

GIS IN WATER RESOURCES

CE 413/513, 3 credits

Prerequisites: Senior or graduate in Engineering or one previous GIS course

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Course Description

The course presents the application of Geographic Information Systems in Water Resources. Arc Hydro concepts, components, and typical applications are discussed. The course provides introduction and hands-on experience with

- Creating hydro networks of rivers and streams and river addressing
- Defining drainage areas: DEMS: catchments, watersheds and basins
- Connecting geospatial features to time series measurements recorded at gauging sites

CE 413 Learning Objectives

- Demonstrate the basic concepts and operation of GIS for water resources
 - Data models, data sources, map projections, Arc Hydro modeling concepts
- Demonstrate ability to create digital data models of water resources in GIS:
 - From existing data sources, such as NHD, River Reaches, time series, etc.
 - From DEMS to create watersheds, streams and drainage points
 - Apply ArcHydro data model
 - Build a geometric network for streams and rivers
- Demonstrate ability to conduct spatial analyses of water resources
 - Conduct hydrologic calculations using map algebra on raster grids
 - Analyze a digital elevation model of land surface terrain to derive watersheds and stream networks

CE 513 Learning Objectives

- Above CE 413 Learning objectives and
- Demonstrate an in-depth aspect of GIS technology to solve a water resource problem
- Demonstrate formulation, execution and presentation of original research, including the proper documentation of using GIS to solve a water resource problem.
- Demonstrate oral presentation skills and dissemination of results through web posting

Textbook

Optional: Maidment, David R., Arc Hydro: GIS for Water Resources, ESRI Press, 2002

Method of Evaluation

Course Work - 60%
Midterm Exam - 20%
Final Exam - 20%

Course Outline

WK 1	Introduction to GIS in Water Resources and ArcGIS
WK 2	Data Sources, Map Projections and Coordinate Systems
WK 3	Raster Spatial Analysis in GIS and Hydrology
WK 4	Watershed and Stream Network Delineation
WK 5-6	Midterm Exam and Arc Hydro and River Networks
WK 7-9	Integration of Geospatial and Temporal Information
WK 10:	CE 513 Presentations

Blackboard

This course uses Blackboard extensively. Lecture notes, slide presentations, assignments and grades are posted on Blackboard.

Lab Procedures

- GIS projects create many files. ***File organization and UNIX file naming conventions are essential.***
 - Keep each lab exercise in its own folder.
 - File naming conventions- no spaces or characters. 8 characters long.
- To transfer your work home or to another computer by SSH file transfer, thumb drives, VPN and remote desktop, etc.
- Computing questions: <http://enr.oregonstate.edu/computing/>
 - How to print wirelessly, manage or forward email, etc.
- To work remotely - install VPN then connect through Remote Desktop. Depending on where your class work is stored used either ENGR and/or ELVIS drives.
 - Host Name: flop.engr.orst.edu** (for the Z drive)
 - Host Elvis: elvis.ce.oregonstate.edu** (for Elvis)
 - Login Name: engineering**(enter your engineering login name)
- ArcGIS software is available around campus (Geography, Milne, Forestry, etc.)
- Lab Assignments must follow lab format. See separate document.

CE 513 Term Project

The purposes of the term project are:

1. To provide an opportunity to explore an in-depth aspect of a GIS application for Water Resources. Graduate students select their own water resource topic and project area to be developed in GIS. Term projects develop a GIS prototype (a small region of your study area) to prove your methodology of your entire project area.
2. To provide experience in the formulation, execution and presentation of research, including the proper documentation of a GIS project.

3. To make an oral presentation and produce a report in html on the web that will be informative to you and to your classmates. Discuss objective, methodology, flow chart of processing steps, results, and modifications to methodology, if required. Include metadata for your data sources (data source, resolution, scale, date, meaning of attributes, map projection, etc.)

The steps in carrying out the project are:

1. Establish a personal web page on “public_html” on the Engineering Unix Gateway under your login name. (http://engr.oregonstate.edu/~your_engr_login_name)
2. Post a 1-page proposal in html on your website by the end of the fourth week of class. This document provides the objective of your project and steps required to accomplish it. Email the instructor that your proposal is available and the instructor will review your proposal. This proposal defines the scope of your term project.
3. Post a brief progress report (6th week) on your web page. We need mid-quarter progress but the majority of effort can occur later once you've learned more.
4. During 10th week of class (dead week) present final report orally (5 minutes) and post term paper in html on your web page. Papers must be posted by this date because class may need to read these papers for the final exam.
5. Submit final typed report to Instructor during 10th week of class (last week) and submit electronic form to TEACH.

Links for previous term papers and projects:

<http://web.engr.oregonstate.edu/~arrast/>

<http://www.ce.utexas.edu/prof/maidment/giswr2007/docs/termpaperlibrary.htm>

Note: some links at Texas don't work.

Special Assistance

Services are available for students with documented special needs. (737-4098).