GEOG 371 – Syllabus
Geovisualization: Web Mapping

Instructor:	Bo Zhao, zhao2@oregonstate.edu
Office Hour:	1400 to 1500 W or by appointment @ Strand Ag 347A
Course website:	https://github.com/jakobzhao/geog371
Text:	Required readings will be available on the course website.
Credits:	4
Meeting:	Lecture: MWF 1200 -1250 @Wilkinson 235; Lab: Th 1000 - 1150 @ Wilkinson 210.
Prerequisites:	GEOG 201 or GEO 301
Grades:	Letter grading (A to F)

Catalog course description: GEOVISUALIZATION: WEB MAPPING (4).
Current developments in Internet mapping and advanced cartographic skills applied to web-based maps. Techniques of Internet mapping and principles of web-based cartography, including multimedia, animation, 3D visualization, and user interface design. PREREQS: GEOG 201 or GEO 301.

Course description:

This course introduces current developments of Internet mapping and advanced cartographic skills in web mapping. By using virtual globe libraries (Cesium), open source mapping clients (Leaflet) and web mapping services (Mapbox, GeoServer), students can learn both the techniques of Internet mapping and the principles of web-based cartography, including multimedia, animation, 3D visualization, and user interface design. The lectures will focus on the theories and principles behind the Internet mapping, including distributed component technologies, graphic designs, and network communications. The lab exercises will focus on the practical applications and web design skills for Internet mapping services. The mid-term focuses on basic web mapping concepts and programming techniques. There is no final exam, but each student is required to design a web interactive map and deploy it to an openly accessible server. Check out the course GitHub and students' final projects of previous year at https://github.com/jakobzhao/geog371. Feel free to contact Prof. Zhao for more information.

Course Content:

Week	Lecture (M)	Lecture (W)	Lab (Th)	Lecture (F)
Wk 00	*N/A*	Intro to the course	Lab 1: Project Management	Intro to Web Mapping
Wk 01	Web Programming Basics I: HTML 5 and CSS	System Architecture for Web Mapping	Lab 2: Web Programming Basics	Web Programming Basics II: Javascript
Wk 02	Spatial Data for Web Mapping	Map Client I: Basics and Geographic Features	Lab 3: Web Map Design	Map Client II: Map Events and Mashup
Wk 03	Map Client III: Web Map Interaction	Map Server I: Intro to GeoServer	Lab 3: Cont'd	Map Server II: Styling
Wk 04	Map Server III: Web Map Services	Base Map and Mapbox	Lab 4: Web Map Service	Map Server IV: Map Tiles
Wk 05	Midterm Exam	Map Design I: Web Template and Framework	Lab 4: Cont'd	Map Design II: Bootstrap
Wk 06	Storytelling with Web Map I	Storytelling with Web Map II	Lab 5: Story Map	Map Design III: User Friendly Design Principles
Wk 07	Time Series	Heat Map	Lab 5: Cont'd	*Veterans Day*
Wk 08	Map Design IV: Map Critiques	3D Web Mapping I: Basics	Lab 6: Thematic Map on the Virtual Globe	3D Web Mapping II: Build a Virtual Environment

Week	Lecture (M)	Lecture (W)	Lab (Th)	Lecture (F)
Wk 09	3D Web Mapping III: Thematic Map on a Virtual Globe	Final Project Discussion and Preparation	Lab 6: Cont'd	*Thanksgiving Break*
Wk 10	Emerging Topics on Web Mapping	Final Project Discussion and Preparation	Final Project Discussion and Preparation	Final Project Presentation

Readings:

There is no required textbook for this course, but required papers and online materials will be available on the course website/github.

Elwood, S., Goodchild, M. F., & Sui, D. Z. (2012). Researching volunteered geographic information: Spatial data, geographic research, and new social practice. *Annals of the Association of American Geographers*, 102(3), 571-590.

Kosara, R., & Mackinlay, J. (2013). Storytelling: The next step for visualization. *Computer* (5), 44-50.

Sui, Daniel, and Bo Zhao. "GIS as Media Through the Geoweb." *Mediated Geographies and Geographies of Media*. Springer Netherlands, 2015. 191-208.

Shekhar, S., & Xiong, H. (2008). Spatial Semantic Web. *Encyclopedia of GIS*, 1106-1106.

Learning Outcomes:

By the end of this class, the student will:

Learning Outcomes	Assessment Method
Consistent with geospatial science (G1 to G3) learning outcomes of the BS degree in Geography and Geospatial Science. Elements specific to this course are shown in learning outcomes 4 to 7.	
1. G1. Recognize and use basic spatial and cartographic concepts (e.g. scale, projection, and coordinate systems), as well as statistical and surveying principles.	Quizzes, midterm
2. G2. Demonstrate facility in the classification and analysis of geospatial data (e.g. satellite images, digital maps and their associated tabular datasets) and the ability to use geographic information science technology (software, data collection instruments and devices).	Labs
3. G3. Develop and integrate spatial thinking and the capacity to create visualizations (e.g. images, maps, diagrams, charts, 3D	Labs, project

views) of spatial phenomena, including those illustrating natural and human systems and their interactions.	
4. Describe and interpret basic concepts of geovisual programming: variables, loops, conditionals, functions, arrays, objects, event handling.	Midterm, quizzes, labs
5. Construct and compose advanced tools and skills used by geospatial scientists: develop geovisualizations that are dynamic and interactive	Labs, project
6. Demonstrate a working knowledge of programming for web or mobile devices, including interactive mapping frameworks, e.g., Leaflet.	Labs, midterm, project
7. Describe and interpret research in interactive cartographic visualization drawing from research and practice on human-computer interaction, information visualization, usability engineering, and geovisual analytics.	Labs, midterm

Grading:

Item	Description	% of final grade
Quizzes	3 in-class and/or take-home quizzes covering topics from lecture and reading assignments.	12
Lab Assignments	6 lab assignments (9% each). We understand that many of the programming techniques discussed early in the course will be relatively new. Recognizing this, the first few assignments will contain more detailed instructions.	54
Mid-term	Evaluating your understanding about the basic concepts of web mapping programming. It is a closed book exam and will cover material presented before the midterm.	14
Final Project	Each student is required to design a web map and deploy it to a dedicated server. Each student will make a presentation to demonstrate their work. This final project is mainly evaluated by both the presentation and the quality of the web map.	20
TOTAL		100

Grades are based on the percentage of maximum points accumulated and assigned according to this table:

A	92 – 100%	B-	80 – 81%	D+	68 – 69%
A-	90 – 91%	C+	78 – 79%	D	62 – 67%
B+	88 – 89 %	C	72 – 77%	D-	60 – 61%
B	82 – 87%	C-	70 – 71%	F	< 60%

Other Information:

Students with Disabilities: Accommodations are collaborative efforts between students, faculty and Services for Students with Disabilities (SSD). Students with accommodations approved through SSD are responsible for contacting the faculty member in charge of the course prior to or during the first week of the term to discuss accommodations. Students who believe they are eligible for accommodations but who have not yet obtained approval through SSD should contact SSD immediately at 737-4098.

Behavior: The goal of Oregon State University is to provide students with the knowledge, skill and wisdom they need to contribute to society. Our rules are formulated to guarantee each student's freedom to learn and to protect the fundamental rights of others. People must treat each other with dignity and respect in order for scholarship to thrive. Behaviors that are disruptive to teaching and learning will not be tolerated, and will be referred to the Student Conduct Program for disciplinary action. Behaviors that create a hostile, offensive or intimidating environment based on gender, race, ethnicity, color, religion, age, disability, marital status or sexual orientation will be referred to the Affirmative Action Office. Twenty-three specific behaviors are prohibited, including:

1. Obstruction or disruption of teaching, learning, research, administration, disciplinary procedures, or other institutional activities
2. Obstruction or disruption that interferes with freedom of movement, either pedestrian or vehicular, on institutionally-owned or controlled property.
3. Hazing, defined as any action that endangers the physical, emotional, mental health or safety of an individual, or destroys or damages personal property for the purpose of initiation, membership, admission or participation in a group or organization.
4. Harassment, defined as conduct of any sort directed at another that is severe, pervasive or persistent, and is of a nature that would cause a reasonable person in the victim's position substantial emotional distress and undermine his or her ability to work, study or participate in his or her regular life activities or participate in the activities of the University.

For more information, see http://studentlife.oregonstate.edu/studentconduct/offenses-0.

Academic Honesty Policy: Students benefit from studying together, and we encourage you to do this. However, work that is to be turned in for a grade must be your own unless otherwise stated – it must not be a copy of anyone else's work (either of another student or anyone else). If you are uncertain about what constitutes copying or academic dishonesty of any kind, ask a TA

or the instructor. Students are expected to be honest and ethical in their academic work. Academic dishonesty is defined as an intentional act of deception in one of the following areas:

Cheating: Use or attempted use of unauthorized materials, information or study aids.

Fabrication: Falsification or invention of any information.

Assisting: Helping another commit an act of academic dishonesty.

Tampering: Altering or interfering with evaluation instruments and documents.

Plagiarism: Representing the words or ideas of another person as one's own.