GEOG 484 Introduction to Geographic Information Systems (Fall 2003)

Web site http://typhoon.sdsu.edu/People/Pages/tsou/geog484/

Lectures: Tue. / Thurs. 11:00pm - 11:50pm Location: Storm Hall 248
Labs: Section 1: Tue. 12:30pm - 3:10pm Lab room: Storm Hall 338
Section 3: Thurs. 12:30pm - 3:10pm

Instructor: Dr. Ming-Hsiang Tsou
Storm Hall 326
mtsou@mail.sdsu.edu
Office Hour: Tuesday 3:00pm - 4:00pm
Thursday 3:00am - 4:00pm
or appt. (619) 594-0205

TA: Alexandra Syphard
Storm Hall 308A
asyphard@yahoo.com
Office Hour: TBA
or appt. (619) 594-8037

Overview: This course is designed to demonstrate interdisciplinary features in Geographic Information Systems (GISystems), which involves geography, cartography, computer science, and remote sensing. The lectures and lab exercises will provide an introductory knowledge of GIScience and a balance among spatial analysis theory, computer technology, and GISystems techniques. Students will learn how to get spatial data into the computer, to organize data so that spatial patterns can be explored, and to learn basic GIS concepts such as query and map overlay. In addition to the basic training of GIS software and techniques, the major goals of this class are to:

1. Communicate with GIS professionals and specialists regarding both theoretical and technical issues.
2. Work in groups to conduct GIS projects, which reflects the current GIS industry tasks.
3. Encourage students to focus on critical thinking, to learn the non-objective aspect of GIS, and to prevent the misuse of GIS.

Prerequisites: Three units from Geography 380, 381, 488, or from computer programming. Students should have basic understanding of Cartography or some experiences in using computer software.

Required Textbooks:

1. Michael DeMers (2000). *Fundamentals of Geographic Information Systems*, (Second Edition), New York: John Wiley & Sons, Inc.
2. Tim Ormsby, et. al, (2001). *Getting to Know ArcGIS Desktop: Basics of ArcView, ArcEditor, and ArcInfo*. ESRI Press.

Additional reading and lecture notes will be available from the Geography Department Reading Room (Storm Hall 319).

Lectures: Lecture sessions emphasize the principles and concepts of GISystems, including spatial analysis theory, GIS operations, and computer technology.

Labs Exercise: Students must register one of lab sessions, meeting every week. Lab exercises focus on the training of GISystems skills, basically followed by the ESRI's *Getting to Know ArcGIS Desktop*. Students are required to attend full lab periods to receive a passing grade. To encourage good attendance, students must **sign-in** for each lab session. **Two points will be taken off the whole course final grade for each missed lab.** Lab assignments are due at the beginning of the lab session on date it is due. Late assignments will be docked 20% per day, beginning effective on the due date. Students must hand in all assignments by **noon Friday, December 12, 2003** to receive a passing grade regardless of how many points have been docked.

Grading: **Class participation (lectures): 5%; Lab exercises: 50%;**
Midterm Exam: 20%; Final project: 25%

Final Project:
3-4 students will form a "project team" after the mid-term exam, and choose a possible GIS research topic. (four possible topics are listed next). Each team will select a team coordinator, who will coordinate the work plan of the GIS project. Each team will submit their progress report each week after the mid-term exam. At the end of semester, each team has to submit a "GIS project report" in paper format and present it in front of the class as the final exam. The paper should include two parts:

Group report (10-15 pages, double space):
Individual report (3-5 pages, double space):

Detail descriptions of Final project will be mentioned later before the mid-term exam. Here are some possible research topics:

1. Site Selection for a new San Diego International Airport.
2. Evaluation of housing price in San Diego.
3. Design a new route-extension for the Trolley System in San Diego.
4. Design a one-day bus tour in San Diego.

Please Note: I do not give incompletes. I do not give make-up exams.

	Week	Lecture	Reading	Lab Exercise
1	2 Sep 4	Introduction What is a GIS? The Nature of GIScience	Abler; Goodchild Ch. 1 (DeMers)	**No lab this week**
2	9 Sep 11	History of GIS Nature of Spatial Data	Coppock Ch. 2 (DeMers)	Lab 1 ArcView-Basic
3	16 Sep 18	Map display Symbolization	Ch. 3 (DeMers)	Lab 2 ArcView-Functions
4	23 Sep 25	GIS Data Structure GIS Database I	Ch. 4 (DeMers)	Lab 3 ArcGIS-1 (Ch. 3,4)
5	30 Sep 2 Oct	Data Process GIS operation	Steinitz Ch. 5, 6 (DeMers)	Lab 4 ArcGIS-2 (Ch. 5, 6, 7)
6	7 Oct 9	GIS Analysis I Map Projection	Sinton Ch. 7, 8 (DeMers)	Lab 5 ArcGIS-3 3D GIS
7	14 Oct 16	**Guest Speech (Web-GIS)** Object-oriented modeling	Tsou (1996) Ch. 9,10 (DeMers)	Lab 6 ArcGIS-4 (Ch.8, 9, 10)
8	21 Oct 23	GIS Analysis II Introduction of Team Project (Exam review)	Ch. 11, 12, 13 (DeMers)	Lab 7 ArcGIS-5 (Ch. 11, 12, 13)
9	28 Oct 30	**Mid-Term Exam** Project Management	Ch. 14, 15 (DeMers)	Lab 8 ArcGIS-6 (Ch. 14, 15, 16)
10	4 Nov 6	Internet GIS Visualization and Multimedia	Buttenfield Fabrikant	Lab 9 ArcGIS-7 (Ch. 17, 18, 19)
11	11 Nov 13	Temporal GIS Computer environments		Group Project
12	18 Nov 20	Mobile GIS applications The Future of GIS	UCGIS Tsou (2002)	Group Project
13	25 Nov 27	**Thanksgiving** **(No class this week)**		*Lab open for group projects*

14	2 Dec 4	GIScience vs. GIServices **Project Presentation (1)**	Wright	Group Project
15	9 Dec 11	**Project Presentation (2)** **Project Presentation (3)**		Group Project

Additional Readings: (located in Storm Hall 319 or on-line http://ecr.sdsu.edu/ → geography → GEOG484 → password: _____

1. Abler, R. F. (1987). The National Science Foundation National Center for Geographic Information and Analysis. *International Journal of Geographical Information Systems,* 1(4), pp. 303-326.
2. Buttenfield, B. P. (1996). Scientific Visualization for Environmental Modeling: Interactive and Proactive Graphics. In M. F. Goodchild et al. (editors), *GIS and Environmental Modeling*. Fort Collins, Colorado: GIS World Books. pp. 463-469.
3. Coppock, J. T., & Rhind, D. W. (1991). The History of GIS. In D. J. Maguire, M. F. Goodchild, & D. W. Rhind (editors), *Geographical Information Systems: Principles and Applications* (Vol. 1). Harlow, U.K.: Longman Group. pp. 21-43.
4. Goodchild, M. F. (1990). Keynote Address: Spatial Information Science. In *Proceedings of the 4th International Symposium on Spatial Data Handling, Zurich, Switzerland*. pp. 3-12.
5. Fabrikant, S. I. (2000). Spatialized Browsing in Large Data Archives. *Transactions in GIS,* vol. 4, no. 1: 65-78. **(In Reading room only)**
6. Sinton, D. F. (1978). The inherent structure of information as a constraint to analysis: mapped thematic data as a case study. In G. H. Dutton (editor), *Harvard Papers on Geographic Information Systems* (Vol. 7). Reading, Massachusetts: Addison-Wesley. pp. 1-17
7. Steinitz, C., Parker, P., & Jordon, L. (1976). Hand-Draw Overlays: Their History and Prospective Use. *Landscape Architecture,* September, pp. 444-445.
8. Tsou, M. -H., & Buttenfield, B. P. (1996). A Direct Manipulation Interface for Geographical Information Processing. In *Proceedings of the 7th International Symposium on Spatial Data Handling, Delft, The Netherlands*. IGU: 13B.37-13B.47.
9. Tsou, M.H. and Buttenfield, B.P. (2002). A Dynamic Architecture for Distributed Geographic Information Services. *Transactions in GIS*. 6(4): 355-381. **(In Reading room only)**
10. Wright, D. J., Goodchild, M. F. and Proctor, J.D. (1997) Demystifying the Persistent Ambiguity of GIS as 'Tool' Versus 'Science'. *Annals of the Association of American Geographers*, 87(2), pp.346-362.