UEP150: INTRODUCTION TO GEOGRAPHIC INFORMATION SCIENCE

Spring Semester 2026

This course fulfills Core Program requirement CPLS

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Office Hours: Tuesday and Thursday 10-11am or by appointment. I am happy to do so by Zoom

No text to buy - readings assigned as web URLs or electronic documents. Instead bring/purchase a USB memory device ("flash drive" or similar) for data backups and transporting your data between computers – minimum capacity 32GB. ***Your Oxynet network storage ('my documents') will not worl reliably with ArcGIS. Google Drive will work but is slow and inconvenient***

Understanding many social and environmental issues can be greatly enhanced, and often made possible, by the ability to access, explore, and integrate information from many different sources. Because location is an important aspect of many types of information and problems alike, it is valuable to have the tools and skills to evaluate information spatially. This course is an introduction to Geographic Information Science using the vector data model to represent "realworld" features in a GIS (geographic information system). You will be introduced to geospatial concepts and the most common methods used in environmental health and epidemiology for mapping and analyzing geographic variation in health impact disparities, and correlation with risk factors. The skills and understanding you develop in this class also apply directly to many other topics of study, and are valuable job skills, as well.

What is a GIS? It is not a computer program that simply makes maps. A F35 fighter jet will take you to the beach but it is capable of doing a lot more – similarly, ArcGIS makes great looking maps, but its core functionality is analysis of data and spatial relationships. In fact, most professionally produced maps are made using Adobe Illustrator using ArcGIS input files. A GIS is an integrated system of software, data, and user intelligence to integrate and manage many types of information in many source formats, using geographic location as a way to relate these data together - just as the Dewey Decimal System relates various books and printed media by subject in a traditional library, or web content uses keywords, a GIS uses geographic location to organize and relate data in a geospatial library. A GIS allows you to simply visualize different types of spatial data to look for patterns and spatial relationships, or to address specific questions and solve problems by combining such techniques as querying attribute information in relational databases, analyzing spatial relationships quantitatively, and model spatial processes. It also forces you to be more honest and objective in drawing conclusions than most other "mapping" techniques.

For example, the most impactful negative effect of climate change (there are many positives) on individuals that has been documented is the increase in number and severity of "heat waves" - periods of sustained high temperatures and humidity that cause medical emergencies ("Changing heat-related mortality in the United States") GIS can be used to make maps of temperature, humidity, population density and heat-related fatalities to help understand this problem. Further, felt heat is more intense in "heat islands" - areas of dense urban development with little tree canopy and ground covering of asphalt, concrete, and other impervious materials - this information can be extracted from satellite imagery. The persons most likely to die in a heat wave are very young children and poor elderly people living alone (lack air conditioning or way to be taken to a cooler place, biologically more susceptible to heat due to age). A GIS allows you to quantitatively evaluate these and other vulnerability factors to look for patterns that might predict future impacts.

The majority of information important to understanding environmental health, and many other fields as well, has a spatial component; it relates to some realworld location. Information about typically exists in different formats, has many sources, and varies in measures of data quality (accuracy, precision, resolution, time, etc.) This makes an information system like a GIS vital to developing understanding and addressing complex problems. GIS technology integrates database operations, such as database query, aggregation, and statistical analysis, with the pattern visualization and geographic analysis benefits offered by maps and animation. These abilities distinguish a GIS – from other information systems you already use, such as spreadsheets to manage numbers and lists, word processors to manage text, web browsers to manage mixed media, and audio synthesizers to manage sound and music.

In this course, you will use GIS as a tool for accessing and exploring information, and as a problem-solving system to address questions related to environmental health. You will have hands-on experience in laboratory exercises, which include selected case studies to highlight principles, methods, and techniques. You will be using realworld datasets used by analysts, researchers, and other professionals. You will also gain some experience working in groups

Course Objectives and Learning Outcomes:

1. Understand fundamentals of geography and spatial thinking
2. Understand and manipulate spatial data and attribute data in a variety of digital formats
3. Learn skills and approaches to cartography and quantitative spatial analysis in the ESRI software
4. Understand how to integrate different data formats using spatial statistics.
5. Practical experience with problem-solving using real issues and real data

Each class meeting will include four elements:

- traditional lectures to present and explain content information,
- demonstrations of techniques that you will use in lab assignments,
- an opportunity to review of your questions and problems from previous lab work, and
- occasional in-class assignments.

All lectures have accompanying PowerPoint presentations, which I will make available to you for studying. *Do not ignore the need to take your own notes*, as research in learning and cognition has clearly shown that you retain and recall information effectively if you actively and mechanically write notes, so plan to at least annotate the PowerPoint slides, although it is better from learning perspective to take notes without the slides and combine them later. Lectures also will serve as the place where we discuss problems you are having in lab and have your questions answered, and you must bring up these questions during the lecture sessions or I will assume you understand past work. In the lab portion of the course, you will work on a variety of assignments, initially step-by-step learning modules to master skills, and later to more challenging, project-based labs.

This course does not use Canvas or other "classroom management" tool - these to be demeaning to students and couterproductive to learning effective skills. Instead, you will access classwork via email attachments or by access to Oxy network storage. This means you need to be organized and meticulous in maintaining all computer files and other information for this class. Think about how you will do that *now* and see me for suggestions or help.

Your course grade will be determined by

- **Attendance** (see defination and explanation below) and **active participation** (15%)
    - You may be absent from class – "lecture" or "lab" sessions - twice without penalty. Being late to a class is counted as ½ of a class absence – see "Class Attendance" below.
    - If you have a third or fourth absence, you will lose credit at the rate of 2% of your final course grade per absence. If you miss more than 4 class meetings, you likely will not pass the course – seniors aspiring to graduate take note.
    - Active, engaged and significant participation is also part of this grade, and you will receive credit according to your contributions such as asking thoughtful questions, contributing to class discussion, replying when I ask for ideas or responses.
- **On-time completion and submission of lab and in-class assignments, and homework** (35%)
    - If absent, you must turn in assignments within 3 days of the due date or you will lose credit
    - Work submitted late will lose credit at 20% per day, pro rata
- **Quizzes** (15%)
    - There are two during the semester (5% and 10%)
    - There are no makeup quizzes if you miss one due to being absent
- **Comprehensive final exam (and project?)** – details to be determined (35%)
    - The final exam will take place on the day and time published in the college final exam schedule unless the class agrees by unanimous consent to have the final on the last day of classes

- Grades assigned as follows (unless the class agrees by unanimous consent to have grades "on a curve"):
  A: >93; A-: 90-93; B+: 87-90; B: 83-87; B-: 80-83; C+: 77-80; C: 73-77; C-: 70-73; D: 63-70; F: <63.

Some Takeaways:

- *Do not make travel plans that will cause you to fail the course by missing this exam.*
- *Other than the final exam, no single assignment or quiz will "make or break" your final grade*
- *The quizzes are designed to help you do well on the final. It costs less to make a mistake on a quiz (your first try) than the final exam.*

- *Keeping up with the coursework is a significant contribution to your grade, but if you cannot be present, on time and engaged, your course grade will suffer. This, in many ways, mirrors life after Oxy in whatever career you choose, and this is by design.*

Learning GIS is very linear - what you to learn today what you will use tomorrow, but if you don't learn it today, you will not do well tomorrow. If you fall behind in terms of skills mastery and understanding content, it is difficult and much more work to catch up. You also need to make sure that you master the content and techniques yourself in lab and homework assignments so that you can perform well on exams – don't depend on a friend to do the work while you only watch. I assume that you plan to have a professional career once out of Oxy, so learning or practicing these "soft skills" are vitally important.

Attendance: ("Eighty percent of success is showing up" quote attributed to Woody Allen) You deserve an explanation of my rationale on attendance and its role in the course. On-time and regular attendance is also required in any profession. Regardless of what you do with your life after college, showing up and being on time are greatly valued, and failing to do so earns significant professional punishment. Similarly, whatever future you choose will involve working with others, and your regular and substantive participation is both expected and valued. If you lack experience or have difficulty with these "work habits" this class offers you an opportunity to work on mastering them, and a relatively inexpensive way to make mistakes as part of the learning process. The pace and content of the course is determined, in part, by your completing assignments, homework or in-class assignments that are later used by the class as a whole, so in essence attendance is part of your "regular and substantive participation" Please refer to: http://www.oxy.edu/student-handbook/general-collegepolicies/class-absence-due-illness-or-extenuating-circumstances

The content of each class and lab meeting is essential to the learning goals and mastery of the subject; missed classes/activities cannot "made up" in a way that that is comparable to being present. Reliable and on-time attendance is not only crucial for success in this class, it will be for the rest of your professional life, so I will be inflexible on this aspect of your grade (see "Crisis management" below). ***On time attendance in class is expected– "on time" means you are at your desk, ready to begin class at the required time, not walking in at that time or slightly after. This class meets 35 times during the semester, and if you miss more than 10% of those times you cannot pass the class.***

By college policy, you may be absent twice during the semester for any reason, be it "for reasons of faith and conscience without academic consequence", illness, athletics competition or artistic performance, conference attendance, field trip for another course, or participation in another activity important to you. This is your own business; you do not have to justify it to me as all I am doing is keeping score. It is professionally courteous to notify me of an absence to help me help you get back on track with the rest of the class. Twice means two class meetings, lecture or lab, but if you want to switch lab days you may do so after contacting me.

If you are absent more than twice, there are consequences (see "Attendance and active participation" above). If an absence results in you missing a due date for turning a lab or in-class assignment or a quiz, you must complete that assignment or quiz within two days of returning to class; contact me immediately by email. The course schedule shows the dates for quizzes, so you can give me advanced notice for all but illness. For any issues that are in excess of this general rule, you must contact me as soon as possible and I will work with you on a solution. There are no "make-up" quizzes so you don't want to lose an entire letter grade over a poorly managed personal schedule.

Being "late" means not seated and ready to work at the scheduled time that the class begins –the definition of "time" please use the National NIST Internet Time Signal as the standard (https://www.time.gov/). If you slip into the room just at the start of class, or are minute or two late, you are late. My advice is to heed the old adage "*if you are early, you are on time; if you are on time, you are late."*

Although I certainly hope not, you might experience a severe health problem or family crisis/emergency. Similarly, it might be necessary for you to isolate due to transmissible infection. If such an event takes place:

- ***Contact me as soon as possible, preferably by email***. I will be confidential and equitable in determining how to proceed, and I will be understanding and fair to you.
- Prepare to use distance learning (Zoom and Virtual Computer Lab) that will require you to work at a Windows PC with a good broadband connection.

Please familiarize yourself with College policy on absence due to illness: https://www.oxy.edu/student-handbook/general-college-policies/class-absence-due-illness-or-extenuating-circumstances

Everyone gets a break: If you need it, you can have one "break". If you feel you need one, contact me and together we will decide what your "break" should be. Usually, this means trying to improve a quiz that you did poorly on, taking an extra day to turn in an assignment that is due, or something similar. Your break will be a minor aspect of the course, as measured by the grading policy. I will be open-minded and understanding, but also must be fair to the entire class. You only get one "break" so spend it wisely

Expectations:

- You will be able to complete some lab projects during the lab period but expect to do additional lab work outside of class time on your own as the semester progresses – about 3 hours per week in the early part of the semester, and 5-6 hours per week later in the semester. You will have "24/7" access to HSC203, and ArcGIS is also installed on computers in the library.
- You should be comfortable using MS Word, Excel and PowerPoint and have some familiarity with the Windows operating system -your abilities will improve during the course.
- Learn and use the technical terminology of GIS as it is introduced throughout the course. You should use it in exams, lab assignments, and discussions.
- Assignments should be neatly and professionally done using Microsoft Office software unless otherwise indicated. Assignments will be turned in as computer files appropriately named and submitted to the course server, and you must be able to do this successfully by the second week of class or you will lose credit.
- During lecture, quizzes and for in-class assignments do not use wireless devices, including texting. You will learn better if you refrain from using earphones during lab but if you do, the volume must be low enough so that no one else can hear. You will miss any interaction with colleagues it would not be tolerated in most serious work settings, so I don't recommend it.
- Check your oxy.edu email account at least twice a day, preferably before lecture or lab begins, as important information and assignments will be delivered this way – use your "@oxy.edu"account for all class purposes.
- Not all in-class assignments are announced in advance, so you should have a "note-taking partner" to brief you on what you miss; this person should also work with you if you have to make up an assignment (it benefits her/him, too).
- If problems arise that are beyond your control, notify me as soon as possible, by email or in person.

  In turn, you can expect me to deliver a challenging and timely curriculum, be on time with all class meetings, create effective and comprehensive course content and assignments, answer your questions, and guide you as you solve problems. I will treat each of you is an individual - equally and with respect. Fairness is fundamental to my teaching and all interactions with students. Please maintain an environment of mutual respect among all members of this class and come to me with any concerns.

  Please provide me the same courtesy. Leaving the room repeatedly to use your phone is distracting to everyone and not doing you any good with the course. Please address me as "Dr. Sadd" or "Professor Sadd". Do not address me "Professor" – this generic title is just as disrespectful as if I addressed you as "generic Student". Please tell me how you wish to be addressed.

Tips on how to succeed - spend less time studying and get better grades:

- Attend class regularly and on time.
- Keep up with the class; do not fall behind; the more behind you are, the harder it is to catch up.
- Take good lecture notes in class. You will be given a copy of the lecture PowerPoint but your own written notes are essential. Within a day, recopy your notes – it takes only about 15-20 minutes but should be done every class day because you will remember the most information. Doing this, you are studying for the first time, and will have notes that you later can actually read.
- Turn in your work completed and on time. ***Again, there are no make-up quizzes, and any assignment turned in late will be penalized 20% per day***
- Create a study group – this consists of maximum 3 people who meet regularly to go over the course material and quiz one another on it and recopying your notes together. Most people think they understand course material better than they actually do, and this is a way to discover what you need to review. In that context, the quizzers learn as much as the quizzed, so it is in everyone's interest to do this.

As a faculty member, I am required by college policy to report any incidents of harrassment covered by college policies. I cannot keep information about sexual misconduct confidential if you share that information with me. (https://www.oxy.edu/sexual-respect-title-ix) The sexual misconduct policy, along with additional resources, can be found at: http://www.oxy.edu/sexual-respect-title-ix/policies-procedures

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It is Occidental College policy to make reasonable accommodations for qualified individuals with disabilities. If you have a documented disability and require accommodations, you must be registered with Disability Services and are required to **present your accommodation letter to me by Feb. 5**. I will make sure you receive access to any accommodations for which you are eligible if these conditions are met. To learn about available services and support, contact Disability Services at (323) 259-2969 or http://www.oxy.edu/disability-services.

Schedule:

I*t is possible that, during the semester, there may need to be updates to how the course is taught.* Topics and details may also be adjusted to respond to class interest; any changes or updates will be posted to Moodle

20-Jan	lec	Intro to GIS;
22-Jan	lec	More intro **PreLab homework**
	lab	Download data and make a map
27-Jan	lec	Thematic mapping
29-Jan		Thematic mapping continued; Tutorial: Download data
	lab	**Tutorial "Learn the Basics"**
3-Feb	lec	Tutorial: Landuse Mapping and Data Querys
5-Feb	lec	Test for normal distribution
	lab	**Tutorial "Vizualize"**
10-Feb	lec	Schelling
12-Feb	lec	QUIZ 1 :
	lab	**Tutorial "Analyze"**
17-Feb	lec	Tables, Joins and Summarizing - ICE
19-Feb	lec	Querys and Selection
	lab	**Tutorial "Manage and edit data"**
24-Feb	lec	Location based querys
25-Feb	lec	Spatial Analysis
	lab	***Thematic Mapping - LA air pollution***
3-Mar	lec	Spatial Analysis
4-Mar		Conflation and area-weighting - ICE
5-Mar		**Census data**
		Spring Break
17-Mar	lec	Location Optimization
18-Mar	lec	*QUIZ 2*
	lab	***Spatial Analysis using multiple criteria***
24-Mar	lec	Spatial Stats - measuring spatial distribution
25-Mar	lec	Spatial Statistics - analyzing patterns
	lab	***Site Suitability Analysis***
31-Mar	lec	Integrating GEP and ArcMap
2-Apr	lec	Cartography
	lab	***RealWorld Health modeling***
7-Apr	lec	Character of Data
9-Apr	lec	Data Quality
	lab	***Cluster and hot spot analysis***
14-Apr	lec	Making sense of the Census
16-Apr	lec	EJ Case Study
	lab	**Applied Spatial Statistics**
21-Apr	lec	**Founders Day - no class**
23-Apr	lec	Map Projections
	lab	***ArcGIS Online***
28-Apr	lec	

Other Course Policies:
Consistent with College Policy, no recording of classroom instruction is permitted. The sharing, altering, or distorting of any audio-visual capture of a class session is not permitted. All content contained in the records shall be subject to the College's Policy on Intellectual Property. If you want to record any portion of classroom instruction, please contact me first for permission.

I will not tolerate academic misconduct - cheating, misrepresenting one's work, and plagiarism. Cheating is the unauthorized possession or use of information in an academic exercise (this includes phone use and texting), as well as unauthorized communication with another person during an exercise such as an examination. Misrepresenting is using material prepared by another as one's own work without my explicit prior permission. Plagiarism means the intentional unacknowledged use or incorporation of any other person's work as your own. If you tolerate or do not report academic misconduct by others, you are also guilty of misconduct. Please maintain professional behavior in the classroom setting, according to the College policies below. Please read and make sure you understand them. ***By remaining enrolled in this class, you agree that you understand and accept these policies***, and we will adhere to them strictly during the semester. ***It is your responsibility to review them all***
http://www.oxy.edu/student-handbook/general-college-policies/class-absence-due-illness-or-extenuating-circumstances
http://www.oxy.edu/student-handbook/code-student-conduct/standards-classroom-behavior.
http://www.oxy.edu/student-handbook/code-student-conduct/standards-classroom-behavior
http://www.oxy.edu/student-handbook/academic-ethics/academic-ethics
https://www.oxy.edu/student-handbook/general-college-policies/discrimination-harassment-and-retaliation
https://www.oxy.edu/student-handbook/academic-ethics/academic-misconduct

UEP 150 is a 4-unit course with a 0-unit lab associated with the course. On average, you should expect to spend at least (12) hours a week (including in-class time and in-lab time) on average.

Statement of the Shared Academic Integrity Commitment

- *Academic Integrity is a shared community value. It is built around trust and respect between members of the Occidental Community, and embodies a commitment to honesty and integrity in every aspect of one's academic life. All members of the Occidental community are committed to uphold the highest degree of academic integrity. Unless stipulated otherwise, the academic work done for all assignments is expected to be the student's own, and students give proper credit to the ideas and work of others.*

  Signing the Academic Integrity Commitment at matriculation and at the beginning of every semester represents a student's affirmation to uphold the shared values of honesty and integrity. When signing the Integrity Commitment associated with work in a course, students are affirming that they have not cheated, plagiarized, fabricated, or falsified information; nor assisted others in these actions.

Link to Student Handbook (which includes the framing of the commitment, definitions of Academic Ethics, and Process for alleged violations of the commitment)

- *Title IX statement, and statement of role of faculty member as a mandatory reporter (Link to Title IX)*
  - *In the event that you choose to write or speak about having experienced sexual misconduct, including sexual assault, dating violence, domestic violence, stalking, sexual exploitation or any other form of sexual and/or gender-based harassment, as a designated Responsible Employee, I must notify the Title IX Office. They will contact you to let you know about accommodations and support services at Oxy and reporting options both on and off-campus. You have no obligation to respond to the Title IX Office or to meet with them to discuss support services and reporting options. If you do not want the Title IX Office notified, instead of disclosing this information to your instructor, either through conversation or a class assignment, you can speak confidentially with the following people on campus:*
    - *Oxy's Survivor Advocate, Project SAFE (survivoradvocate@oxy.edu)*
    - *Emmons Counseling (For appointments, call: 323-259-2657)*
    - *Rev. Dr. Susan Young, Office of Religious and Spiritual Life (young@oxy.edu)*

    The sexual misconduct policy, along with additional resources, can be found at: http://www.oxy.edu/sexual-respect-title-ix/policies-procedures. If you would like to contact the Title IX Office directly, you can email Title IX Coordinator Alexandra Fulcher at afulcher@oxy.edu or call 323-259-1338.

- Language on Special Accommodations/Learning Differences (Link to Disability Services)
  - *Students with documented disabilities and learning differences who are registered with Disability Services are required to present their accommodation letter to the instructor at the beginning of each semester, or as soon as possible thereafter. Any student who has, or thinks they may have, a physical, learning, or psychological disability may contact Disability Services at accessibility@oxy.edu to learn about available services and support. More information is available at http://www.oxy.edu/disability-services*

- Accommodations for Reasons of Faith and Conscience (Link to the policy in Catalog)
  - *Consistent with Occidental College's commitment to creating an academic community that is respectful of and welcoming to persons of differing backgrounds, we believe that students should be excused from class for reasons of faith and conscience without academic consequence. While it is not feasible to schedule coursework around all days of conviction for a class as a whole, faculty will honor requests from individual students to reschedule coursework, to be absent from classes that conflict with the identified days. Information about this process is available on the ORSL website: https://www.oxy.edu/office-religious-spiritual-life*