

# GEOG 488 / GEOG 588 / USP 591 / SOPH 03

## Geographic Information Systems I: Introduction

	Undergraduate Sections		Graduate Sections		Location	Day and Time
	Section	CRN	Section	CRN		
Lecture	GEOG 488-001	41289	GEOG 588-001	41306	Online	Tue and Thur 14:00-14:50
			USP 591-002	43728		
			SOPH 03-021	44929		
Lab	GEOG 488L-001	41290	GEOG 588L-001	41307	CH469/Online	Tue 12:00-13:50
	GEOG 488L-002	41291	GEOG 588L-002	41308		Wed 16:00-17:50
	GEOG 488L-003	41292	GEOG 558L-003	41309		Wed 18:00-19:50
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*Term:* Winter 2024

*Instructor:* Chris Grant <cag2@pdx.edu>

*Office Hours:* by appointment

*Teaching Assistant:* Rachel Cheyney <rcheyney@pdx.edu>

*Office Hours:* by appointment

*Course Materials:* We will use Canvas for this course (canvas.pdx.edu).

### Course Objectives

GEOG 488/588 is an introductory course covering the theory and application of geographic information systems (GIS). The course includes an overview of the general principles of GIS and practical experience in its use. The practical component involves the use of the Esri ArcGIS Pro software package. Both the theoretical and practical components of the course are important. Without a theoretical understanding of GIS methods, you will make poor geographic modeling decisions and when necessary, you will not be able to migrate to a new or different GIS software package. Without a practical understanding of GIS software, your theoretical knowledge cannot be put to use.

### Text and Readings

The recommended but optional textbook for the course is:

Bolstad, Paul, and Steven Manson. *GIS Fundamentals: A First Text on Geographic Information Systems*. 7th edition. White Bear Lake, Minnesota: Elder Press, 2022.

### Content Delivery Model

Content for this course will be delivered using a mixture of asynchronous and synchronous models. Some activities will be asynchronous (completed as individual activities on your own schedule), and others will be synchronous (we will all meet at the same, scheduled time). Asynchronous activities may be completed at whatever location is most convenient for you.

Synchronous class meetings will either take place online, using Zoom, or in-person in the classroom assigned to our course. Please consult Canvas for information about the meeting location of any given synchronous activity.

## **Lectures**

Lectures will be delivered asynchronously in the form of pre-recorded videos and PDF copies of the lecture slides. You will view/read the lecture material on your own schedule prior to the scheduled synchronous class meetings, at which meetings we will address questions and discuss the lecture material.

## **Hybrid Course**

This is a hybrid course. A fully in-person 4-credit course would have 4 hours of lecture class meeting time each week (time spent on labs is in addition to that). In the hybrid model used for this class, there will be 2 hours of synchronous recitation class meetings each week, and you will be expected to spend up to 2 additional hours per week on your own schedule viewing the pre-recorded lectures.

## **Recitation Class Meetings**

Recitation class meetings will be conducted online, using Zoom. We will meet synchronously (everyone at the same time) at our scheduled class time of 2:00 PM on Tuesday and Thursday. At these class meetings, we will cover any questions you may have had while viewing the lecture material, and we will discuss the lecture material. Most recitation class meetings will include problem-solving exercises and demonstrations of GIS software functionality. You are *strongly encouraged* to attend these class meetings, as they will help you understand the material better; however, the attendance policy is quite liberal (see below).

## **Attendance**

Students who attend class regularly typically do better in this class than those who do not. To encourage participation, attendance counts for a small part of your overall grade. To get full credit, you must attend the two term-project presentation classes (the last two class meetings in the term), and you must attend at least 8 recitation class meetings during the term. Zoom meeting reports will be used to confirm attendance. Attendance will not be taken at any lab class meetings.

## **Computer Lab Exercises and Lab Class Meetings**

There will be eight weekly lab assignments that use ArcGIS Pro software. Each assignment will be a mix of tutorial exercises designed to introduce new concepts, plus some additional exercises where you apply what you learned in the tutorial. These exercises provide a way to acquire skills using ArcGIS and allow you to apply the course concepts to real data.

ArcGIS Pro software may be accessed in a number of ways, as detailed in the first week's lecture materials.

If, in any week, you are not able to attend your regular lab session, you are welcome to join either of the other two sessions instead.

Lab assignments may be completed in-person, or remotely. Cramer Hall 469 is reserved for our exclusive use during our scheduled lab meetings. If you are on campus, you may attend lab in-person in CH469. Alternatively, if you prefer, you may attend lab remotely, using Zoom. The lab assignments are designed so that they can, if you prefer, be completed independently on your own schedule.

## Exams

There will be two midterms. Both will be open-book exams. The first midterm will focus on knowledge, while the second will ask you to apply the concepts and skills that you have learned. There will be no final exam. We will use that assigned time period for project presentations.

## Project

Each student must complete a term project that will entail addressing a geography-related question using spatial analysis. The project is intended to provide a deeper understanding of GIS through an investigation of a particular research problem. You will need to acquire the spatial data, and carry out the spatial analysis using the GIS software package you have been using in class. That means you must do more than just make maps. It is suggested that you use secondary GIS data sources available online to do your project. While you are welcome to digitize data or do a field survey to create your own spatial dataset, doing so is *very* time-consuming and is not the purpose of this project. Performing a spatial analysis is the purpose of this project. The grade for your project is based on the cohesiveness and logic of your research question, and the appropriateness of the methods and techniques. The complexity and comprehensiveness of your project will not be criteria for judging the quality of your project. The term project will be described in detail in lecture during week 3.

**Graduate students** will work on self-defined projects. There are three stages to the project:

1. Submit a one or two page project proposal by the start of week 6. It should include a research question, a detailed description of the spatial and attribute data you will use, and a conceptual description of the methods you will use. **You must discuss the proposal with the instructor before turning it in.**
2. Schedule your presentation for either the final day of class or during finals week.
3. Oral presentations. Every presentation must include the following sections: an Introduction, Datasets Used, Analysis Methods, Results, and Conclusions. Turn in a PowerPoint presentation.

**Undergraduate students** will be given several pre-defined project topics to choose from—the project will be like a lab exercise, but with very few instructions. A written project report must be submitted by the time of the final exam period. The project report must include the following sections: an Introduction, Datasets Used, Analysis Methods, Results, and Conclusions.

## Grading

	<b>Geog 488</b>	<b>Geog 588 / USP 591</b>
lab assignments	50%	40%
term project	15%	25%
midterm exams	25% (12.5% each)	
attendance	10%	

Grading break points will be near 90% (A), 80% (B), and 70% (C). However, exact break points will depend on overall class results.

## Academic Integrity

You are responsible for the content and integrity of the academic work you submit. The guiding principle of academic integrity shall be that your submitted work, examinations, and projects must be your own work. Cutting and pasting information from the internet without giving proper credit to your source is considered plagiarism. Submitting work done by another student and representing it as your own work is plagiarism. If you need help determining what is or is not plagiarism, please talk to the instructor. Plagiarism is a form of academic misconduct, and may result in academic sanctions as described in the PSU Code of Student Conduct (<https://www.pdx.edu/dos/psu-student-code-conduct>).

## Access and Inclusion for Students with Disabilities

PSU values diversity and inclusion; we are committed to fostering mutual respect and full participation for all students. My goal is to create a learning environment that is equitable, useable, inclusive, and welcoming. If any aspects of instruction or course design result in barriers to your inclusion or learning, please notify me. The Disability Resource Center (DRC) provides reasonable accommodations for students who encounter barriers in the learning environment.

If you have, or think you may have, a disability that may affect your work in this class and feel you need accommodations, contact the Disability Resource Center to schedule an appointment and initiate a conversation about reasonable accommodations. To contact the DRC, call 503-725-4150, email [drc@pdx.edu](mailto:drc@pdx.edu), or visit the DRC website (<https://www.pdx.edu/disability-resource-center>)

- If you already have accommodations, please contact me to make sure that I have received a faculty notification letter and to discuss your accommodations.
- Students who need accommodations for tests and quizzes are expected to schedule their tests to overlap with the time the class is taking the test.
- Accommodations are not automatically applied. If you are eligible to receive an accommodation, and you want to use it, please let me know.

## **Title IX Reporting Obligations related to Discrimination and Harassment**

As an instructor, students may at times come to me for assistance in matters that are not related to the course material. Please be aware that PSU's policies require faculty members to report any instance of sexual harassment, sexual and relationship violence and/or other forms of prohibited discrimination to University officials. If you would rather share information about these experiences with a PSU staff member who does not have these reporting responsibilities and can keep the information confidential, please contact one of the following campus resources (or visit <https://www.pdx.edu/sexual-assault/get-help>):

- Confidential Advocates (503-894-7982) or [psuwrc.youcanbook.me](https://psuwrc.youcanbook.me) (for matters regarding sexual harassment and sexual and relationship violence)
- Center for Student Health and Counseling (SHAC): 1880 SW 6th Ave, (503-725-2800)
- Student Legal Services: 1825 SW Broadway, (SMSU) M343, (503-725-4556)

The PSU Sexual Misconduct Response website (<https://www.pdx.edu/sexual-assault/>) provides comprehensive information about how to get support if you have experienced sexual misconduct, and/or how to report an incident.

For more information about Title IX, please complete the required student module, Understanding Sexual Misconduct and Resources: (<https://www.pdx.edu/diversity/understanding-sexual-misconduct-and-resources-student-module>)

## **Canvas Learning Management System**

This course uses Canvas as the main learning platform. If you haven't used Canvas before, I recommend that you take the PSU Learning Center's remote readiness course this week.

(<https://www.pdx.edu/learning-center/online-remote-learning-support-canvas>)

If you've used Canvas and you just need occasional technical support, contact the OIT Helpdesk.

(<https://www.pdx.edu/technology/support>)

If they can't help you, please let me know.

## **Flexibility Statement**

The instructor reserves the right to modify course content and/or substitute assignments and learning activities in response to institutional, weather, or class situations.

## **Add / Drop / Withdraw Dates**

*Last Day to Drop with 100% refund:* 14 Jan

*Last Day to Add:* 19 Jan

*Last Day to Drop:* 21 Jan

*Last Day to Withdraw:* 25 Feb

*Last Day to Change Grading Option* 25 Feb

(<http://www.pdx.edu/registration/academic-calendar>)

## Course Schedule

Week	Topics	Labs	Notes
Week 1	<ul style="list-style-type: none"> <li>– Course administrative information</li> <li>– What is GIS?</li> <li>– Who uses GIS and how is it used?</li> <li>– Site suitability example</li> <li>– Critical GIS</li> <li>– Intro to cartography</li> <li>– Map elements</li> <li>– Principles of map design</li> <li>– Scale</li> </ul>	<p>LAB 1: Introduction to ArcGIS Pro</p> <p><b>Due 19 Jan</b></p>	
Week 2	<ul style="list-style-type: none"> <li>– Visual variables</li> <li>– Types of thematic maps</li> <li>– Data classification</li> <li>– Data normalization</li> <li>– Metadata</li> <li>– Cartograms</li> <li>– Data models and vector data</li> <li>– Levels of measurement</li> <li>– Topology</li> </ul>	<p>LAB 2: Map Symbology &amp; Classification</p> <p><b>Due 26 Jan</b></p>	
Week 3	<ul style="list-style-type: none"> <li>– Raster data model</li> <li>– Term project information</li> <li>– Locating systems</li> <li>– Geodesy</li> <li>– Projections &amp; projected coordinate systems</li> <li>– Projection in ArcGIS Pro</li> </ul>	<p>LAB 3: Projections &amp; Public GIS Data</p> <p><b>Due 2 Feb</b></p>	
Week 4	<ul style="list-style-type: none"> <li>– Storing data—geodatabases</li> <li>– Querying data—queries, SQL, and selection methods</li> <li>– Data sources</li> <li>– MCE analysis #1</li> </ul>	<p>LAB 4: Queries &amp; Table Joins</p> <p><b>Due 9 Feb</b></p>	
Week 5	<ul style="list-style-type: none"> <li>– Table joins and relates</li> <li>– Spatial joins</li> <li>– The nature of spatial data</li> <li>– MCE analysis #2</li> <li>– Composite index analysis #1</li> <li>– Case study #1</li> </ul>	<p>LAB 5: Geodatabases &amp; Editing Feature Data</p> <p><b>Due 16 Feb</b></p>	<p><b>First Midterm covers weeks 1-4</b></p> <p><b>Due 7 Feb</b></p>
<p><i>table continues on next page</i></p>			

Week	Topics	Labs	Notes
Week 6	<ul style="list-style-type: none"> <li>- Geocoding</li> <li>- Creating datasets</li> <li>- Uncertainty</li> <li>- Vector analysis 1</li> <li>- MCE analysis #3</li> <li>- Composite index analysis #2</li> <li>- Case study #2</li> </ul>	LAB 6: Geocoding & Mapping XY Data  <b>Due 23 Feb</b>	Term project proposals due (graduate students)  Term project topics posted (undergraduate students)
Week 7	<ul style="list-style-type: none"> <li>- Vector analysis 2</li> <li>- Spatial modeling</li> <li>- MCE analysis #4</li> <li>- Composite index analysis #3</li> <li>- Case study #3</li> <li>- Case study #4</li> </ul>	LAB 7: Introduction to Spatial Vector Analysis  <b>Due 1 Mar</b>	
Week 8	<ul style="list-style-type: none"> <li>- Raster analysis 1</li> <li>- Raster analysis 2</li> <li>- Case study #5</li> <li>- Case study #6</li> <li>- Case study #7</li> </ul>	LAB 8: Introduction to Spatial Raster Analysis  <b>Due 8 Mar</b>	<b>Second Midterm published 29 Feb covers weeks 1-7</b>
Week 9	<ul style="list-style-type: none"> <li>- Advanced spatial analysis</li> <li>- Term project information</li> <li>- Case study #8</li> </ul>	no new lab	
Week 10	<ul style="list-style-type: none"> <li>- GIS software</li> <li>- End-of-term stuff</li> </ul>	no new lab	<b>Second Midterm Due 12 Mar</b>  Term project presentations (Thursday)
Week 11 (finals week)			Term project presentations (Monday)

Notes:

Martin Luther King, Jr. Day, **Monday 15 Jan**, is a holiday (university closed).

The day and time for our last class meeting, during finals week, are different from our normal meeting day and time. Our last class meeting is on **Monday, 18 March, from 10:15 AM to 12:05 PM.**