

****THIS IS A DRAFT SYLLABUS - DO NOT USE AS COURSE REFERENCE****

****ALSO, IF YOU ARE SHOPPING THE COURSE, PLEASE CONTACT THE INSTRUCTOR AHEAD OF TIME FOR ADDITIONAL INSTRUCTIONS ****

Anthropology 2202 - Advanced GIS and Spatial Analysis

Spring 2022 - Fridays, 3:00pm - 5:20pm

Instructor: Parker VanVakenburgh (parker_vanvalkenburgh@brown.edu)

Office Hrs: [Tuesdays, 1-2:30 or 1:30-3:00](#) (please sign up)

Zoom Link: <https://brown.zoom.us/j/7037353204>

Course Description

This course develops students' skills in geographic information systems and spatial analysis, with the goal of facilitating advanced, independent research and teaching. We begin with four weeks focusing on how to work with different kinds of spatial data across multiple platforms (ArcGIS Pro, QGIS and R). We then move on to a series of more complex methods and approaches, including python scripting, deep learning, network analysis, and spatial statistics. Assignments focus on having students incorporate new methods into their own research projects and publications, while fostering the presentation of research in reproducible and

Assignments / Assessment

Weekly Labs (8)	40 pts	Final Presentation	10 pts
Case Presentation	5 pts	Final Project	25 pts
Project Proposal Presentation	5 pts	<u>Participation</u>	<u>10 pts</u>
Final Project Proposal	5 pts	Total	100pts

Grades - 90-100 pts = A / 80-90 pts = B / 70-80 pts = C / < 70 pts = NC | no rounding

Assignment Descriptions

Weekly Labs - Beginning in week 2 (and excluding weeks 6 and 12-15), short lab assignments are due on Wednesdays. Each assignment entails working through one or

more tutorials and then applying methods to additional datasets. The goal of these assignments is to provide practical foundations in various forms of intermediate to advanced GIS analysis and facilitate students' abilities to employ these methods in their own research.

Case Presentations - Developing students' skills and confidence in describing and communicating about the geospatial methodologies they use in their research is a key learning goal of this course. During most weeks, one student will give a short, informal presentation drawing on one or two published studies that employ the skills or tools we are covering in the given week. Each student will be responsible for giving **one** of these presentations at some point during the term. Each should last around 10-15 minutes and should break down the methodologies employed by the chosen study (or studies) and explain them in detail to the class. What problems are the authors trying to solve? What methods do they employ? What workflows do they follow? Can you reproduce their results – and why or why not? Attempt to do so if you can. These presentations serve several purposes: 1) for the presenter, they offer a platform for doing a deep dive into a particular set of techniques, in an area where the presenter is ideally going to try to focus some of their own work for the course; 2) for the class, they serve as a means of exploring compelling examples of research in more detail; 3) for both the presenter and the class, they model some aspects of the research updates that we will give each other later in the term. A list of archaeological articles with open-sourced methods is provided here for those of you who are interested in the subject, but please also explore other sources, as needed:

<https://github.com/benmarwick/ctv-archaeology/blob/master/README.md#publications-that-include-r-code>

Project Proposal Presentations - In week 6 (march 4th), students will give 10-15 minute presentations outlining their proposed final research projects for the course. Each presentation should clearly outline key research questions, cite and characterize relevant secondary literature in such a way as to position the proposed study, explain data sources and proposed methods, lay out potential challenges and doubts about next steps, and propose a specific format or product for the final project. The goal of these presentations is for students to receive critical feedback from each other and the instructor, before turning in their final project proposals the following week. All Project Proposals Presentations should be based on slide decks, and the slide decks should be submitted on the course website.

Final Project Proposals - On March 9th, students will turn in final project proposals of approximately 5 pages in length. Each proposal should clearly lay out a set of research questions, a methodology for answering them, and a proposed final product or

products — e.g., a manuscript incorporating figures, a portfolio of maps, a web-based project, or a scientific poster. Proposals should also identify at least 10 relevant sources or examples from published literature related to the study, describe proposed workflows in detail, identify datasets (including links to said data, where appropriate), and estimate time requirements for each stage of project work. Proposals should also reflect feedback received the week prior during proposal presentations. The goals of these proposals are: 1) to lay out a formal plan for research, which the instructor can provide feedback on; 2) to provide a platform for making progress on research relatively early in the term; and 3) to establish a reasonable working plan for timely completion of research by the end of the semester.

Final Presentations - following completion of analysis for the final project, students will give 15 minute presentations on the results of their work in the class's final meeting. In addition to including illustrative figures, presentations should offer a detailed explanation of project methodology, including discussions of unanticipated challenges and solutions. These presentations are intended to allow students to show off their work, practice their presentation skills, and receive feedback on their projects before the final due date.

Final Projects - Final projects are the capstone assignment in this course – and, as such, its most important assessment item. As described above, the specific format of the final project is flexible and tailored to each students' individual needs and interests, but it should involve novel research and geospatial problem-solving, incorporating methods explored in this course. The one stable requirement is detailed documentation of workflow, in the form of commented R or Python code, R Markdown documents or alternatives.

Participation - because this class meets only once a week, attendance is particularly important and expected at all class sessions, except in the case of emergencies or truly unavoidable conflicts. Please let the instructor know if you anticipate having to miss a class due to a conference or other event, and arrange to conduct make-up work as needed. Half of the participation mark will be based on attendance and punctuality; the other half on professionalism and engagement, as demonstrated by active participation and collaboration with classmates.

Class format

Because this is a small graduate course, we have some flexibility in how we organize our meetings, and I am open to suggestions based on what you think works best for you. I suggest that we start each week with a review of work from the previous week /

check-ins on your progress on independent research projects, before introducing the week's topic, and moving to case presentations. Following a short break, we will then split into working groups to make progress on tutorials and lab assignments.

Late Lab Assignment Policy

Labs are due within one hour of the end of the stated due date. You are allowed three late days throughout the semester, which you can use at your discretion to help you out in non-emergency situations, such as particularly busy weeks in other courses, conferences, and other miscellaneous obligations. Just let the instructor know that you're using one (or two or three) for a given assignment and I will keep track of them. If you don't specify that you'd like to use a late day, late submissions will be docked 10% of the total number of available points on the assignment per 24 hour period after the specified due date and time. These three late days are the only extensions available in the course, unless you have an emergency.

Classroom Environment and Resources for Victims of Sexual Assault, Sexual Harassment and Sexual Violence

Nothing is more important to me than fostering a classroom environment in which everyone feels secure and supported. If you ever feel otherwise, please contact me. I should note that because I am what is called a "responsible employee," I am legally required to contact the Title IX officer if you inform me that you have experienced gender-based violence, including sexual assault, dating violence, and stalking, or harassment. If you have experienced such an incident and wish to keep it confidential, the following services are available to you on campus:

<https://www.brown.edu/campus-life/health/services/promotion/sexual-assault-dating-violence/learn-more/resources-and-links>

Learning Accommodations

Students with registered needs (extra time for assignments, finals, etc.) should provide university documentation and discuss accommodations with the instructor in the first two weeks of class.

Class Schedule and Readings [readings after first week TBA]

Week 1 - Jan 28, 2022 - Intro, Course Overview, and Thematic Mapping Exercise

Reading: 1. [Marwick, Ben et al. 2016. "Open Science in Archaeology."](#)
2. [Boeing and Arribas-Bel.2021. "GIS and Computational Notebooks."](#)

Week 2 - Feb 4, 2022 - Working with Vector Data in ArcGIS Pro, QGIS, and R

Week 3 - Feb 11, 2022 - Working with Raster Data & DEMs in ArcGIS Pro, QGIS & R

Week 4 - Feb 18, 2022 - Processing Point Clouds (LiDAR)

Week 5 - Feb 25, 2022 - Model Builder; Intro to Python Scripting; Viewsheds

Week 6 - Mar 4, 2022 - Project Proposal Presentations

Week 7 - Mar 11, 2022 - Continued work with Python Scripting; Suitability Analysis

Week 8 - Mar 18, 2022 - Spatial Autocorrelation and Hotspot Analysis

Week 9 - Mar 25, 2022 - Geographically Weighted Regression

Week 10 - Apr 1, 2022 - Spring Break (NO CLASS)

Week 11 - Apr 8, 2022 - Network Analysis

Week 12 - Apr 15, 2022 - Deep Learning

Week 13 - Apr 22, 2022 - Final Project Work in Class

Week 14 - Apr 29, 2022 - Final Presentations

Week 15 - May 6, 2022 - Final Projects Due (NO CLASS)

Assignment Due Dates (11:59pm unless otherwise noted)

Feb 2, 2022	Lab 1: Thematic Mapping Exercise
Feb 9, 2022	Lab 2: Working with Vector Data
Feb 16, 2022	Lab 3: Working with Raster Data
Feb 23, 2022	Lab 4: Processing Point Clouds
Mar 2, 2022	Lab 5: Model Builder, Python Scripting, Viewshed Analysis
Mar 4, 2022	Project Proposal Presentations [in class]
Mar 9, 2022	Project Proposals
Mar 16, 2022	Lab 6: Python Scripting and Suitability Analysis
Mar 23, 2022	Lab 7: Spatial Autocorrelation and Hotspot Analysis
Apr 6, 2022	Lab 8: Geographically Weighted Regression
Apr 29, 2022	Final Presentations [in class]
May 6, 2022	Final Projects