**GEOG677 Syllabus**

**Web GIS**

**Course Details:**

Session: Spring 2024

Classroom: LEF 1166

Lecture Times: Wednesdays and Thursdays 5:30 – 8:00 pm

Instructor: Xin Tao (xtao@umd.edu)

Office: LEF1167

Office hours: By appointment

Teaching assistant: Ruichen Wang (ruichenw@umd.edu)

Office: 4600 River Road

Office hours: By appointment

**Course Objectives**:

This course is designed to: (1) introduce the concepts and theories that are related to an increasingly important technology – Internet/Web GIS; (2) introduce various technologies or techniques for creating, analyzing, and disseminating GIS data and services via the Internet. The topics covered include the hardware/software structure of the Internet (e.g., server-client model, TCP/IP protocol), the evolution of Web GIS, and most importantly, different technology options. Students will be required to practice almost all of the Web GIS tools including ArcGIS Server, JavaScript API, Leaflet, OpenLayers, GeoJSON, and Google Earth Engine. Students will also be exposed to the experience of working with the cloud environment such as Azure and ArcGIS Online.

The format of this course will consist of lectures, lab assignments, readings, and a final project. The lectures involve the interaction between students and the instructor in real time. The readings and lab assignments will also be posted in a timely manner.

**Learning Outcomes**

Students will learn concepts and theories related to Internet and Web-based GIS implementations that are useful for creating, analyzing, and distributing GIS data over the web.

Students will gain experiences in commonly used web mapping frameworks, including client-side (front-end) and server-side (back-end) mapping technologies, and gain introductory exposure to cloud computing environments.

**Prerequisites**

GEOG646 is pre-requisite, or you should have a minimum of web programming experience.

**Course Outline:**

Introduction to Web GIS……………………………… 1 week

Responsive web design…………………….…………. 2 weeks

Internet and web mapping…………………............... 1 week

Web Client/server architecture……………............. 2 weeks

GIS server……………………………….….…......……….... 1 week

GIS in the cloud….……………………….…......…………. 1 week

ArcGIS online…………………………………………………1 week

Maps from web………………………………………………2 weeks

**References**

W3Schools online web tutorial, http://www.w3schools.com/

Materialize CSS, https://materializecss.com/

MDN Web technology for developers, https://developer.mozilla.org/en-US/docs/Web

Leaflet JavaScript Library for Interactive Map, https://leafletjs.com/

Documentation for ArcGIS, https://enterprise.arcgis.com/en/server/

Node.js JavaScript runtime environment, https://nodejs.org/en

**Grading**:

It is strongly encouraged to attend each lecture and actively participate in the online discussion board as well as in class. Students are required to post a reply on the forums posted by the instructor. Lab assignments will be given weekly to help students gain practical experience in developing websites. Students need to complete final projects to design and implement an app.

There will be 7 labs, 1 presentation, and 1 final project. The lowest lab score will be dropped and the highest six is worth 60% of the final grade. You could choose a topic you are familiar with, and present in class, which is worth 10% of the grade. The final project score will be worth 20% of the final grade. 10% will be based on attendance and participation.

**Grade Policy**:

* Project, presentation, attendance, and labs:

|  |  |  |
| --- | --- | --- |
|  | % of total grade | Due date |
| Project | 20% | 5/17 |
| Presentation | 10% | TBA |
| Attendance | 10% | In class |
| Labs | 60% (10% × highest 6 labs) | 3/13 (Lab 1), 3/27 (Lab 2), 4/3 (Lab 3), 4/10 (Lab 4), 4/17 (Lab 5), 4/24 (Lab 6), 5/1 (Lab 7) |

Letter Grade Distribution:

The plus/minus grading system will be used to assign student grades. Minor adjustments to this scale might be made based on the performance of the class as a whole.

97-100.0 = A+

94-96.99 = A

90-93.99 = A-

87-89.99 = B+

84-86.99 = B

80-83.99 = B-

77-79.99 = C+

74-76.99 = C

70-73.99 = C-

67-69.99 = D+

64-66.99 = D

60-63.99 = D-

<60 = F

All students must have a UMD TerpConnect (used to be Glue) account to obtain permissions to upload HTML, CSS, and JavaScript files to your account on TerpConnect at http://terpconnect.umd.edu. All assignments should be saved in your personal directory in the remote Web server and run on the server. Details about the webserver will be provided in the class.

**Academic Honesty**: The University of Maryland, College Park, has a nationally recognized Code of Academic Integrity, administered by the Student Honor Council. This Code sets standards for academic integrity at Maryland for all undergraduate and graduate students. As a student, you are responsible for upholding these standards for this course. You need to be aware of the consequences of cheating, fabrication, facilitation, and plagiarism.

Within our class, students may work together to review class notes and home assignments. However, assignments must be done individually. Each student must turn in his or her own work, from his or her personal computer. Any discussion or problem solution must be his or her alone, without assistance from any other person.

**Accessibility Resources**: Any student with a disability is encouraged to meet with the instructor privately during the first week of class to discuss accommodations. I will make every effort to accommodate students who are registered with the Disability Support Services (DSS) Office and provide a DSS accommodation form. Please refer to the Online Undergraduate Catalog Policy on Religious Observance.

**Email**: The instructor will always be available by email. The professor may not always reply to emails after 6pm or on weekends. Normally, an email would be replied within 24 hours. Emails sent over weekend may not be replied until next work day. E-mails should be respectful and professional.

**Course schedule**

The weekly coverage is subject to change as it depends on the progress of the class. However, you must keep up with the reading assignments.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Week | Date | Topics | Readings | Assignments  |
| 1 | 2/282/29 | Introduction to Web GISRefresher on web design | W3Schools |  |
| 2 | 3/63/7 | jQuery onlyMore on jQuery | W3Schools | Lab 1\* out |
| 3 | 3/133/14 | Responsive web designLayout and styling frameworks | Materialize | Lab 1 dueLab 2\*\* out |
| 4 | 3/203/21 | No class (Spring break)No class (Spring break) |  |  |
| 5 | 3/273/28 | The InternetWeb mapping | Materialize | Lab 2 dueLab 3\*\*\* outProject Proposal out |
| 6 | 4/34/4 | Web client/server architectureGIS data storage | Leaflet | Lab 3 dueLab 4\*\*\*\* out |
| 7 | 4/104/11 | GIS serverGIS in the cloud | W3Schools | Lab 4 dueLab 5\*\*\*\*\* out |
| 8 | 4/174/18 | Raster and open geospatial consortiumArcGIS online | W3Schools | Lab 5 dueLab 6\*\*\*\*\*\* outProposal due |
| 9 | 4/244/25 | Introduction to cloud computingGoogle Earth | Documentation for ArcGIS | Lab 6 dueLab 7\*\*\*\*\*\*\* out |
| 10 | 5/15/2 | Geographic data formats: KMLMaps from web | W3Schools | Lab 7 due |
| 11 | 5/85/9 | Independent study for final projectIndependent study for final project | W3Schools |  |
| 12 | 5/155/16 | Final project presentationIndependent study for final project |  | Final Project due |

\*Lab 1: Creating a web development environment in Microsoft Azure

\*\*Lab 2: CSS and responsive design frameworks

\*\*\*Lab 3: Leaflet API

\*\*\*\*Lab 4: Setting up a custom web service

\*\*\*\*\*Lab 5: GIS in the cloud

\*\*\*\*\*\*Lab 6: Introduction to ArcGIS online

\*\*\*\*\*\*\*Lab 7: Deforestation spot on Google Earth