Geography 578: GIS Applications

University of Wisconsin-Madison

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Lecture Hours:
Tuesday & Thursday 11:00 a.m. – 12:15 p.m. 444 Science Hall

Lab Hours:
See lab syllabus

Instructor Office Hours:
Tuesdays & Thursdays: 1:30 p.m. - 2:30 p.m.

TA Office Hours:
See lab syllabus

1. Course Description:

This course focuses on the uses and applications of GIS techniques in solving practical geographic problems. It introduces a generic process for applying GIS techniques in geographic problem solving. The process includes conceptualization of a geographic problem and development of strategies for solving the problem in a GIS environment. The conceptualization focuses on decomposing of a given geographic problem into smaller but interconnected components. The development of strategies looks into specific GIS techniques for solving each of the smaller components so that the overall question can be addressed using GIS. The emphasis is not on the specifics of particular GIS techniques rather on the selection and use of various GIS techniques based on the domain knowledge dictating the problem at hand. The process is further illustrated via the analyses of several case studies of GIS applications in geography. These case studies range from human to physical geography. The course is divided into three basic components: introduction of the generic process of GIS application, case studies illustrating this process, and students projects using this process. Students are encouraged to select the disciplinary domains for their projects.

The objectives are: 1) To provide students with a generic process of solving geographic problems using GIS and to develop student's skills in conceptualizing geographic problems and in developing GIS strategies to solve the problems. 2) To provide student the practical experience on managing GIS projects.

2. Evaluation and grading:

2.1 Components of Evaluation:

Midterm Exam	**15%**
Exercises (four of them)	**20%**
Student Project	**50%**
Planning documents	10%
Presentation	20%
Final report	20%
Classroom Participation	**15%**
Attendence	5%
Discussion	10%

2.2 Grading policy:

Grades of exercises are based on:

1) the academic merit of your answers to the questions
2) clarity of answers, ***NO BEATING AROUND THE BUSH***
3) concise and logical presentation, no one wants to flip through a messy assignment report and looks for answers.

The grade for each of the exercises and examinations is reported as ***points_scored*** / ***total_points_of_exercise***. For example, an assignment has 20 points and your answer is worth 18 points then you should see ***18/20*** on your marked assignment.

2.3 Due date and time:

Each of the assignments will have a due day clearly written underneath the title of the assignment. The due time is 5:30 p.m. on the due day. Any assignment which is turned after the due time on the due day is considered late.

2.4 Penalty for late assignments:

The penalty of a late assignment is based on the number of days late (***including weekends!***). If an assignment is late less than 24 hours, it is considered 1 day late. If an assignment is late less than 48 hours but more than 24 hours, it is considered 2 days late, and so on. If you have to turn in an assignment late during the working hours and the instructor is not in his office, you can put it in the instructor's mail box. However, the assignment will be considered to be turned in when the instructor takes it out of his mailbox.

Late assignments are penalized 10% per day. Here is the formula for calculating the points of a late assignment:

$$Points\_get = Points\_scored - 0.1*num\_days\_late*Points\_scored$$

The minimum value of *Points_get* is 0. Assignments handed in after the instructor has returned the graded assignment to class (usually a week after the due date) will receive ***no points***.

3. Prerequisites:

Geog 377/CEE 357 or equivalent.

4. Computer Environment and Software:

MapInfo on a PC platform will be used for the exercises. Students are free to choose whatever GIS packages on whatever platforms for their individual class projects.

5. Other Important Issues:

Class attendance is accounted as part of classroom participation and classroom participation includes asking questions and engaging in discussion.

There may be a time that the class is full and there are people waiting to get into the class. Those of you who are registered for this class but later decide not to take the course, please let the instructor know as soon as possible so that he can add the people on the waiting list to the class list.

Only medical reasons may be taken as excuses for turning in an assignment late or missing a class. However, you must provide a written report from a medical doctor stating your inability to attend class and/or complete an assignment.

The instructor and the TA will certainly give you ample time to complete each assignment. There is no reason for them to be informed that the computer is down or the software is not working a day before the assignment is due. They will ***NOT*** take this as an excuse for turning an assignment late!

6. Intended Topics and Tentative Schedule:

Lecture 01: (Jan. 20)

Introduction to Geog. 578
The article in the New York Times
CNN articles on targeting voters
Mapping out the US sniper's profile
Project Requirements

Lecture 02: (Jan. 22)

An example of GIS application (neighborhood complaint)
Introduction to a systematic approach in GIS application
Conceptualization of geographic problems
Student projects:
Project ideas (students) I

Lecture 03: (Jan. 27)

Implementation of strategies for solving geographic problems using GIS
Student projects:
Project ideas (students) II

Lecture 04: (Jan. 29)
Flooding scenarios for an insurance company (Conceptualization)
Flooding scenarios for an insurance company (Implementation)
Student projects:
Project ideas (students) III

Lecture 05: (Feb. 3)
Preparation of capstone statement
Examples of capstone statement (executive statement)
Student projects:
Project ideas (students) IV

Lecture 06: (Feb. 5)
Bank branch performance assessment (Conceptualization)
Bank branch performance assessment (Implementation)
Student projects:
Finalize student projects

Lecture 07: (Feb. 10)
Student projects:
Capstone statement for individual projects (class presentation)

Lecture 08: (Feb. 12)
Discussion of Project mini proposal

Lecture 09: (Feb. 17)
Student projects:
Presentation of Mini proposal (class presentation) I
During lab session of the week
Student projects:
Presentation of Mini proposal (class presentation) II

Lecture 10: (Feb. 19)
Conceptualization (class presentation) I

Lecture 11: (Feb. 24)
Conceptualization (class presentation) II
During lab session of the week
Student projects:
Conceptualization (class presentation) III

Lecture 12: (Feb. 26)
Student projects:
Implementation: virtual (class presentation) I
(Project mini proposal due)

Lecture 13: (March 3)
Implementation: virtual (class presentation) II
During lab session of the week
Implementation: virtual (class presentation) III

Lecture 14: (March 5)
Student projects:
Implementation: pseudo coding (class presentation) I

Lecture 15: (March 10)
Student projects:
Implementation: pseudo coding (class presentation) II
During lab session of the week
Implementation: pseudo coding (class presentation) III
(*Conceptualization document due*)

Midterm: (March 12)

Spring break (March 14 – March 22)

Lecture 16: (March 24)
Student projects:
(students working alone on their projects: data collection)

Lecture 17: (March 26)
Student projects:
(students working alone on their projects: data collection)

Lecture 18: (March 31)
Student projects:
(students working alone on their projects: data collection)
(*Virtual implementation document due*)

Lecture 19: (Apr. 2)
Student projects:
(*students working alone on their projects: actual implementation*)

Lecture 20: (Apr. 7)
Student projects:
(*students working alone on their projects: actual implementation*)

Lecture 21: (Apr. 9)
Student projects:
Project progress report
Discussion of Guidelines for Final project presentation and Final project report
(***Pseudo Coding Documentation Due***)

Lecture 22: (Apr. 14)
Student projects:
(*students working alone on their projects: actual implementation*)

Lecture 23: (Apr. 16)
Student projects:
(*students working alone on their projects: actual implementation*)

Lecture 24: (Apr. 21)
Student projects:
(*students working alone on their projects: actual implementation*)

Lecture 25: (Apr. 23)
Student projects:
(*students working alone on their projects: actual implementation*)

Lecture 26: (Apr. 28)
Final Project Presentation (class presentation) I

During lab session of the week
Final Project Presentation (class presentation) II

Lecture 27: (May 5)
Final Project Presentation (class presentation) III

Lecture 28: (May 7)
A physical geography case study moderning soil survey

Lecture 29: (May 8)
(***Final report due***)

7. Course Materials:

There is no text for this course but some references are listed below

7.1 GIS Application Oriented:

Heit, Michael, H. Dennison Parker, and Art Shortreid (eds.), 1996. *GIS Applications in Natural Resources 2*, GIS World, Inc., Fort Collins, Colorado, 540p.

Huxhold, William E., 1991. *An Introduction to Urban Geographic Information Systems.* Oxford University Press, New York.

Longley, Paul and Graham Clarke (eds.), 1995. *GIS for Bussiness and Service Planning*, Pearson Professional Ltd, Cambridge, England, 316p.

Martin, David, 1996. *Geographic Information Systems: Socioeconomic applications*, Routledge, New York, 210p.

Ripple, William J. (ed.). 1994. *The GIS Applications Book: Examples in Natural Resources: A Compendium*, American Society for Photogrammetry and Remote Sensing, Bethesda, Maryland.

Young, Haines, David Green, and Steven Cousins (eds.), 1994. *Landscape Ecology and GIS*, Taylor & Francis, Bristol, P.A., 300p.

7.2 Other GIS Texts:

Aronoff, Stan. 1989. *Geographic Information systems: A Management Perspective*, WDL Publications, Ottawa, 294pp.

Bernhardsen, Tor, 1992. *Geographic Information Systems*. Longum Park, Norway: Viak IT, 318 p.

Burrough, P.A. and Rachael A. McDonnell, 1998. *Principles of Geographic Information Systems*. New York: Oxford University Press, 333 p.

Burrough, P.A. 1986. *Principles of Geographic Information Systems for Land Resources Assessment*. Walton Street, Oxford OX26DP, Oxford University Press.

Chrisman, Nicholas R., 1997. *Exploring Geographic Information Systems*, John Wiley & Sons, New York.

Clarke, Keith C., 1997. *Getting Started with Geographic Information Systems*. Upper Saddle River, New Jersey: Prentice Hall, 353 p.

Clarke, Keith C. 1990. *Analytical and Computer Cartography*. New York City: John Wiley and Sons.

DeMers, M.N., 1997. *Fundamentals of Geographic Information Systems*. New York: John Wiley & Sons, 486 p.

Dent, Borden D. 1990. *Cartography: Thematic Map Design*. Second Edition. Dubuque, IA: Wm. C. Brown Publishers.

Environmental Systems Research Institute, Inc., 1992. *Understanding GIS: The Arc/Info Method*, Environmental Systems Research Institute, Inc., Redlands, CA, USA.

Goodchild, M.F., L.T. Steyaert, B.O. Parks, C. Johnson, D. Maidment, M. Crane, and S. Glendinning (eds.). 1996. GIS and Environmental Modeling: Progress and Research Issues. GIS World, Inc., Fort Collins, Colorado, USA, 486 p.

Goodchild, M.F., B.O. Parks, and L.T. Steyaert (eds.). 1993. Environmental Modeling with GIS. Oxford University Press, New York, 488 p.

Heit, M., H. D. Parker, and A. Shortreid (eds.). 1996. GIS Applications in Natural Resources 2. GIS World, Inc., Fort Collins, Colorado, USA, 540 p.

Maguire, D.J, M.F. Goodchild, and D.W. Rhind (eds.). 1991. *Geographic Information Systems: Principles and Applications*.

Monmonier, Mark S. 1982. *Computer Assisted Cartography: Principles and Prospects*. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Ripple, William. 1994. The GIS Applications Book: Examples in Natural Resources: a compendium. American Society for Photogrammetry and Remote Sensing, Bethesda, Maryland, 380 p.

Star, Jeffry; and Estes, John. 1990. *Geographic Information Systems: An Introduction*. Englewood Cliffs, New Jersey: Prentice-Hall, Inc.