Geography 485L/585L - Internet Mapping Syllabus

Course Instructor

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Office hours prior to the class session on Wednesday afternoons (4:00-5:00 pm), and by appointment

Course Description and Objectives

Internet mapping technologies are an important component of geospatial data capture, sharing, visualization, and delivery. This course provides a survey of current and emerging internet and geospatial interoperability standards, technologies, and capabilities. The emphasis of the work in this class will be hands-on experience in four critical aspects of Internet-enabled mapping:

- The basic concepts behind web development and web mapping technologies that enable the delivery of maps and mapped data through web browsers
- The Open Standards that facilitate the exchange of map images and geospatial data over the internet
- The use of published standards-based services in desktop mapping applications that implement those standards
- The deployment of standards-based geospatial map and data services that other systems and users may make use of

The specific class objectives that relate to these activities and departmental curriculum objectives for undergraduate and graduate students in the Geography Department include the following:

- Students will understand the concepts geospatial data and service interoperability
- Students will be able to define the specific requirements of a particular analysis or project and identify the interoperability standards that are capable of meeting those requirements
- Students will be knowledgeable in the core technologies that they may use to produce their own internet-enabled mapping capabilities
- Students will understand the strengths and limitations of current internet mapping technologies for generating cartographically effective map products.

Course Format

The class is structured around a combination of readings; video tutorials, lectures and demonstration; in-class demonstrations; and in-class lab work in which students will have an opportunity to work on their milestone and deep-dive assignments and work on collaborative problem solving around those assignments.

The class will consist of the following components:

Lectures/Video Tutorials Recorded presentations that provides an overview of high-level concepts, technical demonstrations and reference information

Portfolio Milestones (weekly) Hands-on experiences with the technologies and capabilities covered in the course. The milestones will be exploratory, in that in many instances the work will be problem based with an emphasis on creative use of concepts and reference materials in answering questions and solving practical problems.

Deep Dives (4 over the course of the semester) Activities based upon small projects that reinforce the hands-on activities undertaken in the milestones.

Peer Review of Developing Portfolio Provision of substantive feedback and discussion around products generated by peers in the class.

Mid-term & Final Examinations Take-home examinations that cover materials introduced in class.

Readings Background and reference materials that should be reviewed in conjunction with each week's materials.

Course Readings

Readings for the class are derived from a combination of designated course texts (available in digital form through the library) and online resources. While the specific readings for each week will be provided as part of the information about each class module, they will fall into two broad categories:

Required Readings that cover core knowledge required for success in the course's activities.

Reference Readings that should be reviewed so that they may be effectively used as reference materials when working on lab and homework assignments and exams. These materials typically include specific syntax for web development and other information that you are not expected to memorize but instead know how to find and use when working on a particular problem.

There are three texts that are being used in the course as core resources and are therefore listed as *required* texts.

Duckett, Jon, and Larsen, Rob. *Beginning HTML and CSS*. Somerset, NJ, USA: John Wiley & Sons, 2013. ProQuest ebrary. Web. 28 December 2015. This book is available online through the University Library (you will be asked to login using your UNM NetID and password to access this book if accessing it from off campus)

Svennerberg, Gabriel. *Beginning Google Maps API 3*. Apress, © 2010. Books24x7. Web. Dec. 28, 2015. AKA *Google Maps API* in reading assignments. Available through the *Books 24x7 Library Database*. You will need to create a login for Books 24x7 to access this for the first time. After that you can login using the username and password you created from on- or off-campus.

Gratier, T., Spencer, P., & Hazzard, E. (2015). *Openlayers 3 beginner's guide : Get started with openlayers 3 and enhance your web pages by creating and displaying dynamic maps*. Birmingham, England: Packt Publishing. AKA *OpenLayers Beginner's Guide* in reading assignments. Available as an ebook through the University Libraries.

Evaluation and Grading

Class grades will be based upon the number of points acquired throughout the semester. The grade breakdown will be as follows:

A 360 - 400 points
B 320 - 359.9 points
C 280 - 319.9 points
D 240 - 279.9 points

F $<$ 240 points

Points for the class will be earned through a combination of portfolio milestones, deep dives, peer-review, and exams.

As an ongoing exercise in working with the web-based technologies upon which the course is based, all milestone and deep dive activities *(after the first week's exercise)* will be completed as individual web pages within your web portfolio developed in the class.

You will use locally hosted LoboGit platform for developing and sharing your portfolio with the instructor and the other students in the class. Optionally, you can use GitHub https://github.com to publicly share your web content. We will review the process for using LoboGit and setting up your GitHub account during the first class session.

Portfolio Milestones There will be 13 weekly milestones. While there are no formal weekly due dates for the milestones, you *must keep up* if you expect to successfully complete the course. *If you fall behind it will be very difficult to catch up.* I will evaluate your portfolio milestones at mid-term (40 points) and at the end of the term (40 points) for completeness, functionality, creativity and accuracy (i.e. correct answers for milestone questions when asked).

Deep Dives There will be 4 deep dive assignments during the semester. These will be small project-focussed activities that will be added to your portfolio and will reinforce the hands-on activities undertaken as part of the portfolio milestones. Each homework assignment will be worth an additional 25 points (100 points total). Evaluation of the deep dive assignments will also take place at mid-term and at the end of the class as part of the portfolio review.

Peer Review There will be 4 points during the semester that you will be asked to perform a peer review of specific components within the portfolios of your peers. Each peer review will contribute up to 5-points to your overall score for the course. The peer-review points you earn will be based upon the *substantive* feedback that you provide to other students as part of the assignment. I will review the peer-review procedures in more detail when we have our first peer-review activity.

Exams There will be two exams: a midterm and final. The midterm will be a take-home exam that will be released on Monday March 7 and due on Friday March 11 at 5:00 pm. The final exam will be a take-home exam which will released on Monday May 9 and due on Wednesday May 11 by 5:00 pm. Each exam will be worth 100 points (200 points total).

While students are encouraged to collaborate in their work on their portfolio milestone and deep dive assignments, submitted work must be original and written and submitted by each individual student. Both exams will be individual - each student must complete their exam individually. All assignments and exams are open book and online resources may also be used in completion of the assignments and exams. BUT, again, all submitted work must be original and created by each student.

Please refer to the Pathfinder for detailed student conduct policies, and in particular the following Policy on Academic Dishonesty.

> POLICY ON ACADEMIC DISHONESTY ALSO SEE FACULTY HANDBOOK D100 Adopted by the President June 15, 1992
>
> Each student is expected to maintain the highest standards of honesty and integrity in academic and professional matters. The University reserves the right to take disciplinary action, up to and including dismissal, against any student who is found guilty of academic dishonesty or otherwise fails to meet the standards. Any student judged to have engaged in academic dishonesty in course work may receive a reduced or failing grade for the work in question and/or for the course.
>
> Academic dishonesty includes, but is not limited to, dishonesty in quizzes, tests, or assignments; claiming credit for work not done or done by others; hindering the academic work of other students; misrepresenting academic or professional qualifications within or without the University; and nondisclosure or misrepresentation in filling out applications or other University records.

Technical Requirements

As an hybrid in-person/online course that is focused on the integration of online resources with desktop tools there are some specific computer hardware and software requirements for successful completion of the class.

Computer Hardware Requirements

- At least 2 GB RAM
- At least 20 GB of available disk space
- Internet Connection (broadband [>728 Kb/sec] recommended)

Software Requirements

Operating System (one of the following)

- Microsoft Windows Vista or above
- Mac OS 10.6 or above
- Linux (*speak to Dr. Benedict*)

Geographic Information System (GIS) (one or both)

- Quantum GIS (platform specific download)
- ArcGIS

You will need the following types of software, check with Dr. Benedict if you would like to use an alternative to the ones suggested below.

Text Editor

- Notepad (*Windows* - included with operating system)
- Notapad++ (*Windows* - free download)
- TextEdit (*Mac* - included with operating system)
- TextWrangler (*Mac* - free download)

Secure File Transfer Protocol Client

- WinSCP (*Windows* - free download)
- CyberDuck (*Mac* & *Windows*- free download - with voluntary contribution)

Secure Shell (SSH) Client

- PuTTY (*Windows* - free download)
- Terminal (*Mac* - included with operating system)

Web Browser (at least one of the following)

- Firefox (*All Operating Systems* - free download)
- Chrome (*All Operating Systems* - free download)

A desktop Git/GitHub client for your operating system of choice

- SourceTree http://www.sourcetreeapp.com

Course Outline

Module 1 - *Introduction and Outline*

- Week 1 - January 19-22.

Module 2a - *Web-based Mapping Clients*

- Week 2 - January 25-29. Introduction to HTML, CSS, and Javascript
- Weeks 3, 4 - February 1-12. Google Maps API

Module 3 - *GIS and Services Oriented Architectures (SOA)*

- Week 5 - February 15-19.

Module 4a - *Interoperability Standards*

- Week 6 - February 22-26. WMS, KML, and XML
- Week 7 - February 29-March 4. WFS & WCS

Mid-term Exam and *Portfolio Review* - Portfolio must be ready for review before March 7

- Week 8 - March 7-11 (*Exam Due by 5:00 pm on March 11*)

Spring Break - No Class

- Week 9 - March 21-25.

Module 2b - *Web-based Mapping Clients*

- Weeks 10, 11 - March 28 - April 8. OpenLayers Javascript Framework

Module 4b - *Interoperability Standards*

- Week 12 - April 11-15. Desktop GIS Integration

Module 5 - *Developing and Hosting OGC Services*

- Week 13 - April 18-22. Platforms and GeoServer Introduction
- Week 14 - April 25-29. OGC services and styling in GeoServer

Module 2c - *Web-based Mapping Clients*

- Week 15 - May 2-6. Integrating GeoServer OGC Services into OpenLayers clients

Final Exam and *Portfolio Review* - Portfolio must be ready for review before May 9

- Week 16 - May 9-13 (*Exam due by 5:00 pm May 11*)