

Geography 576 Geospatial Web and Mobile Programming

Instructor: Prof. Qunying Huang

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Office Hours: T, R, and F 1:00-2:00 PM or by appointment

TA: TBD

Lectures

9:30AM - 10:45AM, Tuesday/Thursday, 360 Science Hall

Labs

Tuesday 11:00 AM – 1:00 PM, Wednesday 6:00 – 8:00 PM, 380 Science Hall

Course Scope

This course is designed to introduce the fundamental skills necessary to develop web applications and program spatial analytical functions in web environment. Students will also be able to develop the skills for developing spatial mobile apps on devices such as phones and tablets. Those skills will allow students develop web and mobile applications to support geospatial data access, analysis, sharing, and synthesis over the internet. Previous java programming knowledge is not essential, but basic programming experience is required. The main content of this course will include:

- JAVA programming fundamentals;
- Geospatial programming tools, languages and libraries: GeoTools, Servlet, JavaServer Page(JSP), JavaScript (JS), Google Maps APIs, Leaflet, HTML, CSS, XML etc;
- Web and mobile GIS design and development;

Learning Outcomes

When you have completed this course, you will be able to:

- Develop the capability of web and mobile programming for geospatial mapping and visualization using JAVA, JSP and JS;
- Get familiar with the GIS programming and mapping toolkits, e.g., GeoTools, Google Maps APIs, Leaflet etc.
- Determine, track and record a mobile device's current location;
- Design and develop a web portal and mobile Apps to retrieve, manipulate, and visualize geospatial datasets;

Course Requirements

It is required that students have taken at least one introductory GIS course (Geog170, Geog 370 or Geog377), and programming course (Geog 378, or programming course provided by the computer science, such as cs301, cs302, and cs367).

Recommended Textbook (Optional)

- Fu, P. and Sun, J. 2011. Web GIS: Principles and Applications, Redlands: Esri Press.
- DuVander, A. 2010. Map Scripting 101: An Example-Driven Guide to Building Interactive Maps with Bing, Yahoo!, and Google Maps.
- The Busy Coder's Guide to Advanced Android Development (second edition). CommonsWare, LLC, 2011. 0981678017
- Android Programming Tutorials: Easy-To-Follow Training-Style Exercises on Android Application Development. CommonsWare, LLC, 2009. 0981678025
- Android Programming: The Big Nerd Ranch Guide, 1/E. Big Nerd Ranch Guides, 0321804333

Additional reading materials will be distributed through the Learn@UW.

Course Assessment

| Items | Undergraduate | Graduate | Date |
|---------------|---------------|----------|------------|
| Exam#1 | 15% | 15% | TBD |
| Quizzes | 10% | 10% | ad-hoc |
| Lab (5) | 40% | 40% | throughout |
| Exam#2 | 15% | 15% | TBD |
| Discussions | N/A | 5% | TBD |
| Final project | 20% | 15% | TBD |

1. **Exams** - There will be a mid-term and final-term examination for this course. Exam must be taken at the scheduled time and date. **Make-up exams will not be given unless prior arrangements have been made with the instructor, no exceptions.**
2. **Quizzes** - Throughout the semester, the instructor will randomly check class attendance by assigning quizzes during any class period - immediately after a lecture, at the beginning or end of a class, etc. **Make-up quizzes will not be given unless a written verification for your absence is provided.**
3. **Lab** - You will complete five lab assignments throughout the semester. Most labs will consist of exercises and small projects using open sources to practice and reinforce your understanding about web and mobile programming concepts.
4. **Online discussions** - Graduate students are expected to participate in online discussions on different topics related to web and mobile GIS design and implementations. The topics will be posted on Learn@UW. Every graduate student is expected to contribute at least **five** blog entries.
5. **Term project** - A project that utilizes spatial web and mobile programming skills to solve problems is required. **A one page project proposal and a final project report are required by the due day.** Each project will be carried out in a group of three or four students; graduate students are allowed to work alone only if the project is a component of their thesis research. Students will be required to present your project to the class at the end of the semester. Guidelines of the term project presentation and report will be released during the semester.

Grading criteria:

| | |
|---------------|----|
| 93% and above | A |
| 90 - 92.99% | AB |
| 85 - 89.99% | B |
| 80 - 84.99% | BC |
| 75 - 79.99% | C |
| 70 - 74.99% | DC |
| 60 - 69.99% | D |
| < 60% | F |

Course Policies:

- **Late submission policy:** Students are expected to turn in assignments and project updates before **11:59 PM** on the due days. Failing to do so will result in a 10% deduction per day from the points received for each lab and project update/report. Technical complications (e.g., disk errors, printing problems) are not reason for extension; be sure to back up copies of all of your work and version meticulously, as forgetting to save and back up your program is the easiest way to lose your work.
- **Grade changing policy:** Requests for grade changes must be submitted in writing (via email) within **24 hours** of receiving your feedback.
- **Academic Integrity:** Academic honesty and integrity is expected at all times. All work, including assignments, quizzes and exams, must be completed individually by each student. It is expected that work submitted by a student reflects his or her original ideas and responses. Submissions that reflect substantially similar work by more than one student will be dealt with as an act of scholarly dishonesty and credit will be deducted from each assignment in question. Scholarly dishonesty includes: “cheating on an examination; collaborating with others in work to be presented, contrary to the stated rules of the course; submitting a paper or assignment as one’s own work when a part or all of the paper or

assignment is the work of another; submitting a paper or assignment that contains ideas or research of others without appropriately identifying the sources of those ideas...” Please refer to the “Student Academic Misconduct Policy & Procedures” document produced by Student Advocacy & Judicial Affairs division of the Offices of the Dean of Students for further information.

Tentative Schedule:

| Week | Module | Topic | Labs |
|------|--------------------------|--|---|
| 1 | Programming fundamentals | Computer programming, object-oriented programming using JAVA, integrated development Env (IDE) | JAVA & Eclipse exercise |
| 2 | | Language syntax, data types and operations | JAVA syntax exercise |
| 3 | | Language control structure and I/O control | |
| 4 | WebGIS programming | Library reference, geospatial open sources and tools (e.g., GeoTools) | Program for retrieving tweets with Twitter API |
| 5 | | WebGIS | Exercise for spatial web mapping |
| 6 | | Spatial web client design and development | |
| 7 | | Web mapping basics and libraries: Google Maps APIs, Leaflet etc | |
| 8 | | Client/Server interaction (JSP and servlet) and JDBC | |
| 9 | Mobile GIS | Mobile GIS Basics: Android Technology, Mobile GIS Data, Mobile location services | Building an android-based mobile geospatial application |
| 10 | | Mobile GIS programming fundamentals I: Mobile Side | |
| 11 | | Mobile GIS programming fundamentals II: Server Side | |
| 12 | | Java, ArcGIS Online and Mobile | |
| 13 | | Contemporary Mobile GIS Topics | |
| 14 | | Future of Mobile GIS | |
| 15 | Term project | Term project discussion | |
| 16 | | Project presentation | |

Note: You are responsible for keeping up with the readings, exam dates, and lectures. Any changes to this schedule will be announced in class and posted to the course Blackboard page.