GEOG 184, SPRING 2022
GEOGRAPHIC INFORMATION: CONCEPTS & APPLICATIONS (3 credit hours)
Lectures: Mondays and Fridays, 10:50-11:40am in Waterman 427
Labs: Wednesdays 10:50-11:40 (A01) or 12:00-12:50 (A02) in Lafayette 203

Instructor: Dr. Beverley Wemple
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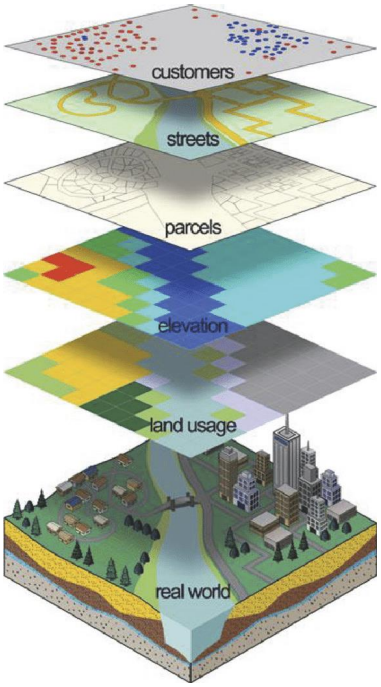
Office hours: Mondays 3:00-4:00pm in Old Mill 201, Tuesdays 9:00-10:00am on MS Teams

COURSE DESCRIPTION & OBJECTIVES:

This course explores the nature and analysis of geographic or spatially-referenced information. Intended to develop both a conceptual and practical understanding, the course examines the ways in which we represent geographical information in digital form, collect data using satellites, airplanes, ground-based sensors, surveys, and other methods involving human subjects, analyze those data to reveal patterns and relationships, and visualize those data to convey information as new knowledge or propaganda. Students will apply concepts and gain technical skills through computer-based mapping, data visualization, and analysis projects utilizing Geographic Information Systems (GIS).



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https://doi.org/10.1016/j.rser.2013.03.019

Topics covered in the course include the use of mapping from pre-history to modern times to represent and understand place and our environment, systems used to represent location and geographical phenomena, the nature of spatial relationships, spatial interactions and spatial networks, and the role of digital computing and geospatial technologies in collecting, analyzing and visualizing spatial phenomena. We will also explore key challenges in the application of these technologies, including surveillance and privacy concerns, public participation and decision making, generalization and uncertainty, and error propagation. Weekly exercises provide an opportunity to gain technical skills in the application of GIS-software to inquiry and problem solving.

LEARNING OUTCOMES

At the conclusion of this course, you should be familiar with ways of collecting and representing spatial data in computer mapping platforms, have an appreciation of the many applications of mapping and GIS technology for inquiry and problem solving, and have a critical eye for the limitations of representing spatial phenomena using maps and geographic information systems. You will also come away from the course with a basic proficiency in the use of a leading GIS software package, making you qualified to pursue advanced course work in data analytics, an internship with an organization using GIS and mapping for problem solving, and entry-level employment in the geospatial technologies workforce.

THIS COURSE WITHIN THE CONTEXT OF OTHER GST OFFERINGS

This course provides an opportunity to gain technical training in the application of GIS technologies to spatial visualization and problem solving. At UVM, we offer a range of other geospatial technologies (GST) courses that expose students from different perspectives to GIS, including ENSC 130, NR 143, GEOL 185, and a special topics course in Anthropology, ANTH 195: GIS for Social Sciences. Although each of these courses is distinctive in the approach they take to integrating GIS into the learning outcomes, each course uses GIS software to develop a technical skill set. Students with one of these courses already completed should speak with the instructor before the add/drop period ends to ensure that enrollment in this course meets their needs and does not duplicate a course already taken. When the technical components of this course overlap with those offered in another course, students may feel that the content was not what they had hoped for. Having an intentional conversation with the instructor about the fit of this course within the broader geospatial technologies (GST) curriculum at UVM is an important responsibility that you bear, as a student, in deciding to take this course.

COURSE FORMAT:

We will meet twice each week (Mondays and Fridays) for lecture and discussion and once each week (Wednesdays) for lab sessions. Preparation for and attendance of class sessions is important for success in this course. Students are expected to stay current with readings and exercises and to participate in class discussion. Students will have an opportunity to begin lab assignments during the lab session and will be expected to complete assignments as homework. All software used in the course can be run on a PC or Mac using UVM's virtual machine capabilities. Details on accessing and running the software we will use on your personal computer is available in this UVM Knowledge Base article.

TEXTS, READINGS and ELECTRONIC RESOURCES:

We will read selected chapters from textbooks and from the primary literature (published, peer-reviewed scholarly papers) that describe the use of GIS in an array of applications, from community planning, to demographic and social analysis, to environmental systems dynamics and change detection. All readings will be posted in **Weekly Course Materials** folders on Blackboard, where you will also find periodic graded reading questions.

GRADING**:**

Grades in the course will be based on the following assignments and weighting factors:

- Reading questions (15%) are posted in the Weekly Course Materials folders on Blackboard when assigned. These readings are intended to help prepare you for selected class sessions and as such should be completed before Monday's class session in the weeks assigned. By Friday morning each week, you should check the Weekly Course Materials folder for the following week for assigned readings and reading questions. I will announce these in Friday's class and provide a quick summary of key ideas to look for in the assigned reading. To provide you with some flexibility in the case of illness or other unpredictable circumstances, I will drop your two lowest reading question grades at the end of the semester.
- Lab assignments (25%) are given weekly from week 2 to week 12 to give you hand-on experience using GIS software. You will have roughly 30-40 minutes during our weekly lab sessions to begin the

assignment and should schedule time as homework to complete each assignment. They are designed to take roughly 1-2 hours to complete. You will always have one full week from the date of the lab assignment until the due date. I encourage you to develop the important professional skill of meeting deadlines by working to complete the lab assignments before the due date. If you hope to use skills gained in this class to apply for an internship or professional position and would like a reference from me, know that employers nearly always ask about the candidate's ability to manage demanding workloads and meet deadlines. Late assignments will be accepted up to one week past the due date, when I aim to release grades. To provide you with some flexibility in the case of illness or other unpredictable circumstances, I will drop your two lowest lab grades at the end of the semester.

- One exam (25%) will assess your understanding of concepts covered in the readings and lectures. The format will include short answer and essay questions and will be held during a class session roughly three-quarters of our way into the course as we transition from content delivery and skills training to the development of a term project. Any request for a make-up date on an exam will require documentation of an unavoidable absence due to illness or other circumstances through your Dean's office.
- The term project (25%) focuses on a question of interest to the student. Projects will include both a written report and an oral presentation to the class.
- Participation (10%) credit is drawn primarily from your attendance and engagement during class sessions. I recognize that some students feel less comfortable than others participating verbally in class by responding to or asking questions. You may also earn participation credit by attending occasional office hours and by contributing to discussion posts on Blackboard.

There are no extra credit opportunities in the course. To earn a top grade in the course, you will need to complete reading and lab assignments, meet assignment deadlines, consistently review material to perform well on the exam, and attend and participate regularly.

ATTENDANCE POLICY and CLASSROOM CONDUCT EXPECTATIONS

- As a student, you have important rights and responsibilities. Please review UVM's guidelines on your rights and responsibilities posted at https://catalogue.uvm.edu/undergraduate/academicinfo/rightsandresponsibilities/ including linked documents on the Code of Student Conduct and the Code of Academic Integrity.
- This is a highly interactive class. Your ability to master both the concepts and the technical skills of this course will require that you keep up with the readings and lab assignments and attend class regularly. If you are unable to attend class in person, please email me *by 9:30am* on that day so that I can send you an invitation to join us remotely. Remote participants should be prepared to work with other remotely-participating students in break out groups or respond to questions during the class session.
- Arrive for class on-time and prepared. Arriving late is disruptive for your classmates and distracting for me. Similarly, leaving class during the class session is disruptive and can impede the ability of your classmates to see slides or hear discussion. With this in mind, I ask that you refrain from leaving class during our 50-minute Monday and Friday lecture sessions and during the first 15

minutes of our Wednesday lab sessions. Students with academic accommodations for breaks should meet with me to discuss a plan for minimizing the distraction to your classmates if you need to take these breaks.

- If you are ill or experiencing symptoms of Covid-19, contact Student Health Services (SHS). When deemed necessary, SHS will send a notification to the appropriate Student Services office in your home college informing them of accommodation needs. Your dean's office staff will then pass this along to me and your other instructors. As a student, you are responsible for taking the initiative to make up class content and late assignments. I will provide support to help you meet negotiated deadlines that still enable me to release graded assignments to your classmates on time. The provisions for two dropped grades on reading assignments and lab exercises described under GRADING above are designed to provide some flexibility for students experiencing illness or other unpredictable circumstances that impact their ability to meet assignment deadlines.
- In the first two weeks of the semester during the add/drop period, I will record class sessions to make them available to students who may add late to the course if seats become available. Following this period of time, I will only record class sessions when I have prior-day notice of an absence due to illness or Covid-related restrictions, and will make the class recording available to students with those documented needs. I will always place lecture slides in the **Weekly Course Materials** folder. These should be considered the authoritative class notes for content covered in class. Please do not record our class session, share course materials (syllabus, assignments), or post course slides, notes, or other materials to publicly accessible sites like CourseHero without my express consent in writing. Violations of this policy will be handled under UVM's Intellectual Property policy and Code of Academic Integrity.

HEALTH and SAFETY CONCERNS

UVM expects students, faculty, and staff to remain compliant with all COVID-19 recommendations and measures in place for UVM, the State of Vermont, and the City of Burlington. This includes following all rules regarding facial coverings when attending class and generally in indoor spaces. If you do not follow these guidelines, you will be asked to leave the class. If you forget your mask, you cannot enter the class. Please refrain from eating in the classroom or lab. The Code of Student Conduct outlines policies related to violations of University policies that protect health and safety on campus.

STUDENT LEARNING ACCOMMODATIONS

In keeping with University policy, any student with a documented disability interested in utilizing ADA accommodations should contact Student Accessibility Services (SAS), the office of Disability Services on campus for students. SAS works with students and faculty in an interactive process to explore reasonable and appropriate accommodations, which are communicated to faculty in an accommodation letter. For students with documented academic accommodations, I will always honor extended test-taking times and need for quiet test-taking space at the Exam Proctoring Center. Please make your reservation at the EPC one week prior to our exam date. Your reservation will prompt the EPC to obtain the exam from me. I will also work to secure a student note taker, and I will provide a pdf of my class slides each week in the Weekly Course Materials folders *as the authoritative class notes on content for which you will be responsible*. Students with flexibility accommodations (breaks, flexible

deadlines) should meet with me during office hours or a scheduled appointment so that we can document a plan on the required Disability Related Flexibility Agreement. Students with academic accommodations for flexible deadlines will be expected to submit a progress update with some work completed at least two days prior to the deadline in order to receive deadline-flexibility accommodations.

COURSE EVALUATIONS and FEEDBACK

Your constructive feedback throughout the semester and especially at the end of the semester is a value resource for me in adapting course content to meet student needs. At the end of the semester, you will be provided with an opportunity to provide written feedback on the course through our online course evaluation tool. You will find information on accessing the course evaluation at this UVM Knowledge Base page.

FINAL GRADES and GRADE APPEALS:

Final grades for the semester are due to the Registrar 72 hours after the scheduled final exam. For this reason, I cannot accept late submissions of work after the last week of the semester or a late submission of your final project deliverables. If circumstances prevent you from completing work on time at the end of the semester, please write to me by email ***and*** contact the Student Services office in your college. They have the sole authority to grant an incomplete. I will set a deadline by which I could accept incomplete work and grade it during my employment contract period. Failure to meet deadlines for an incomplete could be grounds for failing the course.

If you would like to contest the final grade yo earn in the course, please follow the procedures outlined in this policy.

COURSE SCHEDULE:

Check **Weekly Course Materials** folder on Blackboard for assigned readings and reading questions

Week 1 Jan 19, 21	INTRODUCTION: course structure and learning outcomes; how maps influence people.
Week 2 Jan 24-28	MAPPING THROUGH TIME: a brief history of mapping and cartography; emergence of geospatial technologies; mapping for information, decision-making, and persuasion. Lab 1: Introducing spatial data and ArcGIS Pro
Week 3 Jan 31-Feb 4	REPRESENTING GEOGRAPHIC INFORMATION. Approaches for portraying continuous and discrete spatial information. Use of raster and vector data models in GIS. Use of topology to capture spatial information. Lab 2: Geographic data models and attributes
Week 4 Feb 7-11	MAP PROJECTIONS and COORDINATE SYSTEMS. Introduction to geodesy; distortions in 2-D planar mapping; map projections; the geographic grid and planar coordinate systems. Lab 3: Working with map projections
Week 5 Feb 14-18	DATA VISUALIZATION and CARTOGRAPHIC DESIGN. Visualizing continuous and categorical data; classification approaches for continuous data; cartographic design principles Lab 4: Making map layouts
Week 6 Feb 23, 25 (no class Mon, Feb 21)	ACQUIRING GEOSPATIAL DATA. Introduction to data acquisition methods; geospatial data portals; data documentation and metadata standards; U.S. Census Bureau demographic data. Lab 5: Geospatial data portals
Week 7 Feb 28-Mar 4	ACQUIRING GEOSPATIAL DATA (*continued*). Application of remote sensing technologies to data acquisition; principles of electromagnetic radiation applied to land surface remote sensing; active and passive sensors. Lab 6: Using remotely sensed imagery in ArcGIS Pro
Week 8	UVM SPRING BREAK – NO CLASSES

Week 9 Mar 14-18	CONCEPTS IN SPATIAL ANALYSIS, PART 1. Spatial patterns and approaches for detecting spatial dependencies and relationships; proximity and overlay analysis for vector data. Lab 7: Joining georeferenced and tabular data
Week 10 Mar 21-25	GEOGRAPHIC INFORMATION IN ACTION. Applications of GIS and spatial analysis to planning, conservation, healthcare, and environmental change detection. Term project expectations. Lab 8: Spatial analysis using map overlays and geoprocessing
Week 11 Mar 28-Apr 1	CONCEPTS IN SPATIAL ANALYSIS, PART 2: Landcover mapping; raster data summaries and overlay analysis. Lab 9: Examining land cover
Week 12 Apr 4-8	REPRESENTING AND ANALYZING TERRAIN FEATURES. Interpreting terrain features from digital elevation models; concepts in surface analysis; delineating watersheds and stream networks. Lab 10: Terrain analysis in ArcGIS
Week 13 Apr 11-15	NEW DIRECTIONS IN GIS. Epistomological and privacy considerations in the use of geographic information systems; participatory GIS and democratization of spatial technologies. *In-class exam - Friday, April 15*
Week 14 Apr 18-22	CAREERS in GEOSPATIAL TECHNOLOGIES. Professional preparation and career pathways; approaches to professional networking; internship opportunities; building portfolios. Lab: project work session
Week 15 Apr 25-29	PRESENTING GIS RESEARCH. Professional writing and presentation of work in geospatial technologies. Lab: project work session
Week 16 May 2-6	COURSE WRAP UP

Monday, May 9 10:30am (final exam block) – final deliverable deadline for term projects