Online GIS II - Advanced GIS
GEOG 492/592, USP 592 (4 credits)
Winter 2026

Course Information

- Lecture: Online, no scheduled lecture meetings. There are in-person, synchronous weekly lab sessions during TA office hours.
- Lab (TA Office hours): Monday 11am - 12:40am at VSC B1-08 and Zoom and Friday 5pm – 6:40pm) Zoom only. Attendance of TA office hours is optional.
- Weekly online learning on Canvas (make sure that you go to the course Home page and use the weekly quick links to access and complete the weekly tasks)
- Course syllabus URL: https://sites.google.com/pdx.edu/geog-geoffreyduh/home/gis-ii

Instructor & TA

- Instructor: Geoffrey Duh (jduh@pdx.edu), Teaching Assistant: Luke Mitchell-Nelson (lmitch@pdx.edu)
- Instructor's Office Hours: make an appointment at https://calendly.com/jduh/30min.

Course Objectives

Students will learn how to solve spatial decision problems with GIS and understand the limitations and pitfalls of using GIS. The major learning objectives of the course are that students will 1) develop problem-solving skills and 2) interpret quantitative (statistics) results of GIS analysis correctly. The course includes the theory and methods involved in multicriteria spatial analysis, network analysis, GIS modeling, spatial interpolation, and geostatistical analysis. The practical component includes the use of ESRI's ArcGIS Online, ArcGIS Pro, and its extensions, including Spatial Analyst, Network Analyst, and Geostatistical Analyst. Both the theoretical and practical components of the course are important. Students will work on a final project in which they investigate a GIS application in depth based on the concepts and techniques learned in class.

How to succeed in an online course?

More and more people in the workforce—and mostly knowledge workers—will have to manage themselves.
—Peter F. Drucker, Management Challenges for the 21st Century

Learning self-management is also one of the goals of this online GIS course. Given the open-ended nature of data science inquiries, GIS professionals must be good at self-management to be productive. Among other benefits, taking an online course is a good opportunity to learn and practice self-management. You must develop new skills (finding meanings in the tasks you are undertaking, time management, and others) to succeed in an online course. Here is one useful tip: "Students really, really need to be organized from the beginning to be successful in an online course, all assignment due dates should be in their calendar, online or paper folders should be created for each week, [and] the work area should be not only quiet but clean—keeping all coursework materials together." - Karen Stevens, chief undergraduate adviser of the University of Massachusetts—Amherst's University Without Walls program. Read the complete article here.

The course lecture materials are delivered online. The online components (readings, discussions, and quizzes) are administered automatically on Canvas based on a strict weekly schedule (midnight Sunday to 11:59 pm the following Sunday). The weekly online materials become available at the beginning of the week (Sunday). All online activities for that week must be completed by the end of the week (11:59 pm on the Sunday of the weekend). See the class schedule table below for the beginning and ending dates of the weeks. **Make sure that you start working on Canvas weekly assignment(s) at the beginning of the week.**

STEM Course Support at The Learning Center
At The Learning Center Academic Coaches offer free, personalized one-on-one sessions to enhance study strategies, time management skills, test preparation, and more. We have coaches with a variety of specializations, including STEM. Explore our Meet the Coaches page to schedule a session with a coach that aligns with your specific needs. Additionally, our tutors are available for many lower division STEM courses. Schedule a tutoring session through the Penji tutoring page to receive assistance in your STEM studies.

Textbooks

There is no required textbook for this class. Instead, students will read articles from peer-reviewed journals. These articles will be available on Canvas. See the Readings section for a complete reading list.

Diversity, Equity, & Inclusion / Title IX / Academic Accommodations Guidelines
Please read the important information on the DEI, Title IX, & Academic Accommodations and Guidelines page.

Grading

The final grades will be assigned **based on separate curves** for graduate and undergrad students. Please note that Canvas grade book only keeps track of some of the grading components. Its reported grade/scores might not reflect your final grade in this class. The components of the grade are:

- Lab assignments: 30%
- Class quizzes: 25%
- Class participation: 15%
- e-Portfolio: 5%
- Final project: 25%

Lab Exercises

The course has reserved a specific time slot for VSC B1-08 for students in this class. Students are welcome to use VSC B1-08 during these hours. TA and the instructor have maintained separate office hours. TA office hours' attendance is not mandatory but highly recommended for students that need help with their assignments. This class has two TA office hour sessions (Monday and Friday over Zoom) during which TA is available for answering questions. Students can attend either one or both. These practical exercises provide a way to acquire skills using ArcGIS and to apply the course concepts to real data. All exercises require a significant amount of time to finish, so make sure you pace your lab exercises appropriately so that you keep up with their schedule. The lab instructions are available on Canvas. You can do the labs on your own computer or using CH475, VSC B1-08, or VSC B1-13. Please refer to the Lab syllabus for lab submission, due dates, and late policies.

Students should post lab questions on GIS II Slack channel. Students are encouraged to answer questions posted by their peers.

Exams

There are 5 quizzes throughout the term (see the schedule table for the exact quiz schedule). There is no final exam. Students have one week to complete the quizzes, from Monday morning to Sunday midnight. All quizzes are open-book and do not have a time limit to complete them, as long as they are submitted by Sunday midnight. Students are allowed to have two attempts on these quizzes. Some quiz questions are specific to ArcGIS software. Feel free to try out the answers in ArcGIS before providing an answer.

Class Participation

You are expected to read the weekly readings. There are several quizzes associated with the technical readings and ESRI online courses for the instructor to evaluate your progress in class. We will also read a couple non-technical, but important GIS articles this term. To facilitate the exchange and sharing of your thoughts and opinions on these articles (weeks 3 and 9), there are Canvas online discussions that you <u>must</u> participate. You need to respond to all the posted questions **by the end of the week** and are encouraged (and welcome) to engage in any follow-up discussions on Canvas. The instructor will monitor the discussion activities on Canvas and use the information for grading the class participation component of the final grade.

e-Portfolio

By the end of Week 9, students must create an e-portfolio as an ArcGIS Online story map using the materials from their lab work. The portfolio should highlight the key GIS techniques of each lab. Each e-Portfolio entry, which represents a specific GIS technique that students learned in the labs, includes a short paragraph (with 3 to 4 sentences) and a one-page images/pictures/maps. Each lab in the e-Portfolio must have at least one but no more than four e-Portfolio entries. An e-Portfolio counts towards 5% of a student's overall grade.

Students have the option to correct the errors they made in their labs and reclaim some of the deducted points by including the corrected materials in their e-Portfolio. If a student plans to use their e-Portfolio materials to make up for their lab points, then for each lab they must write an email to the instructor (jduh@pdx.edu) with a narrative stating how the issues are addressed in the portfolio and the number of points they request to be reinstated. See the course's Canvas e-Portfolio module for more information.

Graduate students also need to include the 250 words final project abstract and a concise summary of their project in their e-Portfolio. The summary should highlight the objectives, methods, and results of their project. See the Project section below for more information on the graduate requirements for the final project. The final project entry in the e-Portfolio will be counted toward the student's grade of their final project. The deadline for this e-Portfolio component is the same as the deadline for the final project.

Project

A GIS project is required for all students. Students could work alone or as a group depending on the scale of the project. The project should investigate a particular research problem using the GIS software packages that we use in class. You will acquire spatial data and, if necessary, digitize the data yourselves. The project must involve some types of spatial analysis with a quantitative component. The deliverable is an ArcGIS Online StoryMap that will be reviewed by your classmates during the final exam period. Please visit the [instructor's student project page](#) for examples of previous GIS student projects.

Graduate students also need to submit a 250 words project abstract that provides a comprehensive description of the project. See [this wiki page](#) or any journal articles we read this term for examples of how to write an effective abstract. In addition, graduate students are required to add the abstract and a summary of their final project to their e-Portfolio.

There are two major milestones of the project:

Project proposal: (see Schedule Table for the due date): Submit a one-page project proposal in Google Doc format. See Canvas for proposal preparation instructions. If you have any questions, please meet with the instructor before the due date to discuss your proposal.

Peer-Review of StoryMaps: You will create an ArcGIS Online StoryMap for your final project. Students will perform a peer-review on the story maps during the final exam period. See Canvas for AGOL StoryMap instructions.

Course Schedule

Online GIS II Course Assignments & Deadlines Summary : GIS II

# Week	Date	Lab & e-Portfolio Due Date	Canvas Quiz	Canvas Class Participations	Final Project
1	Jan 5 - 11	-	-	Getting Started	-
2	Jan 12 - 18	Lab 1 Jan 16	-	-	-
3	Jan 19 - 25	Lab 2 Jan 23	Quiz #1	Canvas Discussion	-
4	Jan 26 - Feb 1	Lab 3A Jan 28 Lab 3B Jan 30	-	-	-
5	Feb 2 - 8	Lab 4 Feb 6	Quiz #2	-	Proposal due (Feb 2 midnight)
6	Feb 9 - 15	Lab 5 Feb 13	Quiz #3	-	-
7	Feb 16 - 22	Lab 6 Feb 20	Quiz #4	-	-
8	Feb 23 - Mar 1	-	Quiz #5	-	-
9	Mar 2 - 8	e-Portfolio Mar 8	-	Canvas Discussion	Share project storymap
10	Mar 9 - 15	-	-	-	-
11	**Finals week**	-	-	-	**Project due: Mar 18, noon** Online Peer-Review

Week 1
- Course Overview & Basic GIS Concepts Review
- Lab 1: Raster Analysis Tools in ArcGIS

Week 2:
- Raster Data Analysis
- ESRI Online course: Raster Data Analysis Using Raster Data for Site Selection
- Lab 1 continued

Week 3:
- Environmental Justice Analysis (Online Quiz #1 - 10 points)
- Canvas Online Discussion: Volunteered Geographic Information
- Lab 2: ArcGIS Online Web Maps and Map Applications

Week 4:
- Dasymetric Mapping
- Lab 3: ArcGIS ModelBuilder

Week 5:
- **Project Proposal due by Sunday midnight**
- Multi-Criteria Decision Making and Geostatistical Interpolation: Introduction (Online Quiz #2 - 10 points)
- Lab 4: Dasymetric Mapping

Week 6:
- ESRI Online course: Network Analysis (Online Quiz #3 - 10 points)
- Lab 5: Network Analyst

Week 7:

- Spatial Pattern Analysis
- ESRI Online course: Mapping Clusters: Introduction to Statistical Cluster Analysis (Online Quiz #4 - 10 points)
- Lab 6: Spatial Pattern Analysis

Week 8:
- Statistical GIS Modeling
- ESRI Online course: Introduction to Regression Analysis Using ArcGIS Pro (Online Quiz #5 - 10 points)
- Work on final project

Week 9:
- Canvas Online Discussion: Online: Critical GIS
- Work on term project

Week 10:
- Work on term project

Final Week:
- Online Project Story Map Peer-Review (see course schedule table for due date)

Readings

The pdf files of the class readings are available on Canvas.

Week 1: Course Overview
- ESRI. 2013. The Language of Spatial Analysis.

Week 2: Raster Data Analysis
- ArcGIS Pro Spatial Analyst Online Documents - Performing Analysis (https://pro.arcgis.com/en/pro-app/latest/help/analysis/spatial-analyst/performing-analysis). Read all subtopics in the Performing Analysis container.

Week 3: Environmental Justice Analysis & Volunteered Geographic Information
- Chakraborty, J. and Armstrong, M.P. (2001). Assessing the impact of airborne toxic release on populations with special needs. Professional Geographer, 53(1):119-131. (ChakrabortyArmstrong_2001.pdf)
- Elwood, S., et al. 2012. Researching Volunteered Geographic Information: Spatial Data, Geographic Research, and New Social Practice. Annals of the Association of American Geographers, 102(3): 571–590. (Elwood_2012.pdf)

Week 4: Dasymetric Mapping
- Eicher, Cory and Brewer, Cynthia 2001. Dasymetric mapping and areal interpolation: Implementation and evaluation. Cartography in Geographic Information Science, Vol. 28, No. 2 pp. 125-138. (EicherBrewer_2001.pdf)

- Holloway, S. R.,J. Schumacher, and R. Redmond. 1996. People and place: Dasymetric mapping using Arc/Info. Missoula: Wildlife Spatial Analysis Lab, University of Montana.

Week 5: <u>Multi-Criteria Decision Making</u> & <u>Geostatistical Interpolation: Introduction</u>
- Fuller, D.O., Williamson. R., Jeffe, M., and James, D. 2003. Multi-criteria evaluation of safety and risks along transportation corridors on the Hopi Reservation. Applied Geography, 23 (2-3): 177-188. (Fuller_etal_2003.pdf)
- ESRI E-Learning course: Geostatistical Interpolation: Introduction
- Pages 49-79. Using ArcGIS Geostatisical Analyst (Using_Geostatistical_Analyst.pdf)

Week 6: <u>Network Analysis</u>
- ESRI E-Learning course: ArcGIS Network Analyst: An Introduction
- ESRI online documentation on Network Analyst

Week 7: <u>Spatial Pattern Analysis & Exploring Spatial Patterns in Your Data Using ArcGIS</u>
- Zhang, C. et al. 2008. Use of local Moran's I and GIS to identify pollution hotspots of Pb in urban soils of Galway, Ireland. Science of the Total Environment, 398, pp. 212-221. (Zhang_etal_2008.pdf)
- ESRI E-Learning course: Mapping Clusters: Introduction to Statistical Cluster Analysis
- Read ArcGIS Online Help for all tools in the Spatial Statistics Toolbox.

Week 8: <u>Statistical GIS Modeling</u>
- Lee, S. and Pradhan, P. 2007. Landslide hazard mapping at Selangor, Malaysia using frequency ratio and logistic regression models. Landslides, 4: 33-41. (LeePradhan_2007.pdf)
- ESRI E-Learning course: Introduction to Regression Analysis Using ArcGIS Pro

Week 9: <u>Critical GIS</u>
- Schuurman, Nadine (2006). Formalization matters: Critical GIS and Ontology research Annals of the Association of American Geographers, 96(4), 2006, pp. 726-739. (Schuurman_2006.pdf)

Week 10:
- No reading