

GIS in Water Resources Fall 2009

<p>CE 394K.3 University of Texas Tue- Thur, 12:30-2 PM ETC 5.148 Unique Number: 15970</p>	<p>CEE 6440 Utah State University Tue- Thur, 11:30-1 PM ENGR 401 Catalog Number: 41932</p>	<p>CIVE 898 University of Nebraska- Lincoln Tue- Thur, 12:30-2 PM 202 Teachers College (City campus)</p>
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Instructors:

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Course Description

Application of Geographic Information Systems in Water Resources. Digital mapping of water resources information. Spatial coordinate systems. Terrain analysis using digital elevation models. River and watershed networks. Soil and land use mapping. Flood hydrology modeling and flood plain mapping. Terrain analysis for hydrologic modeling.

Integration of time series and geospatial data. Hydrologic Information Systems.

Prerequisites

Graduate standing in engineering or a related discipline.

Course Objectives

The six course exercises are intended to enable you to be able to:

- Plot a map of a hydrologic region including measurement sites and associate it with time series of data measured at those locations;
- Develop a Hydrologic Information System that links time series of water observations to locations where the measurements are made
- Create a base map of a study region including watersheds, streams, and aquifers by selecting features from regional maps;
- Interpolate measured data at points to form raster surfaces over a region, and spatially average those surfaces over polygons of interest;

- Do hydrologic calculations using map algebra on raster grids;
- Build a geometric network for streams and rivers;
- Apply the Arc Hydro data model to a set of streams, watersheds, water bodies, monitoring points and time series of information measured at those points;
- Analyze a digital elevation model of land surface terrain to derive watersheds and stream networks;
- Use remote sensing information in ArcGIS

Course Web Sites

University of Texas.

Public web site: <http://www.ce.utexas.edu/prof/maidment/giswr2009/giswr2009.htm>. This contains the course outline, PowerPoint presentations, class exercises for the course and University of Texas specific information such as UT student work and term papers.

Video web site: <http://utwired.engr.utexas.edu/maidment09>. This contains an archive of the video of each class in Windows Media format.

Utah State University.

<http://www.engineering.usu.edu/dtarb/giswr/2009>. This contains copies of the course outline, PowerPoint presentations and class exercises, archived presentations from each class in Wimba format, and other USU specific information such as USU term paper and student work.

University of Nebraska-Lincoln

<http://snr.unl.edu/airmak/giswr/2009/>. This website contains copies of the course outline, PowerPoint presentations and class exercises, archived presentations from each class in Macromedia Breeze format, and other UNL specific information such as UNL term paper and student work.

Method of Instruction

The course has six elements: lectures, assigned reading materials, homework exercises, a term paper, class interaction, and examinations. All students will have a web page where they will post their term paper proposal and final term paper. Part of the final examination will involve synthesis of the term papers presented in the class to provide an assessment of the state of knowledge in particular subject areas. The course material is divided into modules with each module having one or two lectures and a homework exercise involving extensive use of GIS software.

Term Project

The purposes of the term project are:

1. To enable you to explore in-depth some aspect of the subject of personal interest to you and to develop experience in the use of GIS technology to solve that problem.
2. To provide experience in the formulation, execution and presentation of original research, including the proper documentation of a GIS project.
3. To make an oral presentation and produce a report in html on the world wide web that will be informative to you and to your classmates.

The steps in carrying out the project are:

1. Establish a web page. At Texas, if you don't already have a personal web page, establish one at the University of Texas Webspace <http://www.utexas.edu/its/services/webpub/> . At Utah a web page will be established for you on the Geomatics lab. See the USU class web site for instructions on accessing this. At UNL a web page will be established for you. See the UNL class web site for instructions on accessing this.
2. Prepare a 1-page proposal in html on your website by Thurs Oct 1 specifying the objective of your project and outlining how you plan to go about executing it. Notify the instructor by email that your proposal is available and you will receive a response by email containing an assessment of the scope of work that you propose. After making any revisions in your proposal that seem necessary in the light of this assessment, this proposal defines the scope of your term project.
3. Prepare a 2 page status report on your project to be posted on your website by Tues Oct 27. You are expected to make some progress by mid-semester but the main effort on your term project in the later part of the course once you've learned more about the methods in the course. This report will be read and commented on by the instructor, and perhaps other students.
4. Present a final report orally in class near the end of the semester (you will have 10 -12 minutes for your presentation) and present your term paper in html on your web page by the last day of classes (Dec 4). It is critical that you post your paper by this date because your classmates may need to read your paper in order to complete their final exam.

If you would like to work in a group to pursue a term project, that is fine, but you must carry out a particular section of the project on which you will present your oral and written report.

Archives are available showing the reports from more than 200 term papers done by students in this course from Spring 1997 to last year. See:

<http://www.ce.utexas.edu/prof/maidment/giswr2009/docs/termpaperlibrary.htm>

<http://www.engineering.usu.edu/dtarb/giswr/>

<http://bse.unl.edu/airmak/giswr/2006/>

<http://snr.unl.edu/airmak/giswr/2008/>

Course Computer Environment

This course uses the ArcGIS version 9.3.1 software. The Spatial Analyst and 3D Analyst extensions of ArcGIS will also be used in the course. These programs run under the Windows operating system.

Texas. ArcGIS is available in the Civil Engineering Learning Resource Center. You may want to get a magnetic card so that you can enter the LRC in the evenings or weekends. If you work at the LRC, you'll be assigned a standard amount of disk space for your personal use.

Utah. ArcGIS is available in the Engineering PC lab, ENGR 305.

Nebraska: ArcGIS is available in the Teaching Lab (room 141 and 142) in Hardin Hall at East Campus. Rm 162 at Hardin Hall (24/7 computer lab) is also available to use.

If you have access to the software elsewhere, you can do the computer assignments at that location. You should plan to back up your work on a removable drive (e.g. zip or thumb) to avoid complications from lack of disk space in your personal area.

Course Readings

The readings for this course will be taken from: "Arc Hydro: GIS for Water Resources" Ed by David R. Maidment, published by ESRI Press, 2002, \$59.95 ISBN 1-58948-034-1, see <http://gis.esri.com/esripress/display/index.cfm>

Method of Evaluation

Course grades will be based on a weighted average of results as follows:

Homework 20%
Term Project Written Report 30%
Term Project Oral Presentation 10%
Midterm Exam 20%
Final Exam 20%

The midterm exam will be an in class exam. The final exam will be a take home exam handed out during the last class and due 1 week after the last class. This final exam will include project type GIS analysis as well as essays and short reports that synthesize material from the class and from the term projects of other students in the class.

Letter grades will be assigned as follows:

A = 95 – 100%
A- = 90 – 95%
B+ = 87 – 90%
B = 83 – 87%
B- = 80 – 83%
C+ = 77 – 80%
C = 73 – 77%
C- = 70 – 73%
D = 60 – 70%
F < 60%

There will be no make-up exams or incomplete grades in this course. We reserve the right to change the date of a quiz with notice in advance.

Course/Instructor Evaluation Plan

Course/Instructor evaluation will be conducted separately at each University according to the policies of each University.

Texas. Forms will be distributed during the final lecture period. A student from the class will be asked to distribute and collect the evaluation forms, and to return them to the Department of Civil Engineering office on the 4th floor of ECJ.

Utah. A secretary from the CEE department will conduct the course evaluation during one of the final lecture periods with the instructor not present.

Nebraska. Forms will be distributed during the final lecture period. A student from the class will be asked to distribute and collect the evaluation forms, and to return them to the Department of Civil Engineering office on the 3th floor in Nebraska Hall (city campus)

We also encourage students to speak to us during the semester, and are open to suggestions relating to the course.

Students with Disabilities

Texas. The University of Texas at Austin provides upon request appropriate adjustments for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259, or 471-4241 TDD

Utah. Students with ADA-documented physical, sensory, emotional or medical impairments may be eligible for reasonable accommodations. Veterans may also be eligible for services. All accommodations are coordinated through the Disability Resource Center (DRC) in Room 101 of the University Inn, (435)797-2444 voice, (435)797-0740 TTY, or toll free at 1-800-259-2966. Please contact the DRC as early in the semester as possible. Alternate format materials (Braille, large print or digital) are available with advance notice.

Nebraska: The University of Nebraska provides upon request appropriate adjustments for qualified students with disabilities. For more information, 132 Canfield Administration Building or contact the Office of the Dean of Students at 472-3787.