

# Our Digital Globe: An Overview of GIScience and its Technology

## Geography 170

Tuesday & Thursday 2:30-3:45pm  
6102 Social Science

**Lecturer** Jamon Van Den Hoek  
**Office Hours** T & R 4:00-5:00pm, 460 Science Hall  
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### Course Description

This course explores the geospatial information that surrounds us – maps, images, and location-specific data. Geospatial data are acquired from many different sources – land surveying, aerial photography, satellite remote sensing, global positioning systems and social surveys like the U.S. Census. Geospatial data, and the maps created from this data, are important communication tools conveying information such as locations of people and objects, how to navigate from one place to another, and the spatial trends of various phenomena of the natural and human landscape.

Geography 170 explores the creation, distribution and growth of geospatial data, and the application of geospatial technologies (GPS, remote sensing, GIS) used to turn data into maps, tables and other forms of information and expression. This course is an introduction to the field of Geographic Information Science (GIScience), which researches the design, development and use of geospatial information.

### Course Objectives

By the end of the semester, students will develop an understanding of how maps are created and how geospatial information is represented and conveyed through the use of maps. Students will also develop a basic understanding of related geospatial technologies (remote sensing, GIS) and an appreciation of how these technologies have improved and enhanced our ability to convey spatial information. This course is also designed to help students become knowledgeable and critical users of maps, able to examine the advantages and considerable limitations of geospatial data and map products. As career opportunities in the field of GIScience continue to grow, the course also serves as a preparatory course for further study in Cartography and Geographic Information Science.

### Course Prerequisites

No previous experience with map-making or GIS is required; however, students should be comfortable with basic math and interested in working with maps, satellite imagery and related products. Students will occasionally need a basic calculator to complete in-class exercises and will need a calculator for each exam. Students will *not* be allowed to use the calculator on their cell phones or PDAs.

### Textbooks and Readings

Our textbook is Kimerling, A.J., Muehreke, P.C. & Muehreke, J.O. (2005). *Map Use: Reading, Analysis, and Interpretation, 5th Edition*. Madison, Wisconsin: JP Publications. A copy of the course textbook has been placed on reserve in Geography Library (280 Science Hall).

Supplemental readings will be required throughout the semester, and are denoted in the course calendar by the letters SR. These readings will be placed on the course website (Learn@UW – learnuw.wisc.edu).

1. SR1: Robinson, A.H., et al. (1995). *Elements of Cartography, 6<sup>th</sup> Edition*. New York: John Wiley & Sons, Inc.
2. SR2: Delaney, J. & Van Niel, K. (2007). *Geographical Information Systems: An Introduction, 2nd Edition*. Melbourne, Australia: Oxford.
3. SR3: Campbell, J. (2001). *Map Use & Analysis, 4th Edition*. New York: McGraw-Hill.

### **Grading and Evaluation**

Your final grade for this course is based on your performance on exams, assignments and quizzes.

Students are expected to attend all class meetings and actively participate in class discussions and exercises. Although class participation is not a component in your final grade, attending class regularly will help ensure you succeed especially since we will have in class discussions and examining the visual nature of maps and images.

Your grade in this course is based on two exams, in-class and out-of-class quizzes, and assignments, which total to a possible 1,000 points. Each evaluation component is described below. The points assigned to each component are as follows:

Exam 1 = 250 points	In-class quizzes (Best 3 of 4) = 150 points
Exam 2 = 300 points	Online quizzes (Best 3 of 4) = 150 points
	Assignments (3) = 150 points

1. Exams: You must complete two exams in this course, which are non-cumulative. Exams consist of multiple choice and T/F questions, short answer questions and the solution of map-related tasks. Each exam is designed to assess your understanding of assigned readings and material presented in class, as well as your ability to understand and describe information presented in maps and map-related products.

Students are expected to take exams at their scheduled times. *No alternative exam times will be scheduled except in extreme circumstances.* You must contact me as soon as possible prior to the exam date with appropriate documentation so that alternative arrangements can be made.

2. Quizzes: You will complete four quizzes in this course, with your top three scores counting towards your final grade; i.e., you are allowed to drop your lowest score. Because of this, *no* make-ups will be given for quizzes – if you miss class the day of a quiz, you will receive a 0. Quizzes will be brief (10-15 minutes) and distributed at the start of class so it is imperative that you arrive to class on time on quiz days. The dates corresponding to each quiz are given in the course calendar with the lecture material covered by each quiz in parentheses. For example, Quiz 1 will take place at the start of class on September 20th and will cover material presented in class on September 13th and September 15th.
3. Assignments: You will complete three assignments throughout the semester. Assignments are distributed and discussed at the end of class on the date listed in the course calendar. Typically, if an assignment is distributed on Tuesday, it will be due prior to the start of class the following Tuesday. If an assignment is distributed on Thursday, it will be due prior to the start of class the following Thursday. Any changes to this general guideline will be discussed in class prior to the distribution of the assignment, and all due date information will be presented clearly at the top of each assignment.

Assignments must be submitted either in class or via email *prior to the start of class* on the day it is due. *If you are unable to complete an assignment by the deadline, I must be made aware in advance of the deadline.* Do not assume you will be granted an extension. Only in cases of verified illness, family or personal emergencies, or other extenuating circumstances (accompanied by appropriate documentation) will assignments be accepted without penalty. An assignment can be submitted after the due date without a documented excuse, however it will be assessed a 10% penalty per 24-hour period beyond the deadline (e.g., 1 day late = -10%, 2 days late = -20%, etc.).

4. Online quizzes: You will complete four out-of-class quizzes during the semester, with your top three scores counting towards your final grade; i.e., you are allowed to drop your lowest score. Online quizzes will be posted and completed on the class Learn@UW website on the days listed on the course calendar. Typically, you will have 2-3 days to complete the quiz once it has been posted; submission deadlines will be listed on the class Learn@UW announcement page as well as the introductory text to the quiz. No extensions to the submission deadline will be made – students who fail to submit their out-of- class quiz within the allotted time will receive a 0.

### **Grading Guideline**

The baseline grade for the course is a B, which translates to meeting the course requirements with serious effort. Meeting course requirements with outstanding achievement will result in an A; satisfactorily meeting all requirements merits a C; not fully meeting all requirements with some demonstrated effort or failing to meet all requirements will result in a D or F, respectively.

### **Additional Course Information**

- I do not distribute copies of lecture material. If you miss class, you need to obtain notes from another student. However, I will place figures of key maps, photos, imagery, graphs and websites discussed in class on the course Learn@UW website.
- Course information is disseminated in class or via the course website on Learn@UW. It is your responsibility to obtain this information and check the course website regularly. I intend to keep changes to the syllabus to a minimum, but do keep in mind that changes to the syllabus may occur. If changes are made, I will inform you in class and via the course website.
- A note on scholastic dishonesty: Academic honesty and integrity is expected at all times. All work, including assignments, quizzes and exams, must be completed individually by each student. It is expected that work submitted by a student reflects his or her original ideas and responses. Submissions that reflect substantially similar work by more than one student will be dealt with as an act of scholarly dishonesty and credit will be deducted from each assignment in question. Scholarly dishonesty includes: “cheating on an examination; collaborating with others in work to be presented, contrary to the stated rules of the course; submitting a paper or assignment as one’s own work when a part or all of the paper or assignment is the work of another; submitting a paper or assignment that contains ideas or research of others without appropriately identifying the sources of those ideas...” Please refer to the “Student Academic Misconduct Policy & Procedures” document produced by Student Advocacy & Judicial Affairs division of the Offices of the Dean of Students for further information.
- A note on class etiquette: Cell phones must be silenced when you are in lecture. In addition, please refrain from reading the paper, participating in social conversations and other disruptive behavior during lecture.

### **Course Calendar**

TOPIC	DATE	LECTURE	READING	ACTIVITY
Geospatial Data Basics	T Sept. 6	1. Course overview & thinking spatially		
	R Sept. 8	2. Geographic information & representation	Introduction	
	T Sept. 13	3. Geodetics and geomatics	Ch 1	
	R Sept. 15	4. Map projections	Ch 3 (skim projections)	
	T Sept. 20	5. Coordinate systems	Ch 4: 68-76	Quiz #1 (Lectures 3 & 4)
	R Sept. 22	6. Land partitioning systems	Ch 5: 84-93	Assignment #1
	T Sept. 27	7. Locational systems (cont.)	---	
	R Sept. 29	8. Map scale	Ch 2	
	T Oct. 4	9. Portraying terrain 1	Ch 8: 142-156	Online quiz #1
	R Oct. 6	10. Portraying terrain 2	---	
Collecting Geospatial Data	T Oct. 11	11. GPS	Ch 14	
	R Oct. 13	12. Remote sensing basics	Ch 9: 162-164	Quiz #2 (Lectures 9-11)
	T Oct. 18	13. Aerial photographs and satellite imagery	Ch 9: 164-173, 178-187	Online quiz #2
	R Oct. 20	14. Remote sensing in action	---	
	<b>T Oct. 25</b>	<b>Exam 1</b>		
Representing Geospatial Data	R Oct. 27	15. Cartography & geospatial data	SR1: 271-274	
	T Nov. 1	16. Maps & generalization	SR1: 450-457	Online quiz #3
	R Nov. 3	17. Thematic maps 1	Ch 6	Assignment #2
	T Nov. 8	18. Thematic maps 2	Ch 7	
	R Nov. 10	19. Special purpose maps	---	
	T Nov. 15	20. Animated mapping	---	Quiz #3 (Lectures 17-19)
	R Nov. 17	21. GIS & geospatial data	SR2: Ch 1 & 2	Online quiz #4
	T Nov. 22	22. GIS analytics and applications 1	SR3: 305-311	
	R Nov. 24	<i>Thanksgiving break</i>		
T Nov. 29	23. GIS analytics and applications 2	---		
Applications, Issues & Critiques	R Dec. 1	24. Analyzing spatial patterns	Ch 17: 326-332, 336-337 & Ch 18: 346-352, 358-359	Quiz #4 (Lectures 21-23) & Assignment #3
	T Dec. 6	25. GIScience in action	Ch 24: 478-491	
	R Dec. 8	26. Geospatial data quality	Ch 10	
	T Dec. 13	27. Maps as viewpoints	SR3: Ch 16	
		<b>R Dec. 15</b>	<b>Exam 2</b>	