

# GEOG 081: Geotechniques

## (Geospatial concepts and visualization)

Fall 2015

Dr. Ingrid L. Nelson

Office: Old Mill 212

Office hrs: M 1-2:30pm (in Old Mill 212); F 10:30am-12pm in the GIS Lab); or by appointment (ilnelson@uvm.edu)

Class Meetings: Hills Ag. Sci. 226

M & W 12:00pm-12:50pm

Lab: Lafayette L203; F 12-12:50pm

### Computer Science Senior Seminar Mentors

**Jack Hegman:** john.hegman@uvm.edu; **Grace Samsonow:** grace.samsonow@uvm.edu

### Overview and Structure

This course introduces students to core geospatial concepts and techniques used by geographers across sub-disciplinary interests: from urban geography to medical geography, climatology, biogeography, political ecology, cartography and beyond. The course is required for all geography majors at UVM, and thus provides essential knowledge and skills for all geographical interests. As we learn how to read maps and to use GIS (geographic information systems), we will also begin to approach maps with a critical eye, engaging the key ethical and political implications of mapping. This course is not a 'memorize which options to click in ESRI's ArcGIS software' course. Rather, this course prepares students with the fundamental concepts necessary for beginning to work through geospatial problems and to approach map-reading, map-making, mixed-methods and spatial analysis for addressing real world problems. By the end of the semester, students will be prepared to pursue more advanced collegiate studies that utilize GIS and/or remote sensing and cartographic techniques.

### Learning Objectives<sup>1</sup>

After completing and reflecting on experiences in this course, students should be able to:

- i. Identify the scope and breadth of geospatial concepts and specific geographical techniques across sub-disciplinary areas of interest in geography (*knowledge/integration*),
- ii. Apply core geospatial concepts and spatial thinking in lab exercises (*application/integration/skills*),
- iii. Develop introductory technical skills in GIS software and spatial analysis (*application/skills*),
- iv. Identify the broad scope of potential real-world applications of geospatial concepts and techniques (*application/integration*),
- v. Explore introductory qualitative and quantitative data interpretation and methods (*knowledge/skills*),
- vi. Work in small groups to conduct basic analysis in a way that enhances both individual and collective communication of and understanding of specific geographical concepts (*knowledge*),
- vii. Engage in critical reflection and discussion of the ethical dimensions of mapping with an understanding that mapping is *political* and requires that we always consider who maps for whom and with what intentions and agendas (*human dimension/personal/values/caring*),
- viii. Build an awareness of the on-campus and off-campus resources for geographical analysis as well as the potential career pathways that require geotechniques skills and critical thinking (through this process, students will build a clearer sense of what they would like to learn next and what knowledge and skills will be required to do so) (*learning how to learn*).

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<sup>1</sup> These draw from the Department of Geography's Learning Goals and approaches in L. Dee Fink's *Creating Significant Learning Experiences: An Integrated Approach to Designing College Courses* (2013).

## Course Equipment, Readings and Online Resources

### 1. Required Books:

**Krygier, J. and D. Wood. 2011.** *Making maps: A visual guide to map design for GIS*. Second Edition. New York: The Guilford Press.

**Monmonier, M. 1995.** *Drawing the line: Tales of maps and cartocontroversy*. New York: Henry Holt and Company.

### 2. Recommended Book:

**Harmon, K. 2004.** *You are here: Personal geographies and other maps of the imagination*. Princeton, NJ: Princeton Architectural Press.

### 3. Required Equipment: Compass available at the UVM Bookstore

- Treknor T580 baseplate (flat) map compass with 1:24,000 map scale
- Course flash drive (for course material only) with minimum 16GB capacity for all course data due to slow server speed in Lafayette (obtain by week 2)

### 4. Additional required readings in .pdf format posted to our course Blackboard site (bb.uvm.edu) **must be read and brought to class (in digital or printed format) on the specified dates.**

### 5. Online Resources:

Course PowerPoint slides (when applicable, as I use 'old school' chalk/marker board for many explanations), lab exercises, assignment materials and links to resources/databases will be posted on our course Blackboard site. Note: If you encounter difficulties accessing the class Blackboard website, contact UVM Computing Helpline regarding connectivity ((802) 656-2604; email: [helpline@uvm.edu](mailto:helpline@uvm.edu)) or contact Prof. Nelson regarding content ([ilnelson@uvm.edu](mailto:ilnelson@uvm.edu)).

## Course Format

Geography 081 consists of 7 topic-focused sections, some of which extend beyond one week in length. Some class time slots will frequently be used for additional lab-based instruction when possible. Each course section will include readings, assignments, and lab exercises. Details for section #1 (Course Introduction) are included on the last page of this syllabus and in Blackboard. **Details for subsequent sections will be distributed on a week-to-week basis and posted in Blackboard.**

Assessment	Percentage of Final Grade
<b>Course Engagement</b> <ul style="list-style-type: none"> <li>• Lab recap activity, attendance and class participation (7%)</li> <li>• In-class quizzes and short activities (3%)</li> </ul>	<b>10%</b>
<b>Reflective, Integrative and Applied Work</b> <ul style="list-style-type: none"> <li>• Lab exercises (20%)</li> <li>• 'Drawing the Line' essay (5%)</li> </ul>	<b>25%</b>
<b>Major Examinations</b> <ul style="list-style-type: none"> <li>• Midterm I (10%)</li> <li>• Midterm II (15%)</li> <li>• Final Exam (20%)</li> </ul>	<b>45%</b>
<b>Semester Project</b> <ul style="list-style-type: none"> <li>• Group proposal draft (2%)</li> <li>• Draft map check and cartographic design peer-review (4%)</li> <li>• Final presentation (4%)</li> <li>• Final project, work flow chart and complete metadata (10%)</li> </ul>	<b>20%</b>
<b>Total</b>	<b>100%</b>

**Assessment Guidelines** (specific instructions and rubrics will be posted in Blackboard):

**Course engagement** (10% of the final course grade) includes both attendance and participation (7% of the total course grade) in class discussions and activities. There will be several in-class short activities to evaluate comprehension of the readings and lecture material (3% of the total course grade).

**Reflective, Integrative and Applied Work** (25% of the total course grade) includes lab exercises (20% of total course grade) assigned for each course section. Students who do not keep up with the labs are likely to do poorly on their final course project and on their exams as they serve as a foundation for these assessments. **Lab exercises must be handed in within one week of the completion of each scheduled lab session unless otherwise indicated.** Shortly after finishing Monmonier's *Drawing the Line* (1995), students will write a three-page response essay that connects our course work with key themes in the book (5% of the total course grade).

**Major Examinations** (45% of the total course grade) includes two mid-term exams and a final exam. The first midterm (10% of total course grade) will take place during class on Wednesday, September 30<sup>th</sup>. The second midterm (15% of the total course grade) will consist of an in-class component (Wednesday, October 28<sup>th</sup>) and a lab practical component (Friday, October 30<sup>th</sup>). The final exam is worth 20% of the total course grade and will take place on December 11<sup>th</sup>, 7:30-10:15am in our regular classroom. There is no lab component for the final exam.

**Semester Project** (20%) includes several stages of preparation including a group project proposal draft (2% of the total course grade), a draft map check and cartographic peer-review (4% of the total course grade), a final group presentation (4% of the total course grade) and the final project materials, a work flow chart and complete metadata information (10% of the total course grade). Our final project task is to map new themes on campus landscapes in the greater Burlington area. The project focus needs to be pre-approved by Professor Nelson who will distribute a full assignment description early in the semester and allow for time during class to brainstorm project ideas with other students.

**NOTE: This syllabus is subject to change due to scheduling logistics and solicited student input.**

### **Course Grading\***

A+: 98-100%; A: 93-97.9%; A-: 90-92.9; B+: 88-89.9; B: 83-87.9; B-: 80-82.9;

C+: 78-79.9%; C: 73-77.9%; C-: 70-72.9%; D+: 68-69.9; D: 63-67.9; D-: 60-62.9; F: below 60%

*\*Warning letters:* If a student has earned a D+ or lower in class, they and their advisor will receive a warning letter suggesting they seek out ways to improve their work or consider withdrawing from class. If you receive one of these letters, please ask Prof. Nelson for assistance in improving your work.

### **General Course Policies and Resources**

**Fostering a Critical and Responsible Learning Environment:** Throughout the course, please feel free to express your ideas and enter into dialogue with your fellow students. Although I encourage you to express your views, I expect that you will be courteous to others, respect different views, and refrain from personal attacks—both in class and on-line. In this class we do not debate, we discuss. Disruptive behavior will not be tolerated. Failure to abide by these expectations will result in a reduced class engagement grade or disenrollment. During class, all phones must be turned off (no texting allowed). Laptops may be used for taking notes or engaging in class activities only and must not be connected to the Internet during class unless otherwise directed during specific activities. All assigned readings must be completed before class and all students must arrive on time. **Some of the software that we will use in this course has a steep learning curve. Be sure to support one another through this learning process by problem solving**

**together. You can always take a break and come back to it later with a clear and rested mind if a task becomes too frustrating in the moment.**

**Late work:** No late work will be accepted unless you provide documentation from Student Services in your Dean's Office or contact Prof. Nelson in advance about upcoming conflicts that pose a reasonable need for delay.

**Academic Integrity:** All submitted work must be your own unless the assignment calls for collaboration. You must distinguish your own words and ideas from those of others by utilizing proper citations and references. Failure to do so constitutes plagiarism. Detailed style guides are in our course 'Learning Resources and Guides' folder. Please also refer to UVM's Code of Academic Integrity and the Academic Integrity Program in The Center for Student Ethics and Standards for further clarification.

**ACCESS:** I encourage students with documented disabilities to contact me in **the first two weeks of classes** to discuss and arrange accommodations in co-ordination with the ACCESS office. In keeping with University policy, any student with a documented disability interested in utilizing accommodations should contact ACCESS, the office of Disability Services on campus. ACCESS works with students and faculty in an interactive process to explore reasonable and appropriate accommodations via an accommodation letter to faculty with recommended accommodations as early as possible each semester. Contact ACCESS: A170 Living/Learning Center; [802-656-7753](tel:802-656-7753); [access@uvm.edu](mailto:access@uvm.edu); or [www.uvm.edu/access](http://www.uvm.edu/access).

**Athletic and religious schedule accommodations** follow UVM policy, which can be viewed at <http://www.uvm.edu/csces>.

**Recording and Transmission of Course Materials:** Consistent with the University's policy on intellectual property rights, teaching and curricular materials (including but not limited to classroom lectures, class notes, exams, handouts, and presentations) are the property of the instructor. Therefore, electronic recording and/or transmission of classes or class notes is prohibited without the express written permission or request of the instructor. Such permission is to be considered unique to the needs of an individual student (e.g. ADA compliance), and not a license for permanent retention or electronic dissemination to others.

**Use of student work:** This course may use course participation and documents created by students for educational purposes. In compliance with the Federal Family Educational Rights and Privacy Act, works in all media produced by students as part of their course participation at UVM may be used for educational purposes. It is understood that registration for and continued enrollment in a course where such use of student works is announced constitutes permission by the student. After the course has been completed, any further use of student works will meet one of the following conditions: (1) the work will be rendered anonymous through the removal of all personal identification of the work's creator/originator(s); or (2) the creator/originator(s)' written permission will be secured.

**GEOG 081 Course Schedule 2015 – Please consult Blackboard for updates**

Week	Date	Topic	Assignments and Readings (due date in class)
1	Mon. Aug. 31	<b>Section 1</b> - Course Introduction and Overview; Introduction to <i>Cartesian</i> thought and knowing why, what and when we map	Read the syllabus in Blackboard and bring any questions to class
	Wed. Sept. 2		Monmonier (p.1-8); K&W (p.i-15); Harmon (p.8-13)
	Fri. Sept. 4th		<b>First Assignment due</b> (map presentation)
2	Mon. Sept. 7	<b>Labor Day Holiday</b>	
	Wed. Sept. 9	Guest lecture: Dr. Beverley Wemple	Monmonier (p.9-44); Read GST Minor Webpage
	Fri. Sept. 11	<b>Section 2</b> - Projections, Coordinate Systems and Geographic Data	K&W (p.96-7); Map Use Ch. 1 (Kimerling et al.)
Mon. Sept. 14	K&W (p.76-93); Slocum et al. Ch.8 (Map Projections)		
Wed. Sept. 16	Dent et al. 2009 (Projected Coordinate Systems)		
3	Fri. Sept. 18		K&W (p.94-5); Slocum et al. Ch.6 (Scale & Generalization)
	Mon. Sept. 21	<b>MAP Library</b> Intro. and Lab	Review Compass and USGS Topo Map Guidelines
	Wed. Sept. 23	<b>Section 3</b> - Navigation, GPS and Map Interpretation	Complete the Google Compass Activity
Fri. Sept. 25	Shellito 2014 Ch.4 (GPS); eTrex Owner's Manual		
Mon. Sept. 28	Monmonier (p.45-71); <b>Hiking Route Lab Due</b>		
5	Wed. Sept. 30	<b>Midterm I</b> (in-class)	Study for Midterm I
	Fri. Oct. 2	<b>Section 4</b> – Geographic Information Systems and Science	K&W (p.18-59)
	Mon. Oct. 5		K&W (p.60-73); <b>GPS Import X,Y Coordinates Lab Due</b>
Wed. Oct. 7	Guest Lecture: Dr. Beverley Wemple		
6	Fri. Oct. 9	Section 4 Continued	Browse ESRI.com website; Short GIS Lab Due
	Mon. Oct. 12		<b>Exam Wrapper Due</b>
	Wed. Oct. 14	<b>Section 5</b> – Mixed Research Methodologies (spatial statistics, qualitative analysis, participatory research, community GIS and critical GIS)	<b>Group Project Proposal Due</b>
Fri. Oct. 16	K&W (p.48, 50-1, 152-165)		
Mon. Oct. 19	Tufte 2001 (select sections); <b>Joining Tabular Data Lab Due</b>		
8	Wed. Oct. 21		Monmonier (p.189-255)
	Fri. Oct. 23		Nelson (forthcoming); <b>Spatial Statistics Lab Due</b>
	Mon. Oct. 26	Cumulative Review for Exam	Study for Midterm II
9	Wed. Oct. 28	<b>Midterm II</b> (in-class)	Study for Midterm II
	Fri. Oct. 30	<b>Midterm II</b> (lab component)	Study for Midterm II
	Mon. Nov. 2	<b>Section 6</b> – Image interpretation, analysis and remote sensing	Kimerling et al. (Map Use Ch. 9); Aronoff Chs. 1 & 2
Wed. Nov. 4	Aronoff Chs. 3 & 4		
Fri. Nov. 6	Set up a USGS Account and Download Data for Lab		
11	Mon. Nov. 9		Monmonier (Ch. 8)
	Wed. Nov. 11	<b>Section 7</b> – Cartography and Geovisualization	K&W (p.107-139); <b>Essay due Friday, November 20th</b>
	Fri. Nov. 13		K&W (p.168-199); <b>Landsat Classification Lab Due</b>
12	Mon. Nov. 16	Guest Lecture - Dr. Mark Monmonier	Monmonier (Chs. 4 & 5); <b>Aerial Photo Lab Due</b>
	Wed. Nov. 18	Section 7 Continued	K&W (p.202-243); Geography Awareness Week (GAW)
	Fri. Nov. 20		No class meeting, see GAW event list; <b>Essay due today</b>
	Nov. 23-27	<b>Thanksgiving Recess</b>	
13	Mon. Nov. 30	Cartographic peer-review clinic	All drafts of final project maps due in class
	Wed. Dec. 2	Final project work	Final Project Work (see posted readings and handout)
	Fri. Dec. 4		
14	Mon. Dec. 7	Cumulative Review for Exam	Study for Final Exam; Continue Final Project Work
	Wed. Dec. 9	In class final group presentations - Last day of class	No assigned readings
<b>FINAL EXAM – December 11<sup>th</sup>, 7:30-10:15am in our normal classroom (Hills 226)</b>			

**Full Citations for the short readings posted in Blackboard:**

Aronoff, S. 2005. *Remote Sensing for GIS Managers*. Redlands, CA: ESRI Press.

Dent, B.D., Torguson, J.S. and T.W. Hodler. 2008. *Cartography: Thematic Map Design* (6<sup>th</sup> Edition). Boston: McGraw-Hill.

Kimerling, A.J., Buckley, A.R., Muehrcke, P.C. and Muehrcke, J.O. 2010. *Map Use: Reading and Analysis, Sixth Edition*. Redlands, CA: ESRI Press Academic.

Nelson, I.L. forthcoming. Responding to Technologies of Fixing 'Nuisance' Webs of Relation in the Mozambican Woodlands (Section Four: Gender, science, ecology; A response to Dianne Rocheleau's 'Rooted Networks, webs of relation, and the power of situated science bringing the models back down to Earth in Zambrana' (2007). In W. Harcourt (ed.) *The Palgrave Handbook on Gender and Development: Critical engagements in feminist theory and practice*. New York and London: Palgrave Macmillan.

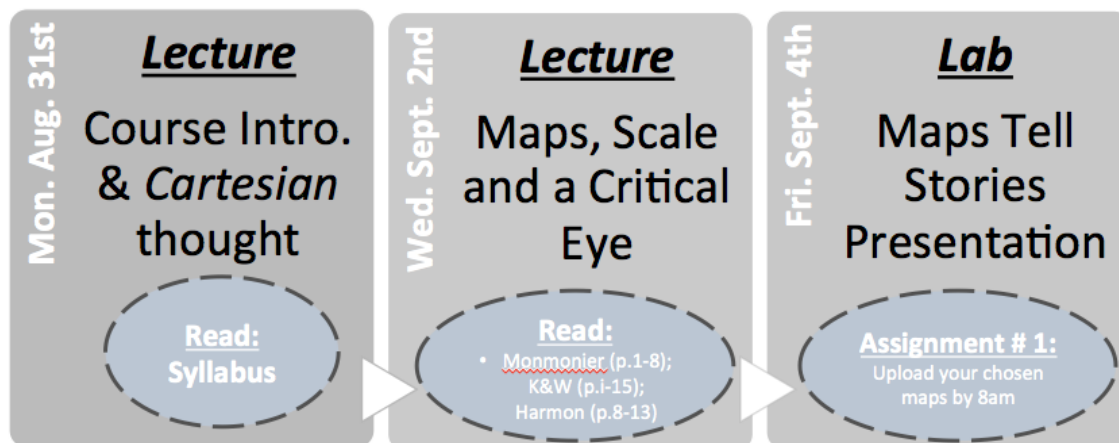
Shellito, B.A. 2013. *Introduction to Geospatial Technologies* (2<sup>nd</sup> Edition). New York: W.H. Freeman and Company.

Slocum, T.A., McMaster, R.B., Kessler, F.C. and H.H. Howard. 2009. *Thematic Cartography and Geovisualization* (3<sup>rd</sup> Edition). Upper Saddle River, NJ: Prentice Hall.

Tufte, E.R. 2001. *The Visual Display of Quantitative Information*. Cheshire, CT: Graphics Press.

# GEOG 081 Section 1 Details

## Section 1 – Course Introduction



### Monday, August 31<sup>st</sup> Lecture: GEOG 081 Overview of the Course

- Make sure that you review the syllabus today.
- **Assignment # 1 (due Friday, September 4<sup>th</sup>):**

Find two maps that interest you:

- The first map should communicate a clear story very well
- The second map should be an example of a badly designed map

Prepare brief written comments concerning each map that you will present to the class on Friday in our lab (one minute per map).

Submit the URL for each map and your comments in the Blackboard upload space before 8am on Friday (September 4<sup>th</sup>).

Potential Sources for Maps Include:

[www.cartotalk.com](http://www.cartotalk.com) (you will need to create an account)

Library of Congress – <http://memory.loc.gov/ammem/gmdhtml/gmdhome.html>

ESRI (GIS Software Vendor) – <http://arcgis.com/home/gallery.html>

<http://www.esri.com/mapmuseum/index.html>

Others:

<http://www.davidrumsey.com>

<http://hcl.harvard.edu/libraries/maps/collections/print.cfm>

[http://en.wikipedia.org/wiki/Map\\_collection](http://en.wikipedia.org/wiki/Map_collection)

### Wednesday, September 2<sup>nd</sup> Lecture: Maps, Scale and a Critical Eye

- Read Monmonier (p.1-8); K&W (p.i-15); Harmon (p.8-13)

### Friday, January 17<sup>th</sup> Lab: Present Assignment #1

- Upload your map links AND comments by 8am in Blackboard
- Be prepared to discuss the following (during our lab presentations of the online maps):

1. *What kinds of data and what kinds of information are presented in this map? Can you identify maps with quantitative versus qualitative data? Which maps effectively mix both quantitative and qualitative data?*
2. *Did the authors and cartographers exclude particular topics or information? What is missing?*
3. *How transparent are the authors, cartographers and editors regarding their cartographic choices? Do they explain what they left out or emphasized and why?*

**Readings for Next Wednesday, September 9<sup>th</sup>:**

- 'Map Use, Ch. 1' by Kimerling et al. (Blackboard)
- 'Elements of Map Projections' by Slocum et al. (Blackboard)