## GEOG 104 (Fall 2009) Geographic Information Science and Spatial Reasoning (GE course in the category of FOUNDATION: Mathematics/Quantitative Reasoning) Class Web site <u>http://map.sdsu.edu/geog104/</u> Blackboard URL: <u>https://blackboard.sdsu.edu/</u>

Lectures: Tue. / Thurs. 11:00am - 12:15pm Location: Storm Hall 248 Web-based GIS exercises: <u>http://map.sdsu.edu/geog104/lab.htm</u>

Instructor:	Dr. Ming-Hsiang Tsou	TA: Justin Shepard
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Office Hours:	Monday 4:00pm - 5:00pm	Office Hours: Friday 11am-12pm in SAL lab
	Tuesday 4:00pm - 5:00pm	or by appt. (619) 594-2599
	or by appt. (619) 594-0205	

### **Overview:**

This course will introduce fundamental concepts of geographic information science (GIScience), including geographic information systems (GIS), global positioning systems (GPS), cartography, remote sensing, and spatial statistics. Advanced geospatial application tools, such as Google Earth, Google Map, iPhone Applications, and the National Geographic Map Machine will be used to demonstrate these concepts. Students will learn how to use these geospatial technologies and tools in addressing human and environmental problems. Students will learn how to organize geospatial data, visualize spatial patterns, and conduct basic spatial query and map overlay functions.

Prerequisites: Satisfaction of the Entry-Level Mathematics requirement (ELM).

### **Required Textbooks:**

Longley, Paul A., Goodchild, Michael F., Maguire, David J., and David W. Rhind. (2005) Geographic Information Systems and Science (Second Edition), John Wiley and Sons, Toronto.

**Lectures:** Lecture sessions emphasize the principles and concepts of GIScience and spatial reasoning, including spatial analysis theory, GIS operations, Cartography, spatial statistics, remote sensing, and computer technology. Lecture notes are available on the class website.

### Web-based Assignments (Homework):

This course will provide a series of web-based GIS exercises. Students may utilize any campus computer or their home computers using high speed Internet access. Web-based assignments are due at the beginning of the lecture (11:00am) on the due date. Late submissions will be docked 20% per day, beginning on the due date. This course also provides students with access to the SAL lab (Storm Hall 338) on **Friday mornings between 11:00am to 12:00pm** for students who need to access high speed Internet.

# Grading:Class participation 5%;<br/>Web Exercises: 30%;Discussion Board: 15%;<br/>Midterm Exam: 20%;Final Exam: 30%

Midterm and final exams include 10 multiple choice questions, four problem solving questions (computation), and four short answer questions (4-5 sentences).

For the web-based exercises, there are several GIS modules with on-line demo and exercises. Each module consists of multiple choice questions, short answer questions, and problem solving questions.

Class participation is based on attendance and questions/answers during lectures and on the Blackboard.

We	ek/Dates	Lecture	Reading	Web Exercises
1	1 Sep	Introduction	Butler	No Exercise this week
	3 Sep	Overview of GIScience	Chapter 1	
2	8 Sep	Mapping the Earth	Chapters 2&3	Exercise 1 Mapping the
	10 Sep	Describing location		Earth
3	15 Sep	Network of Geographic Info.	Chapters 4&5	Exercise 1 Mapping the
	17 Sep	Scale and Resolution		Earth
4	22 Sep	GIS software	Chapters 7&8	Exercise 2 Quantitative
	24 Sep	Data Models	Mark, et al.	reasoning
5	29 Sep	GPS introduction	Corvallis	Exercise 2 Quantitative
	1 Oct	Mobile GIS and LBS	Trimble	reasoning
6	6 Oct	GIS Data Collection	Chapter 9	Exercise 3 Georeference
	8 Oct	Geo-processing		and map projection
7	13 Oct	GIS data input	Chapter 10	Exercise 3 Georeference
	15 Oct	Database Management		and map projection
8	20 Oct	Internet and the Web GIS	Tsou	Exercise 4 Web-GIS
	22 Oct		Chapter 11	examples
9	27 Oct	Intro Remote Sensing	(NASA Website)	Exercise 4 Web-GIS
		(Exam review)		examples
	29 Oct	Mid-term Exam		
10	3 Nov	Remotely Sensed Imagery		Exercise 4 Web-GIS
	5 Nov	EMR interaction		examples
11	10 Nov	Cartography	Chapters 12&	Exercise 5 Remote
	12 Nov	Geospatial Visualization	13	Sensing
12	17 Nov	Spatial Analysis	Chapters	Exercise 5 Remote
	19 Nov	Spatial Statistics	14&15	Sensing
13	24 Nov	Furlough Day (No class)		NO Exercises this week
	26 Nov	Thanksgiving (No class)		
14	1 Dec	GIS and Society	Chapter 20	Exercise 6 Spatial
	3 Dec			Analysis
15	8 Dec	The future of Geospatial	Chapter 21	Exercise 6 Spatial
	10 Dec	Technology	Gewin	Analysis
16	15 Dec	Final Exam 11:00 – 12:30		Due date for all missed

		lab exercises (5:00pm)

Additional Readings: (Available via the Internet inside the Blackboard "readings" folder under "Course Documents")

Butler, Declan. (2006). The web-wide world. Nature, 439(16). February 2006, pp. 776-778.

- Corvallis Microtechnology, Inc. (1996). Introduction to the Global Positioning System for GIS and TRAVERSE. URL: <u>http://www.cmtinc.com/gpsbook/index.htm</u>
- Gewin, Virginia. (2004), Mapping opportunities. *Nature*, 427(22). Pp. 376-377. URL: <u>http://www.aag.org/nature/nature.htm</u>
- Mark, David M., Chrisman Nicholas, Frank, Andrew U., McHaffie Patrick H., & John Pickles, (1997), *The GIS History Project Summary Paper*, at URL: http://www.geog.buffalo.edu/ncgia/gishist/bar\_harbor.html

NASA Earth-Sun System Website: http://science.hq.nasa.gov/earth-sun/

Trimble, Inc. (2006). GPS Tutorial. URL: http://www.trimble.com/gps/index.shtml

Tsou, Ming-Hsiang (2009). Chapter 48: The Integration of Internet GIS and Wireless Mobile GIS. In *Manual of Geographic Information Systems*, edited by Marguerite Madden, published by the American Society for Photogrammetry and Remote Sensing (ASPRS), pp. 923-933.