Department of Geography and Geoinformation Science

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GGS 462/692
Web-based GIS

1. General Information

Instructor:	Dr. Dieter Pfoser
Where:	Tuesday 4:30-6:00pm, Exp 2103 + Online sessions
When:	Fall 2020
Course website:	Blackboard + Slack
Credits:	3.0
Office Hours:	Tuesday 3-4pm (online) and reachable on the course Slack channel

2. Course Objectives

Managing geospatial data is at the core of an emerging Billion-Dollar industry. This course will provide the students with the knowledge to curate, store, manage and query geospatial data by means of powerful database management systems. Moreover, to communicate the data, the students will learn how to build Web mapping applications on top of a database and so communicate and interact with the data using nothing more than a Web browser. The course will cover a variety of open source software packages for web mapping and will provide pointers to commercial solutions where appropriate.
The specific goals are

- To enable students to develop a good understanding of the principles and techniques of spatial databases incl. to perform common various types of queries and spatial analyses.
- To design, develop, and implement custom web mapping applications using open standards and open-source software.

3. Learning Outcomes

By the end of the course each student will be able to:

1. Have a broad knowledgebase on fundamentals, theory and techniques of Spatial Data Management in the context of Web Mapping applications.
2. Articulate and effectively communicate concepts and ideas related to Spatial Data Management and Web Mapping to experts, non-experts, and other professionals in a work environment.
3. Have the ability to appropriately apply the knowledge acquired in the course for various hypothetical and real-world data processing tasks.
4. Given a problem or task, be able to effectively analyze it, identify key elements and potential difficulties, and define a strategy for successfully addressing it.
5. Perform a critical review of the potential, effectiveness, and reliability of specific solutions.

4. Textbooks

Required reading:

- **Learning Web Design**, Jennifer Niederst Robbins, 5th ed., 2018. (https://learningwebdesign.com) Available online through GMU library https://proquest-safaribooksonline-com.mutex.gmu.edu/9781491960196 - requires login when accessing from outside GMU.
- **Selected readings** incl. tutorials and other sources will be distributed via the course website - Web mapping and programming

Additional reading (not required, but interesting):

- Database System Concepts. Abraham Silberschatz, Henry Korth, S. Sudarshan. McGraw-Hill Science/Engineering/Math; 6 edition (January 27, 2010). Any edition is fine for the course, since we will only use a few basic chapters - order as used book!
  - ➔ GMU Library link http://magik.gmu.edu/cgi-bin/Pwebrecon.cgi?BBID=1252251

5. Technology Requirements

Hardware

- Activities and assignments in this course will regularly use the Blackboard learning system, available at https://mymason.gmu.edu. Students are required to have regular, reliable access to a computer with an updated operating system (recommended: Windows 10 or Mac OSX 10.13 or higher) and a stable broadband Internet connection (cable modem, DSL, satellite broadband, etc., with a consistent 1.5 Mbps [megabits per second] download speed or higher. You can check your speed settings using the speed test at fast.com.)
- Activities and assignments in this course will regularly use web-conferencing software (Blackboard Collaborate / Zoom). In addition to the requirements above, students are required to have a device with a functional camera and microphone. In an emergency, students can connect through a telephone call, but video connection is the expected norm.

Software

- A supported web browser (See Blackboard Support for supported web browsers)
- Blackboard Courses (Log into http://mymason.gmu.edu, select the Courses Tab)
- Blackboard Collaborate (Select Tools from the Blackboard Course Menu, then select "Blackboard Collaborate")
- Adobe Acrobat Reader (free download)
- PDF Creator - An open source PDF printer (free download)
- Microsoft Office (purchase, also available at Citrix Virtual Computing Environment - https://its.gmu.edu/service/citrix-virtual-lab/)
- **Visual Studio Code** – free download at https://code.visualstudio.com/
- **Node JS** - https://nodejs.org/en/download/

Tools

Visit the following two Web pages and create accounts!

- **Codepen** – https://codepen.io - our Web-hosted Web programming tool
- **Cartodb** - http://www.cartodb.com - our Web-hosted database software (you can get a free account at Carto by signing up for the **Github Education pack** https://education.github.com/students)
- **Slack** - sign up at http://slack.com, after signup, email your instructor to add you to the course's slack channel
- **Zoom** – single-sign on with your GMU account.

6. Format

- This hybrid course (online and in person meetings) will be taught as a combination of lectures, topic/problem-oriented discussion (flipped classroom), and tutorials based on independent reading and class discussion.

- There will be no midterm or final exam.
- The course will be team-based and project driven.
- Evaluation will be based on (i) participation in lectures and progress meetings, (ii) team presentations, and (iii) the course project.
- Teams will report on their project progress during brief bi-weekly progress meetings.
- Teams will also present their progress during regular project presentations.

7. Course outline and schedule

This course will cover the following topics (please note that the topics and their order are subjected to change at the discretion of the instructor, any changes will be announced in class).
The course topics and dates are subject to change.

F2F/ Online	Week of	Mod. #	Topic	Presentations
Exp 2103	8/25	1	Introduction and overview of the course – project orientation, teams, project topics, Web development, SCRUM, updates meetings	
Exp 2103	9/1	2	Javascript introduction, Codepen environment, Leaflet intro	
Online	9/8	3	Leaflet, functionality, AJAX, GeoJSON	
Online	9/15	4	Database integration and interactivity	Project pitches
Exp 2103	9/22	5	Mapbox GL	Mapbox.GL presentation
Online	9/29	6	Mapbox GL	SCRUM presentation
Online	10/6	7	VSCODE + Github + SCRUM	Github presentation
	10/13		*Fall break*	
Exp 2103	10/20	8	Web frameworks, React and Mapbox	React presentation, project updates
Online	10/27	9	React and Mapbox	
Online	11/3	10	Deck.gl	Deck.gl presentation
Online	11/10	11	Project work	Project updates
Online	11/12	12	Project work	
Online	11/24	13	Buffer date	
Online	12/1	14	Project presentations (online)	Final projects due

Please check the GMU Semester Calendar for holidays, etc.

8. Grades

Each assignment and written exam will be given a numerical grade on a 0-100 scale. Some assignments may include bonus tasks. At the end of the term all the marks will be totaled as a weighted average according to the following weights:

Participation	**25%**
Assigned Presentations	**25%**
Project	**50%**

Please note that in general all assignments will not have the same weight. The weight of each individual assignment will be indicated on the assignment form. Final grades at the end of the course will be assigned using **a combination of absolute achievements and relative standing in the class**.

9. Exams

There are no exams.

10. Assigned Presentations

Each team is required to present an assigned topic (examples include Github, SCRUM, Mapbox.gl, React, Deck.gl) to the class and lead the ensuing discussion. As part of the presentation, teams will also provide a tutorial video and/or source code in support of the presentation.

The teams will be evaluated based on the quality of their results, the organization of their slide presentation, the clarity and comprehensibility of their talk as well as on the knowledge and depth of the presented material (as demonstrated during the presentation as well as during the discussion in class) and the provided supplemental material.

11. Project

The course will include one project addressing a Web mapping application and including data management aspects as well as communicating this data over the Web using the tools and techniques discussed in class. The project will include (i) a written report, (ii) a software demonstrator and (iii) an in-class presentation of the project results incl. a live demonstration.

The specific format and timing of the project will be discussed in class.

The project will be graded based on the following criteria.

- **Academic merit** of your project
- **Quality of the written report**. The project results need to be communicated in a written report. Please remember that your report is a professional document, and should therefore be formatted and constructed accordingly. A template will be made available. Submission of a hardcopy of the report will be made in class; submission of a softcopy (in PDF) will be made through Blackboard.
- **Quality of the demonstrator** as assessed by the instructor and fellow students during the presentation of the project.
- **Quality of the presentations of the project results** as assessed by the instructor and fellow students**.** Students will be required to present their results in-class. The presentation will include a demonstration of the developed system.

12. Course website

The course has a Blackboard website. This website will provide you a single portal through which you may obtain lecture notes, retrieve assignment data and, review links to additional materials, and receive special announcements. Please notify ITU (and, if necessary, the instructor) if you encounter any problems accessing this website.

13. Course Materials and Student Privacy

All course materials posted to Blackboard or other course site are private to this class; by federal law, any materials that identify specific students (via their name, voice, or image) must not be shared with anyone not enrolled in this class.

- Video recordings — whether made by instructors or students — of class meetings that include audio, visual, or textual information from other students are private and must not be shared outside the class.
- Live video conference meetings (e.g. Collaborate or Zoom) that include audio, textual, or visual information from other students must be viewed privately and not shared with others in your household or recorded and shared outside the class.

14. Course Recordings

Some/all of our synchronous meetings in this class will be recorded to provide necessary information for students in this class. Recordings will be stored on Blackboard and will only be accessible to students taking this course during this semester.

15. Campus Closure

If the campus closes or class is canceled due to weather or other concern, students should check Blackboard for updates on how to continue learning and information about any changes to events or assigned work.

16. Student Expectations:

- **Academic Integrity:** Students must be responsible for their own work, and students and faculty must take on the responsibility of dealing explicitly with violations. The tenet must be a foundation of our university culture. [See http://academicintegrity.gmu.edu/distance].
- **Honor Code:** Students must adhere to the guidelines of the George Mason University Honor Code [See http://oai.gmu.edu/the-mason-honor-code/].
- **MasonLive/Email (GMU Email):** Students are responsible for the content of university communications sent to their George Mason University email account and are required to activate their account and check it regularly. All communication from the university, college, school, and program will be sent to students solely through their Mason email account. [See https://masonlivelogin.gmu.edu].
- **Patriot Pass:** Once you sign up for your Patriot Pass, your passwords will be synchronized, and you will use your Patriot Pass username and password to log in to the following systems: Blackboard, University Libraries, MasonLive, myMason, Patriot Web, Virtual Computing Lab, and WEMS. [See https://password.gmu.edu/index.jsp].
- **University Policies:** Students must follow the university policies. [See http://universitypolicy.gmu.edu].Responsible Use of Computing - Students must follow the university policy for Responsible Use of Computing. [See http://universitypolicy.gmu.edu/policies/responsible-use-of-computing].
- **University Calendar:** Details regarding the current Academic Calendar. [See http://registrar.gmu.edu/calendars/index.html].
- **Students with Disabilities:** Students with disabilities who seek accommodations in a course must be registered with the George Mason University Office of Disability Services (ODS) and inform their instructor, in writing, at the beginning of the semester [See http://ods.gmu.edu].
- Students are expected to follow courteous Internet etiquette at all times; see http://www.albion.com/netiquette/corerules.html for more information regarding these expectations.

17. Student Services:

- **University Libraries:** University Libraries provides resources for distance students. [See http://library.gmu.edu/distance and http://infoguides.gmu.edu/distance_students].
- **Writing Center:** The George Mason University Writing Center staff provides a variety of resources and services (e.g., tutoring, workshops, writing guides, handbooks) intended to support students as they work to construct and share knowledge through writing. [See http://writingcenter.gmu.edu]. You can now sign up for an Online Writing Lab (OWL) session just like you sign up for a face-to-face session in the Writing Center, which means YOU set the date and time of the appointment! Learn more about the Online Writing Lab (OWL).
- **Counseling and Psychological Services:** The George Mason University Counseling and Psychological Services (CAPS) staff consists of professional counseling and clinical psychologists, social workers, and counselors who offer a wide range of services (e.g., individual and group counseling, workshops and outreach programs) to enhance students' personal experience and academic performance [See http://caps.gmu.edu].

- **Family Educational Rights and Privacy Act (FERPA):** The Family Educational Rights and Privacy Act of 1974 (FERPA), also known as the "Buckley Amendment," is a federal law that gives protection to student educational records and provides students with certain rights. [See http://registrar.gmu.edu/privacy].

18. Fall 2020 COVID-19 considerations

All students taking courses in person must take Safe Return to Campus Training before coming to campus. Training is available in Blackboard.

Students must follow the university's public health and safety precautions and procedures outlined on the university Safe Return to Campus webpage.

All students taking in-person and hybrid courses must also complete the Mason COVID Health Check daily, seven days a week. The COVID Health Check system uses a color code system, and students will receive either a Green, Yellow, or Red email response. Only students who receive a "Green" response are permitted to attend courses with a face-to-face component. If you suspect that you are sick or have been directed to self-isolate, please quarantine or get testing. Faculty are allowed to ask you to show them that you have received a Green email and are thereby permitted to be in class.

Disclaimer: Any typographical errors in this Course Outline are subject to change and will be announced in class. The date of the final examination is set by the Registrar and takes precedence over the final examination date reported by the instructor.

Note: Recording is permitted only with the prior written consent of the professor or if recording is part of an approved accommodation plan.