Geography 4/572: Interactive Cartography: Web Mapping

(4 credits)

Instructor: Jim Thatcher, thatchja@oregonstate.edu (he/him/they/them)
Office Hours and Location: Mondays, 11:00am-12:30pm, Strand 318
And ***by appointment***

Teaching Assistant: Nazia Afroze, afrozen@oregonstate.edu (she/her)
Office Hours and Location: Thursdays, 2:00pm-3:00pm, Strand 347
And ***by appointment***

Prerequisite: **472:** Geog 360, 370, or equivalent with instructor permission
572: None

Class Meeting Times

The class meets three times per week (M/W/F) for lectures from 10 to 10:50am in Strand 361. Additionally, it meets once per week on Mondays for a dedicated lab session from 2:00pm to 3:50pm in Strand 361. The course credit number and class contact hours are in alignment with the *course credits policy*.

Lecture: Mondays, Wednesdays, and Fridays – 10:00-10:50 am (Strand 361)
Lab: Mondays – 2:00 – 3:50 pm (Strand 361)

Catalog Course Description

Examines concepts, theories, and techniques of web programming, digital storytelling, online project management, and web-based cartographic principles. Explores the history, present, and potential future of online mapping libraries, technologies, and data. Builds foundational concepts for compiling, constructing, and analyzing interactive maps. Creates online, interactive web visualizations using open-source tools.

Extended Course Description

This course is broken up into two major components – lectures and lab exercises. The lectures focus on the theories, principles, and questions surrounding interactive, web-based maps and visualizations. The lectures will roughly consist of one-half traditional lecture, one-quarter activities meant to introduce major concepts and technologies, and one-quarter broader discussions surrounding the larger questions facing (interactive) cartography in the coming years – including biases, gaps, and concerns.

The labs will apply the concepts and technologies introduced in the lecture sections and provide opportunities for students to explore additional concepts and techniques in a hands-on environment.

Student assessment will consist of five labs, four quizzes, a final project, and classroom discussions. Details can be found in the **Evaluation of Student Performance** section below.

Textbooks and Readings

This course relies heavily on two freely available open-education resources.

1. *Web Mapping: A Workbook for Interactive Cartography and Visualization on the Open Web*. This resource was created with the support of NSF CAREER #1555267 and has been made available for use following a CC-BY license. You may find the original here: https://github.com/uwcartlab/webmapping
   The appropriate citation for this material is:
   > Roth RE, CM Sack, G Baldrica-Franklin, Y Chen, R Donohue, L Houtman, T Prestby, R Tolochko, and N Underwood. 2020. Web Mapping: A Workbook for Interactive Cartography and Visualization on the Open Web. Version 0.1. University of Wisconsin Cartography Laboratory: Madison, WI. DOI: 10.5281/zenodo.5565480
2. The GIS&T Body of Knowledge which was created by UCGIS and intended to represent the domain of knowledge needed for an undergraduate understanding of GIS. It can be found here: https://gistbok.ucgis.org/
   Each entry will have its own citation.
3. In addition, research articles that address the theoretical and practical limits and promises of web mapping will be added to the canvas site regularly. These reflect the latest research in the field of interactive cartography. On weeks with such readings, the syllabus will make note.

Additional optional resources will also be provided at the course's github site. These include optional readings, tutorials, and other exercises.

Readings are to be completed PRIOR to the week for which they are assigned. In other words, the readings for Week 2 should be completed **before** the Monday class of the second week. Some weeks will have heavier reading assignments than others.

Class Github and Canvas use

This class will predominantly distribute and submit materials through github. Students are expected to both acquire class content and submit class work using github. This can be done either through private repositories (which the TA and instructor are added to) or a public repository, the student is allowed to select the arrangement with which they are most comfortable.

Grading will be handled via the course Canvas site; however, note that **the average and total grades seen in Canvas do not necessarily accurately reflect your overall course grade.** If you have any questions regarding your grade, please reach out to the instructor directly.

The class github can be found at: https://github.com/OSUCart/WebCart
This is a private repository, you will need to have your account added to it in order to access it. This will be handled during the first weeks of class. If you have any issues accessing this repository, please contact the instructor directly.

Class Schedule

Week 1

Readings: Roth et al. 2020, Chapter 1; Chapter 7 (optional)
Lab 1: A First Web Map

1/6 M - Course and student/faculty introductions; introduction to the working environment (git, github)
1/8 W – Setting up our working environment (git, github); "My first website!"
1/10 F – **Graduate Student Only Meeting 1** (discussion of expectations and interests)

Week 2

Readings: Roth et al. 2020, Chapter 2
Lab 2: Thinking Computationally in Javascript

1/13 M – Introduction to HTML and CSS, **Lab 1 due**
1/15 W – HTML best practices for interactive mapping
1/17 F – Fundamentals of CSS

Week 3

Readings: Roth et al. 2020, Chapter 2 (review) and Chapter 3
Lab 2: Thinking Computationally in Javascript (**no official meeting due to holiday)**

1/20 M – **NO CLASS - MARTIN LUTHER KING JR. DAY**
1/22 W – Javascript Basics; **Quiz 1**
1/24 F – Functions and Objects in Javascript, Using AI, Common Data Types
Time Permitting: p5.js intro

Week 4

Readings: Roth et al. 2020, Chapters 3 (review) and Chapter 4
Lab 3: Interactive Mapping with Leaflet

1/27 M – Introduction to Leaflet; **Lab 2 due**
1/29 W – Control Flow in Javascript
1/31 F – **Graduate Student Only Meeting 2; Undergraduates take Quiz 2**

Week 5

Readings: Roth et al. 2020, Chapters 4 (review) and Chapter 5
Lab 3: Interactive Mapping with Leaflet

2/3 M – Data, AJAX, and debugging; Final Project discussion and explanation
2/5 W – When and what to map?
2/7 F – What is a basemap?

Week 6

Readings: Roth et al. 2020, Chapter 6; Chapter 7
Lab 4: A beautiful basemap

2/10 M – Introduction to Mapbox Studio; **Lab 3 due**
2/12 W – Basemaps and data formats in the internet age; review of concepts
2/14 F – The promise and perils of 'open source'

Week 7

Readings: Body of Knowledge entries: "CV-15 – Web Mapping" and "CV-33 Narrative and Storytelling"; **see canvas for additional readings**

Lab 4: A beautiful basemap

2/17 M – Storytelling with interactive maps; **Final Project topic proposal due**
2/19 W – *Discussion*: Our Favorite web maps
2/21 F – **NO CLASS MEETING**; **Undergraduates take Quiz 3**

Week 8

Readings: Body of Knowledge entries: "CV-13 – User Interface and User Experience (UI/UX) Design" and "CV-26 – Cartography and Power"; **see canvas for additional readings**

Lab 5: Interactive narrative cartography

2/24 M – Taking it all in - a final review and discussion of limits to (or of) Web Mapping; **Lab 4 due**
2/26 W – Turf.js activity (**Extra Credit assignment 1**)
2/28 F – **Graduate Student Only Meeting 3**

Week 9

Readings: see canvas for additional readings

Lab 5: Interactive narrative cartography

3/3 M – Cesium.js activity (**Extra Credit assignments 2**)
3/5 W – Final Project Work Time
3/7 F – **Graduate Student Only Meeting 4; Undergraduates take Quiz 4**

Week 10

Readings: None, though see Canvas for *optional* readings

Lab: Work on Final Project

3/10 M – Final Project Presentations or Work Time as needed; **Lab 5 due; Extra Credit Assignments due**
3/12 W – Final Project Presentations
3/14 F – Final Project Presentations

Final Projects are due 3/19 by 11:59pm

Course Specific Measurable Student Learning Outcomes

By the completion of this course, students will be able to:

- Evaluate the accuracy and appropriateness of various cartographic principles when applied in interactive environments.
- Identify appropriate data formats and programming libraries for use in interactive mapping tasks.
- Develop web-based maps that are dynamic and interactive using open-source mapping frameworks, e.g. Leaflet and Turf.js.
- Build an interactive narrative mapping project on a topic of their choice.

Additional learning outcome for graduate students:

- Describe and interpret research in interactive cartography and spatial data visualization drawing from research, practice, and theory in the fields of Cartography and cognate disciplines.

Evaluation of Student Performance

Student performance will be evaluated out of 100 total points. For undergraduates, these points are divided between **five** lab assignments (12 pts each, 60 pts total), **four** quizzes (5 pts each, 20 pts total), a final project (20 pts total).

Undergraduate Point totals

5 Labs x 12 pts =	60 pts
4 Quizzes x 5 pts =	20 pts
Final Project =	20 pts
Total:	**100 pts**

Graduate Student Additional Standards

The four quizzes are optional for graduate students.

Graduate students will meet with the instructor within the first two weeks of the course (see **Class Schedule** above) to discuss a series of additional research focused readings and discussions that will occur throughout the quarter. Each discussion will feature three or four articles selected by the instructor and graduate students. Graduate students (individually or in self-selected groups) will be responsible for leading one of these discussions which will be worth 10 points. The final project will also have additional research requirements (including a literature review) that will be worth an additional 10 points.

Graduate Point totals

5 Labs x 12 pts =	60 pts
Discussion lead =	10 pts
Final Project =	30 pts
Total:	**100 pts**

Grading Scale

Grade	*Total Pts*
A	*94-100*
A-	*90-93*
B+	*87-89*
B	*83-86*
B-	*80-82*

Grade	*Total Pts*
C+	*78-79*
C	*74-77*
C-	*70-73*
D+	*68-69*
D	*64-67*
D-	*61-63*
F	*<61*

Late Policy

Assignments are marked late as soon as their submission deadline passes. If submitted within one day of the due date, students will lose one point. For each week past the due date, students will lose an additional point. Assignments are accepted up to three weeks late.

Within 24 hours of due date	-1 point
Over 24 hours, under one week	-2 points
One to two weeks	-3 points
Two to three weeks	-4 points
More than three weeks	Not accepted

This policy may be modified on an individual basis with the instructor's approval.

Learning Resources

This course relies upon a series of technologies and texts which are open-access and/or free to use. The principle texts are discussed above in the **Textbooks and Readings** section. In addition, the course will ask students to make use of **qgis, github**, **mapbox studio**, **the leaflet javascript library**, and assorted libraries and technologies that they may find useful.

All of the **required** technologies work on mac, windows, and linux platforms and are available for use in the class without additional cost. All additional readings will be provided on canvas.

Course Statements

Academic Calendar
All students are subject to the registration and refund deadlines as stated in the Academic Calendar: https://registrar.oregonstate.edu/osu-academic-calendar

Statement Regarding Students with Disabilities
Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations."

Student Conduct Expectations link: https://beav.es/codeofconduct

Student Bill of Rights
OSU has twelve established student rights. They include due process in all university disciplinary processes, an equal opportunity to learn, and grading in accordance with the course syllabus: https://asosu.oregonstate.edu/advocacy/rights

Reach Out for Success
University students encounter setbacks from time to time. If you encounter difficulties and need assistance, it's important to reach out. Consider discussing the situation with an instructor or academic advisor. Learn about resources that assist with wellness and academic success at oregonstate.edu/ReachOut. If you are in immediate crisis, please contact the Crisis Text Line by texting OREGON to 741-741 or call the National Suicide Prevention Lifeline at 1-800-273-TALK (8255)

Rules of civility
The College of Earth, Ocean, and Atmospheric Sciences follows the university rules on civility and honesty. These can be found at:
http://oregonstate.edu/studentconduct/offenses-0 Behaviors disruptive to the learning environment will not be tolerated and will be referred to the Office of Student Conduct for disciplinary action.

General Etiquette – Respect and Inclusivity
It is expected that, at all times, we will behave in a way that is respectful and encouraging to those around us. On this matter, we follow the general rules of civility and honesty linked above. In addition, students will be given the chance to indicate the name that they prefer to be called and, if they choose, to identify pronouns with which they would like to be addressed. This will be done confidentially through Canvas during the first week.

Use of Artificial Intelligence
Use of generative AI tools such as ChatGPT is allowed in this course on all non-writing assignments. Be transparent about your uses of AI. When you use AI tools in this course, ***always cite the source***. In code, make a comment that states the resource used and what it was used to accomplish. For example, you might have a comment like "//

ChatGPT was used to locate a bug in this function" or "// The layout of this script was generated using ChatGPT prompts". These are **acceptable** uses, but they need to be documented.