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University of Wisconsin at Madison
GIS Applications (Geography 578)
Spring Semester 2019

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Instructor: Bill Gartner   **Place:** 444 Science Hall
Office: 115D Science Hall   **Time:** Tu & Th 11:00 - 12:15 PM
Phone: 890-3816   **Final:** Project Presentation, 2 May
Email: wgartner@wisc.edu   **Credits:** 4
Office Hours: W 1:00 - 3:00   **Class Number:** 56244 (Geog)

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Course Synopsis and Structure

This class details the geographic concepts, logical arguments, and workflows that make geographic information software a valuable tool for problem-solving. As detailed below, the class consists of lectures, laboratory exercises, and a student project that analyzes an original GIS data layer (eg a data layer derived from student data collection, digitization, geocoding addresses, or data entry).

Lectures will detail the conceptualization process for addressing geographic problems. The conceptualization of a geographic problem begins with crafting a research question or problem statement, identifying its key concepts and variables, operationalizing variables and their relationships so that they can be analyzed within a GIS software package, and then constructing an appropriate GIS workflow. Only after a GIS analyst has conceptualized a geographic problem or scenario, can he or she address it with GIS software. We will explore various GIS projects and scenarios in lecture with an emphasis on conceptualization. Students will then implement the solutions to these geographic problems presented during lab.

Laboratory exercises highlight the practical uses of QGIS and ArcGIS software to address different types of questions and problems. QGIS is a free, cross-platform, open-source desktop geographic information system (GIS) that has advanced map layer viewing, editing, and analytical abilities. Students will work with both vector and raster datasets in lab.

Finally, and most importantly, this class provides a vehicle for students to conceptualize and implement a GIS project of their own choosing. Students will form research groups and craft a research question to be addressed within a GIS environment. All student projects must have a minimum of two data layers, one of which must be the culmination of student data collection, digitization, data entry, and/or data layer editing. You may use any GIS software package for

your project – both QGIS and ESRI ArcGIS software packages are available in the department computer labs.

HLC Accreditation Statement

This class meets for two 75-minute class periods plus one 2-hour laboratory period each week over the semester. It carries the expectation that students will work on course learning activities (reading, writing, working on problem sets or projects, studying, etc) for a minimum of 2 hours per 50-minute period per week (eg you should plan on 10 hours/week of outside work over the course of the semester). The syllabus includes additional information about meeting times and expectations for student work.

Learning Outcome Statement

By the end of the course, students will:

- Learn how to conceptualize and implement a GIS project from start to finish within a team environment.
- Identify, formulate, and solve geographic problems using appropriate information and analytical approaches.
- Communicate effectively through written reports, oral presentations, and discussion.
- Prepare and present effective, informative, and persuasive arguments utilizing GIS.

Text and Class Materials

There is no textbook for this class. *All readings* are posted on Canvas.

Grading

Individual assignments are typically graded on the following scale: (A) 93-100%, (AB) 90-93%, (B) 82-89%, (BC) 79-81%, (C) 70-78%, (D) 60-69%, and (F) 59%. This percentage scale approximates, and is derived from, grade breaks in previous classes.

Your final grade is calculated from the total number of points earned over the semester and your relative rank with respect to your classmates (see below). In addition, each of you will evaluate the other members of your research group on a standardized form at the end of the semester. If necessary, your peer evaluations will be used to modify individual grades for the final project.

Your final grade will be calculated from the assignments and activities listed below. The weight of each category towards your final grade is shown below as a percentage in parentheses.

A) Student Project and Paper (250 points total, 50% of Final Grade)

- Project Capstone Statement (25 pts)   **Due Date:** 7 Feb, ff
- Project Proposal Presentation (25 pts)   **Due Date:** 28 Feb, ff
- Project Proposal Paper* (50 points)   **Due Date:** 12 March
- Final Project Presentation (50 Points)   **Due Date:** 2 May
- Final Project Paper (100 points)   **Due Date:** 2 May

* The Project Proposal is a first draft of the Introduction and Methodology sections of your final paper.

B) Class Attendance, Participation, and Preparedness (20 points, 4% of Final Grade)

C) Mid-Term Exam (80 points total, 16% of Final Grade)

D) Laboratory Assignments (130 points total, 26% of Final Grade)
- 5 Labs Total

E) Lab Attendance, Participation, and Preparedness (20 points, 4% of Final Grade)

Total Possible: 500 Points

For each component listed above, your score will appear in the Canvas grade book as the number of points scored out of the total points possible for the exercise (eg 18/20).

Your final grade is determined by a computer algorithm, often termed "Jenks optimal breaks", that places students into groups based on the total number of points earned throughout the semester. You will earn points throughout the semester from exams, lab assignments, and your final project. At the end of the semester, I will generate a histogram for the class based on the total number of points earned throughout the course. Since this is a project oriented class, the Jenks optimal breaks algorithm will place similar point scores into one of *three* groups. The group with the highest set of scores will have earned an "A" and the group with next highest set of scores will have earned an "AB". Typically, those in the third group will have earned a "B". However, anyone in the left-hand tail of the histogram will receive a grade of "BC" or less.

I will periodically post grade progress reports on Canvas throughout the semester, typically after the exam. However, only the final histogram, the one based on the total number of points earned throughout the semester, will be used to assign your course grade.

If the percentage-based scale generates the best possible grades for the most number of students at the end of the semester, then this method will supplant the "Jenks optimal breaks" method described above when calculating final grades.

We are happy to discuss your grade and correct errors in grading, but please bring any errors in grading to our attention immediately. *Do not wait until the end of the semester to ask questions about grades, as it is very difficult to make corrections then*.

Unfortunately, the UW-Madison reports student final grades as letters rather than as a percentage of points earned.   A letter-based grading system requires class breaks, which in turn disenfranchises everyone near the upper boundary of their grade cohort. A letter-based grading system is inherently unfair.   But, sadly, it is the system that is in place*. UW System policies and procedures require all grading methods to be systematic. Giving a student a higher grade because they are only "a few points away" is not systematic.   I will use the grading system that gives the most students the best possible grade*. Since I am choosing the grading method that gives most students the best possible grade, and since I am required to grade systematically, I will ignore student groveling, begging, and any other obsequious behavior for the purposes of receiving a higher final grade.

Student Peer Evaluations and the Adjustment of Final Grades

Teamwork is increasingly the norm in private and public sector employment. Group research projects foster the intellectual and social skills necessary for individuals to thrive in a collaborative environment. However, this is only true if everyone equitably contributes to the group project.   Regardless of your point total, *individual grades may be significantly adjusted based on student peer evaluations at the end of the semester*. In the past, I have raised or lowered individual grades by upwards of two full letter grades based on student peer evaluations that have aligned with my personal observations of an individual's performance.

Class Policies

Academic Integrity

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be

forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to studentconduct.wiscweb.wisc.edu/academic-integrity/.

- It is your responsibility to become familiar with the rules of academic misconduct, and your rights to due process, according to UW Administrative Code 14.   An overview of academic integrity, misconduct, and detailed information concerning UW Administrative Code, Chapter 14 are available at http://www.students.wisc.edu/doso/academic-integrity/

- Please see the UW Writing Center's guide for avoiding plagiarism, which also details the many substantial penalties for acts of intellectual theft at http://writing.wisc.edu/Handbook/QuotingSources.html

Accommodations for Students with Disabilities

The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA.

- If you need special accommodations or have a developmental disability, please contact me by phone, email, or come to my office. The McBurney Disability Resource Center provides resources for students with disabilities. Please see http://www.mcburney.wisc.edu/ or call 263-2741.

Diversity & Inclusion

Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

- It is the responsibility of all students to familiarize themselves with University policies concerning special accommodations, misconduct, discrimination, sexual harassment, and disruptive behavior. For details, please see Chapter 14 of the UW Administrative Code cited above and the resources posted at the Office for Equity and Diversity website at http://www.oed.wisc.edu/

Other Class Policies

- Readings, the class schedule, and any other component of the course may be amended by the instructor at any time.

- Chronic absenteeism may result in a lower or failing grade for the course at the discretion of the instructor.

- Neither I nor the TA will accept late assignments unless you have an excused absence or made prior arrangements with one of us. We well understand the difficulties of balancing school, work, and family concerns. Please talk to us *ahead of time* if you have work or family obligations that necessitate flexibility.

- There is no extra-credit.

Student Projects

Student projects are the most important component of this class. Separate handouts detail project guidelines and procedures. Do not underestimate the amount of time or effort that is necessary to complete your project. Although we devote many class and lab periods for students to work on their projects, the amount of allocated course time is not sufficient to complete them. You are expected to meet with the other members of your group and work on your project outside of class every week throughout the semester. Time management, task allocation, and working with others are important skills for most GIS projects.

Everyone must contribute to all components of the student project, including presentations, assignments, and the final paper. In order to accommodate everyone's class and work schedules, please use Google Docs, Office 365, or some other form of "cloud computing" so that all research group members can contribute to written assignments and presentations.

Lecture Schedule

Week	Tuesday	Thursday
Week 1 (1/22, 1/24)	Course Introduction and Class Overview *Student Projects: Ideas and Group Formation*	Research Questions (Capstone Statement) *Student Projects: Ideas and Group Formation*
Week 2 (1/29, 1/31)	The Process of Conceptualization and Implementation in GIS	Project Proposal Requirements *Student Projects: Finalize Projects & Groups*
Week 3 (2/5, 2/7)	Scenario 1: Park Access	*** Present Research Capstone ***
Week 4 (2/12, 2/14)	Scenario 2: Flood Risk	*** Present Research Capstone ***
Week 5 (2/19, 2/21)	Scenario 3: Bank Branch Assessment	*Student Projects: Work on Project Proposals (meet in 444 Science Hall)*
Week 6 (2/26, 2/28)	Scenario 4: Land-Use Suitability	*** Proposal Defense ***
Week 7 (3/5, 3/7)	*** Proposal Defense ***	***Proposal Defense ***
Week 8 (3/12, 3/14)	***Proposal Defense *** ***Project Proposal Paper Due***	*** Mid-Term Exam ***
Week 9 3/16 – 3/24	****Midterm Break****	
Week 10 (3/26, 3/28)	GIS Technique Lecture	*Student Projects (meet in 380 Science Hall)*

Week 11 (4/2, 4/4)	*Student Projects (meet in 380 Science Hall)*	*Student Projects (meet in 380 Science Hall)*
Week 12 (4/9, 4/11)	*Student Projects (meet in 380 Science Hall)*	*Student Projects (meet in 380 Science Hall)*
Week 13 (4/16, 4/18)	*Student Projects (meet in 380 Science Hall)*	*Student Projects (meet in 380 Science Hall)*
Week 14 (4/23, 4/25)	*Student Projects (meet in 380 Science Hall)*	*Student Projects (meet in 380 Science Hall)*
Week 15 (4/30, 5/2)	*Student Projects (meet in 380 Science Hall)*	*** Final Project Presentation *** *** Final Project Paper Due ***

* The course schedule may be amended at the discretion of the instructor at any time.

* The conceptual underpinnings of laboratory exercises will be presented during lecture prior to the exercises being assigned in lab.

* All students should be prepared to present, discuss, and defend components of your research project during student work periods (italicized above). You are also expected to constructively critique the projects of the others.