computer screen that you are performing the GIS tasks in the computer lab. You are encouraged to check the PLNU Bookstore, Amazon, and McGraw Hill websites, and others, to find the best option for you. You are NOT required to have access to the textbook's online supporting material via an access code. However, the textbook MUST be the ninth edition.

Supplementary readings and videos may also be assigned; these will be available on Canvas.

Course Credit Hour Information

In the interest of providing sufficient time to accomplish the stated Course Learning Outcomes, this class meets the PLNU credit hour policy for a 3-unit class delivered over 15 weeks. It is anticipated that students will spend a minimum of 37.5 participation hours per credit hour on their coursework. For this course, students will spend an estimated 112.5 total hours meeting the course learning outcomes.

Assessment and Grading

Assessment	Percentage of Final Grade
Exam 1	15%
Exam 2	15%
Final Project	25%
Quizzes and Assignments	35%
Attendance and Participation	10%
Total	100%

The following scale will be used to determine your final course letter grade:

93.0% ≥	A		73.0% ≥	C	< 77.0%
90.0% ≥	A-	< 93.0%	70.0% ≥	C-	< 73.0%
87.0% ≥	B+	< 90.0%	67.0% ≥	D+	< 70.0%
83.0% ≥	B	< 87.0%	63.0% ≥	D	< 67.0%
80.0% ≥	B-	< 83.0%	60.0% ≥	D-	< 63.0%
77.0% ≥	C+	< 80.0%		F	< 60.0%

Exams 1 and 2 (30% total):

This course has two mid-term exams that will consist a 'closed-book' and 'open-book' section. The 'closed-book' section of the exam will include a variety of question types, including multiple choice, true or false, fill in the blank, matching, and short answer. The 'open-book' section of the exam will include various computer tasks to perform using ArcGIS software. In both sections, even the 'open-book' section, students must work alone.

Final Project (25%):

Students will work in small groups to complete a final project applying the course concepts and skills to a problem of interest. Students will investigate a question that can be addressed with GIS, translate that need into a specific GIS project, and conduct data collection and analyses necessary to create an effective and professional map-based product to be displayed in a presentation.

Quizzes and Assignments (35%):

There will be an online quiz (administered using Honorlock on Canvas) for every chapter of the textbook covered. Quiz questions will be similar to exam questions, including multiple choice, true or false, fill in the blank, matching, and short answer. Generally, the weekly quiz will be due by 11:59 pm on the Monday after the week that chapter is covered. Any deviations from this typical schedule will be announced with plenty of notice in class and on Canvas. Unless otherwise noted, these weekly quizzes are 'closed-book.'

Assignments will mostly consist of computer tasks using ArcGIS software. These tasks, including step-by-step instructions, are at the end of each chapter. Generally, the Thursday class session is devoted to working on these tasks and troubleshooting as needed. Assigned tasks that are not completed during class will be homework.

Attendance and Participation (10%):

Students are expected to attend every class session, arriving on time and prepared, being engaged with in-class activities (i.e., not distracted by cell phones or asleep), listening respectfully to others, answering questions, and asking questions. All students are expected to contribute their fair share to group work.

Final Examination Policy

Successful completion of this class requires taking the final examination on its scheduled day. The final examination schedule is posted on the Class Schedules site. If you find yourself scheduled for three (3) or

more final examinations on the same day, you are authorized to contact each professor to arrange a different time for one of those exams. However, unless you have three (3) or more exams on the same day, no requests for alternative final examinations will be granted.

Incompletes and Late Assignments

All assignments are to be submitted/turned in by the due date and time indicated on Canvas. Unexcused late assignments will be accepted with a 10%-off-per-day (including weekends and holidays) penalty. Course Incompletes will only be assigned in extremely unusual circumstances.

Spiritual Care

Please be aware PLNU strives to be a place where you grow as whole persons. To this end, we provide resources for our students to encounter God and grow in their Christian faith. If students have questions, a desire to meet with the chaplain or have prayer requests you can contact your professor or the Office of Spiritual Life and Formation.

State Authorization

State authorization is a formal determination by a state that Point Loma Nazarene University is approved to conduct activities regulated by that state. In certain states outside California, Point Loma Nazarene University is not authorized to enroll online (distance education) students. If a student moves to another state after admission to the program and/or enrollment in an online course, continuation within the program and/or course will depend on whether Point Loma Nazarene University is authorized to offer distance education courses in that state. It is the student's responsibility to notify the institution of any change in his or her physical location. Refer to the map on State Authorization to view which states allow online (distance education) outside of California.

PLNU Copyright Policy

Point Loma Nazarene University, as a non-profit educational institution, is entitled by law to use materials protected by the US Copyright Act for classroom education. Any use of those materials outside the class may violate the law.

PLNU Academic Honesty Policy

Students should demonstrate academic honesty by doing original work and by giving appropriate credit to the ideas of others. Academic dishonesty is the act of presenting information, ideas, and/or concepts as one's own when in reality they are the results of another person's creativity and effort. A faculty member who believes a situation involving academic dishonesty has been detected may assign a failing grade for that assignment or examination, or, depending on the seriousness of the offense, for the course. Faculty should follow and students may appeal using the procedure in the university Catalog. See Academic Policies for definitions of kinds of academic dishonesty and for further policy information.

Artificial Intelligence (AI) Policy

The use of Artificial Intelligence (AI) tools (e.g., ChatGPT, iA Writer, Marmot, Botowski, GrammarlyGo, Perplexity, etc.) is prohibited in this course for any aspect of your work, including idea generation,

drafting, editing, or final submissions. This course is designed to assess your independent critical thinking, writing, and research skills without the assistance of AI technologies. Violations of this policy will be treated as breaches of academic integrity.

PLNU Academic Accommodations Policy

PLNU is committed to providing equal opportunity for participation in all its programs, services, and activities in accordance with the Americans with Disabilities Act (ADA). Students with disabilities may request course-related accommodations by contacting the Educational Access Center (EAC), located in the Bond Academic Center (EAC@pointloma.edu or 619-849-2533). Once a student's eligibility for an accommodation has been determined, the EAC will work with the student to create an Accommodation Plan (AP) that outlines allowed accommodations. Professors are able to view a student's approved accommodations through Accommodate.

PLNU highly recommends that students speak with their professors during the first two weeks of each semester/term about the implementation of their AP in that particular course. Accommodations are not retroactive so clarifying with the professor at the outset is one of the best ways to promote positive academic outcomes.

Students who need accommodations for a disability should contact the EAC as early as possible (i.e., ideally before the beginning of the semester) to assure appropriate accommodations can be provided. It is the student's responsibility to make the first contact with the EAC. Students cannot assume that because they had accommodations in the past, their eligibility at PLNU is automatic. All determinations at PLNU must go through the EAC process. This is to protect the privacy of students with disabilities who may not want to disclose this information and are not asking for any accommodations.

Language and Belonging

Point Loma Nazarene University faculty are committed to helping create a safe and hospitable learning environment for all students. As Christian scholars we are keenly aware of the power of language and believe in treating others with dignity. As such, it is important that our language be equitable, inclusive, and prejudice free. Inclusive/Bias-free language is the standard outlined by all major academic style guides, including MLA, APA, and Chicago, and it is the expected norm in university-level work. Good writing and speaking do not use unsubstantiated or irrelevant generalizations about personal qualities such as age, disability, economic class, ethnicity, marital status, parentage, political or religious beliefs, race, gender, sex, or sexual orientation. Inclusive language also avoids using stereotypes or terminology that demeans persons or groups based on age, disability, class, ethnicity, gender, race, language, or national origin. Respectful use of language is particularly important when referring to those outside of the religious and lifestyle commitments of those in the PLNU community. By working toward precision and clarity of language, we mark ourselves as serious and respectful scholars, and we model the Christ-like quality of hospitality.

If you (or someone you know) have experienced other forms of discrimination, you can find more information on reporting and resources at www.pointloma.edu/nondiscrimination.

Sexual Misconduct and Discrimination

In support of a safe learning environment, if you (or someone you know) have experienced any form of sexual discrimination or misconduct, including sexual assault, dating or domestic violence, or stalking,

know that accommodations and resources are available through the Title IX Office at pointloma.edu/Title-IX. Please be aware that under Title IX of the Education Amendments of 1972, faculty and staff are required to disclose information about such misconduct to the Title IX Office.

If you wish to speak to a confidential employee who does not have this reporting responsibility, you can contact Counseling Services at counselingservices@pointloma.edu or find a list of campus pastors at pointloma.edu/Title-IX.

If you (or someone you know) have experienced other forms of discrimination or bias, you can find more information on reporting and resources at www.pointloma.edu/bias

PLNU Attendance and Participation Policy

Regular and punctual attendance at all class sessions is considered essential to optimum academic achievement. If the student is absent for more than 10 percent of class sessions, the faculty member will issue a written warning of de-enrollment. If the absences exceed 20 percent, the student may be de-enrolled without notice until the university withdrawal date or, after that date, receive an "F" grade.

Note: The information below must be included under the "PLNU Attendance and Participation Policy" Section if you are teaching an Online or Hybrid course.

PLNU Course Modality Definitions

1. Online Courses: These are courses with class meetings where all instruction and interaction is fully online.
    a. Synchronous Courses: At least one class meeting takes place at a designated time.
    b. Asynchronous Courses: All class meetings are asynchronous.
2. Hybrid Courses: These are courses with class meetings that take place both in the classroom and online synchronously and/or asynchronously.
3. In-Person Courses: These are courses that meet in person with the instructor and students in a physical classroom setting. With approval by the area dean, this may include up to 25% of qualified class interactions through a Learning Management System (such as Canvas).

In some courses, a portion of the credit hour content will be delivered asynchronously and attendance will be determined by submitting the assignments by the posted due dates. See Academic Policies in the Undergraduate Academic Catalog.

Asynchronous Attendance/Participation Definition

A day of attendance in asynchronous content is determined as contributing a substantive note, assignment, discussion, or submission by the posted due date. Failure to meet these standards will result in an absence for that day. Instructors will determine how many asynchronous attendance days are required each week.

Use of Technology

In order to be successful in the online or hybrid environment, you'll need to meet the minimum technology and system requirements; please refer to the Technology and System Requirements information. Additionally, students are required to have headphone speakers, microphone, or webcams

compatible with their computer available to use. Please note that any course with online proctored exams requires a computer with a camera (tablets are not compatible) to complete exams online.

Problems with technology do not relieve you of the responsibility of participating, turning in your assignments, or completing your class work.

PLNU Recording Notification

In order to enhance the learning experience, please be advised that this course may be recorded by the professor for educational purposes, and access to these recordings will be limited to enrolled students and authorized personnel. Note that all recordings are subject to copyright protection. Any unauthorized distribution or publication of these recordings without written approval from the University (refer to the Dean) is strictly prohibited.

Course Format

This course consists of highly interactive 'lecture' sessions that will employ Socratic dialogue, using probing questions to guide classroom discussion. Students are expected to come to class prepared, having completed the scheduled readings, ready to participate in classroom activities. 'Lecture' sessions will regularly consist of class discussions, computer tasks, PowerPoint presentations, board work, videos, breakout groups, and student sharing. The goal of 'lecture' sessions is to review and highlight elements of assigned readings, answer students' questions, and apply concepts learned to new issues.

Your Expectations of Me

My goal is to maintain a warm and inclusive learning environment. Teaching and learning are inherently interactive and thus social and emotional; thus, I will never intentionally intimidate or embarrass you. Instead, I will try to challenge, empower, and inspire you. I will be friendly, fun, and approachable, but never at the expense of integrity, thoroughness, and fairness. I invite your questions and challenges (I make mistakes too) whenever they arise. In addition to your teacher, I am also your mentor and advocate; feel free to approach me with any question or concern about this class or otherwise. I am committed to mastery of the material I am teaching, to punctuality, accountability, organization, and preparedness. I will have assignments and exams graded and e-mails answered in short order, and I will make myself as available to students as possible.

My Expectations of You

I expect you to attend every lecture and lab session, arriving slightly *early* so we can begin on time. You should arrive prepared, having completed any assignments due as well as the scheduled readings. I expect a certain decorum in the classroom. Please respect your fellow students and me, as I will respect you. Your cell phones should be turned off or silenced and put away (out of sight, out of your hands) during class, unless you have prior approval from me (e.g., you have a child in daycare, a relative in hospice, etc.).

To succeed in this course, you must attend every lecture and lab, complete all assigned readings by their due date, and submit assignments on time. When completing assigned readings, read *actively* and *do not ignore the figures*. That means not merely skimming and/or highlighting. Reading actively means taking notes and drawing concept maps while reading and developing insightful questions you can bring to class. Most importantly, COME TO OFFICE HOURS *EARLY* AND *OFTEN*! I love helping students and office hours

are perfect for me to work with you individually or in small groups. Coming to office hours early and often is bound to improve your grade! I am personally invested in your success; however, you must be proactive and seek out help as needed. You must take ownership of your education! Lastly, use this general rule of thumb to self-assess your learning: if you truly understand the material, you should be able to teach it (explain it) clearly and concisely to another student.

I prefer that you take notes by hand, as several recent studies have shown that handwriting notes improves learning and retention over typing notes on a computer. One reason is that using your computer can be distracting, with countless temptations to engage with social media, e-mail, etc. The other reason is that handwriting notes is slower, which means you must actively distill in real time the lecture material to the most important points. This vital processing step is lost when you type notes because you can probably type fast enough to write every word being said. Nevertheless, if, for whatever reasons, you feel typing your notes in class works best for you and your learning style, I will be happy to accommodate this. Please just talk to me.

If you know ahead of time you will miss class for a valid reason (e.g., interview for graduate/medical school, competing in an intercollegiate athletic event, etc.), please notify me AT LEAST TWO WEEKS ahead of time. Alternative arrangements *may* be possible, but are not guaranteed. If you unexpectedly miss class for a valid reason (e.g., severe illness, family emergency, etc.), contact me as soon as possible; you may be asked to provide proof of absence (e.g., a doctor's note). Note that other travel plans (e.g., leaving PLNU early for Spring Break, Easter Break, or similar) DO NOT count as a valid reason to miss class and may not be accommodated.

Land Acknowledgement

I want to acknowledge that the land on which we gather is the traditional and unceded territory of the Kumeyaay Nation. I want to pay respect to the citizens of the Kumeyaay Nation, both past and present, and their continuing relationship to their ancestral lands.

Tentative Course Schedule (*subject to change* – changes will be announced in class and on Canvas.)
Note: Assigned textbook chapters in Chang should be completed before *lecture begins (11:00 am) on the date indicated.*

Day	Date	Topics Covered
TUE	9/2	Lecture: Introduction to GIS (Chang Chapter 1)
THUR	9/4	ArcGIS Computer Tasks (Chang Chapter 1)
TUE	9/9	Lecture: Coordinate Systems (Chang Chapter 2)
THUR	9/11	ArcGIS Computer Tasks (Chang Chapter 2)
TUE	9/16	Lecture: Vector Data Model (Chang Chapter 3)
THUR	9/18	ArcGIS Computer Tasks (Chang Chapter 3)
TUE	9/23	Lecture: Raster Data Model (Chang Chapter 4)
THUR	9/25	ArcGIS Computer Tasks (Chang Chapter 4)
TUE	9/30	Lecture: GIS Data Acquisition (Chang Chapter 5)

THUR	10/2	ArcGIS Computer Tasks (Chang Chapter 5)
TUE	10/7	Lecture: Geometric Transformations (Chang Chapter 6)
THUR	10/9	ArcGIS Computer Tasks (Chang Chapter 6)
TUE	10/14	**Exam 1 (Chapters 1 – 5)**
THUR	10/16	Lecture: Spatial Data Accuracy and Quality (Chang Chapter 7)
TUE	10/21	ArcGIS Computer Tasks (Chang Chapter 7)
THUR	10/23	*NO CLASS – FALL BREAK*
TUE	10/28	Lecture: Data Display and Cartography (Chang Chapter 9)
THUR	10/30	ArcGIS Computer Tasks (Chang Chapter 9)
TUE	11/4	Lecture: Data Exploration (Chang Chapter 10)
THUR	11/6	ArcGIS Computer Tasks (Chang Chapter 10)
TUE	11/11	Lecture: Vector Data Analysis (Chang Chapter 11)
THUR	11/13	ArcGIS Computer Tasks (Chang Chapter 11)
TUE	11/18	**Exam 2 (Chapters 6 – 10, except 8; review Chapters 1 – 5)**
THUR	11/20	Lecture: Raster Data Analysis (Chang Chapter 12)
TUE	11/25	ArcGIS Computer Tasks (Chang Chapter 12)
THUR	11/27	*NO CLASS – THANKSGIVING BREAK*
TUE	12/2	Open Computer Lab – Work on Final Project
THUR	12/4	Guest Speaker: Rachel Sarner (GIS Analyst, ICF) Open Computer Lab – Work on Final Project (if time after guest lecture)
TUE	12/9	Open Computer Lab – Work on Final Project
THUR	12/11	Open Computer Lab – Work on Final Project
THUR	12/18	**Final Exam, 10:30 AM – 1:00 PM, in Ryan Library 213 (Computer Lab)**