New Course

Proposal Reference Number : 9819
PRN Alias : 14-15#1042
Version No : 5
Submitted By : Prof Renee Sieber
Edited By : Ms Josie D'Amico

	New Data
Program Affected?	Y
Program Change Form Submitted?one term	
Credit Weight or CEU's	3 credits
Course Activities	<table><tr><th>Schedule Type</th><th>Hours per week</th></tr><tr><td>A - Lecture</td><td>3</td></tr></table> Total Hours per Week : 3 Total Number of Weeks : 13
Course Title	<table><tr><td>Official Course Title :</td><td>Principles of Geospatial Web</td></tr><tr><td>Course Title in Calendar :</td><td>Principles of Geospatial Web</td></tr></table>
Rationale	Responds to new developments in geospatial field, including big data and new geospatial sampling techniques, cloud based data visualization and application development. Current courses don't have sufficient time to cover these courses. Also relieves student numbers in another 300-level course, which is over-capacity.
Responsible Instructor	
Course Description	Theory and practice of geospatial web, including Examining spatial data accuracy and uncertainty of user generated content; Understanding motivations of contributors of volunteered geographic information for purposes like citizen science and crisis mapping; Critically evaluating political, societal, economic and legal issues in online mapping applications; Developing tgEal,ssolutions,evaluating and justifying various existing and emergent geospatial technologies and enabling software stacks; Exploring underlying methods of digital earth architectures; Understanding implications to geospatial analysis and visualization of real time streaming data and mobile sensors
Teaching Dept.	0288 : Geography
Administering Faculty/Unit	SC : Faculty of Science
Prerequisites	GEOG 201 COMP 202 or permission of the instructor

	Web Registration Blocked? : N
Corequisites	
Restrictions	
Supplementary Calendar Info	
Additional Course Charges	
Campus	Downtown
Projected Enrollment	30
Requires Resources Not Currently Available	N
Explanation for Required Resources	
Required Text/Resources Sent To Library?	
Library Consulted About Availability of Resources?	
Consultation Reports Attached?	Y • Geog.384_consultation_UP--140109.pdf
Effective Term of Implementation	201601
File Attachments	• GEOG 384 Course Descriptionv5.pdf
To be completed by the Faculty	
For Continuing Studies Use	

Approvals Summary

Show all comments

Version No.	Departmental Curriculum Committee	Departmental Meeting	Departmental Chair	Other Faculty	Curric/Academic Committee	Faculty	SCTP	Version Status
5					Approved Geralda Bacaj Meeting Date: Apr 28 2015 Approval Date: Apr 30 2015 View Comments			Approved by Curric/Academic Committee Edited by: Josie D'Amico on: Apr 20 2015
4	Approved Michel F Lapointe Meeting Date: Apr 06 2015							Approved by Departmental Curriculum Committee Edited by: Renee Sieber on: Apr 11 2015

	Approval Date: Apr 12 2015 View Comments							
3								Submitted to Departmental Curriculum Committee for approval Edited by: Renee Sieber on: Apr 10 2015
2								Submitted to Departmental Curriculum Committee for approval Edited by: Renee Sieber on: Apr 3 2015
1								Submitted to Departmental Curriculum Committee for approval Created on: Mar 24 2015

GEOG 384: Principles of the Geospatial Web 2.0

Introduction

The paradigm has shifted. No longer is desktop-bound, single software geographic information systems (GIS) considered the state of the art in technologies for geographic data handling, analysis and data visualization. Now advances in geographic information occur on cloud and mobile platforms and data representations are “mashed up” in web 2.0 applications. The nature of geographic data has changed as well. We now have very large and streaming datasets, called “big data”, containing geo-locations, for example from mobile sensors. Much of the new data comes from user generated content, which is generally available on social media and is far more heterogeneous in its characterization of geographic locations. In contrast to traditional geospatial data, which originates from authoritative sources, new possibilities emerge with crowdsourced asserted data, which is location-based sentiments and observations from non-experts (called volunteered geographic information {VGI}). In this course we will cover the principles of this paradigm, called the Geospatial Web 2.0 or Geoweb.

Like GIS, the Geoweb has broad applicability that extend well beyond the discipline of geography. Numerous examples can be seen in health provision and epidemiology, wildlife and natural resources, criminology, and transportation planning. The Geoweb can be used in retail marketing, political mobilization, tourism development, journalism and the humanities. The Geoweb also can be fully linked to social networking platforms.

The course will offer a combination of theory and practice of the Geoweb. In terms of theory, we will cover subjects like VGI and how it changes our ideas about spatial data accuracy. In practical lab sessions students will design and develop Geoweb “apps”. An additional goal is not to learn specific skills, but to ‘learn how to learn’. Geoweb software can change monthly so students learn of resources and strategies to effectively use emerging technologies and anticipate innovations in geospatial technologies. The course will cover the following topics:

- Exploring the underlying methods of digital earth architectures, including georeferent systems. These architectures underlie most platforms (e.g., Google Maps, Google Earth, Microsoft Bing Maps, OpenLayers, NASA WorldWind)
- Exploring political, economic and legal issues in using VGI
- Critically analyzing the concept of VGI, for example, spatial data accuracy and uncertainty of heterogeneous data sources (spatial data quality)
- Learning about the field of citizen science, including the underlying motivations of citizens (non-experts) to contribute
- Understanding the infrastructure of the Geoweb, including the geospatial software stack and Application Program Interfaces (APIs)
- Comparing and contrasting GIS and the Geoweb (e.g., changes in geocoding)

- Repurposing geographic digital content (secondary data), for example via web scraping
- Learning underlying concepts of server/cloud geospatial applications
- Understanding issues related to real time streaming data (e.g., changes in sampling and geostatistics)
- Working with location based services and mobile platforms
- Identifying basic problem solving requirements for geospatial apps. For proposed solutions, critically evaluating and justifying various existing and emergent geospatial technologies and enabling software stacks.

We also have the opportunity to hear from experts in the field. We anticipate having guest lectures from representatives of Geoweb firms like Mapbox and Stamen Design representatives of traditional GIS firms like ESRI, coordinators of VGI sites like OpenStreetMap, and faculty members working in the Geospatial Web (e.g., researching copyright laws for geospatial data).

GEOG 201 and COMP 202 are required. OR permission of the instructor.

Books and Other Reading Material
During the course, students will be required to read a variety of articles, white papers and other material. These will be posted on the course website. If you require additional help in learning material such as KML, web scraping, or Javascript, you may wish to purchase books (e.g., Eloquent JavaScript: A Modern Introduction to Programming).

Evaluation
In-class and online participation 10% (5% in-class and 5% online)
Programming – 15% (5% programming course completion and 10% quiz)
Assignments – 50%
Final Exam – 25%

In-class and online participation: Student preparation and participation as well as performance during class will be assessed for half (5%) of the participation grade. We are looking for quality of contributions over the quantity of contributions. Class participation will be evaluated based on evidence that students have read assigned readings, done exercises and otherwise prepared for class. Students also will be assessed in their ability to thoughtfully and reflectively build on other students' contributions. The other five percent of the participation grade will be based on online contributions on Twitter, using the hashtag #neogeoweb. Like above, quality of contributions in tweets is preferred over number of tweets.

Assignments: Assignments allow the student to apply lecture material and/or programming to real world cases of geospatial representation on the web. There are five assignments in the course. All assignments will be done in groups of three to four students. The goal is to balance levels of computational experience so every group possesses a similar level. All assignments are graded as a group regardless of individual contribution.

Programming Approximately half of the assignments require the use of a specific coding language, which currently is Javascript. Students are required to learn JavaScript programming via the online course codeacademy. Students must successfully complete the codeacademy course and email a screenshot of the badge of completion by the beginning of Week 6. (Students must complete for loops by end of Week 4.) Five percent of the grade is based on completion of the codeacademy course on Javascript. This is on a pass-fail basis, where pass is completion of the course. Ten percent is on a quiz testing Javascript knowledge given during one of the in-class exercise periods following Week 6.

It is possible to waive out of the code academy requirement if the student knows JS. Contact the instructor for details.

Final Exam The final exam is comprehensive of all material in the course. It is divided into two equally weighted components—a written exam and a lab practical exam. The latter is essentially a lab version of a test, where you move from computer station to station answering the geoweb questions presented to you.

Obligatory Statements

1. McGill University values academic integrity. Therefore, all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see www.mcgill.ca/students/srr/honest/ for more information). (approved by Senate on 29 January 2003)
2. In accord with McGill University's Charter of Students' Rights, students in this course have the right to submit in English or in French any written work that is to be graded. (approved by Senate on 21 January 2009 - see also the section in this document on Assignments and evaluation.)

Syllabus

Introduction

Overview of Geoweb and goals of the course.

In-class exercise: Work with existing Geoweb platform, Mapbox.
Set up Twitter account for online participation

Module 1: Digital Earths, the prime mapping platform in the Geoweb.

Definitions and types of digital earths. Georeferent systems and tiling. Differences between data structuration in GIS compared to the Geoweb. Introduction to concepts of markup languages as used on Digital Earths (e.g., KML). Examples from health geography.

In-class exercise: Create your first kml. In-class exercise: Work with 3D globe APIs (Cesium)

Assignment 1: Create a kmz 'story' with found ArcGIS shape files and attribute data, which should be displayed in an info window and rendered with the Google Charts API

Module 2: Geo- and Data Visualization

Principles of cartographic/ geo-visualization and the emergence of data visualization. Exploratory data visualization vs explanatory data visualization. Visualization as storytelling.

In-class exercise: Explore the "maps" of D3JS. Tell a story with a Geoweb platform.

Module 3: Geographic Data Handling in the Cloud

Introduction to web architectures, software stacks. Principles of web harvesting/scraping. Legal issues in repurposing data, for example, intellectual property and liability. Example from tourism. Structured and unstructured data. Formal introduction to tags, which extend from XML, to KML and HTML.

In-class exercise: Conduct web scraping. Tag content with XML. Create a web page

Assignment 2: Use Google Spreadsheets and XPath to automatically scrape and then map popular classified advertising site

Module 4: Democratization of Data: Volunteered Geographic Information (VGI) and Beyond

Concepts in VGI (e.g., citizen sensors, crowdsourcing, and neogeography). Motivations for volunteers to contribute. Common methods to assessing accuracy of VGI. Legal issues underlying VGI (e.g., copyright and intellectual property of using citizen-generated content). Emergence of citizen science, crisis mapping and open data.

In-class exercise: Create and edit your own VGI on OpenStreetMaps. Write Google Maps

mashup with Javascript (from w3schools)

Assignment 3: Create crowdsourcing application with the Google APIs or Cesium/webgl or Leaflet on the browser with Javascript and utilizing Google Fusion tables as the Internet database

Module 5: Streaming, real time BIG Geospatial Data

Introduction to concepts of big data and data-intensive science. Brief discussion of geosensors, which are a prime source of geolocated data. Challenges to working with big data, like sampling.

In-class exercise: Collect and manipulate Twitter data

Assignment 4: Create a transportation app with bixi bike or streaming bus data

Module 6: Geoweb on Mobile Devices

Concepts of geospatial awareness on devices--location based services (LBS), including location intelligence, vehicle tracking, and RFIDs. Examples from mobile commerce. Social issues in LBS (privacy, surveillance)

In-class exercise: Mobile messaging and mapping of geographic data

Assignment 5: Conduct data journalism using D3JS using heroku or jsfiddle

TBD: Final exam

CONSULTATION REPORT FORM
RE: COURSE PROPOSAL

Date: November 25, 2013
TO: Prof. Raphaël Fischler, Director, School of Urban Planning
FROM: Renee Sieber, Geography

The attached proposal has been submitted for your consultation.
Course Title: GEOG 384: The Geospatial Web 2.0

The School of Urban Planning has no objections to the creation of this course. It welcomes the proposed addition to the curriculum and hopes that its students will be able to benefit from it.

Signature:

Date: January 9, 2014

From: Bettina Kemme [mailto:kemme@cs.mcgill.ca]
Sent: March-28-14 2:10 PM