EVR 7056 GIS in Water Resources
Department of Earth and Environment

Spring 2011

Location: GL 274
Time: MW 6:25 - 7:40 PM
Instructor: Assefa M. Melesse
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Office Hours: MW 3:30:00-5:00 PM

Course Description

The course will acquaint students with the application of geospatial analysis to water resources. Both vector and raster GIS will be used to analyze and model watershed processes. Grid-based input data preparation, watershed delineation, flow analysis, routing, overland and channel flow estimation and hydrograph development will be covered. Modeling water quality in a GIS environment will be covered. The use of GIS and remote sensing in spatially distributed watershed analysis, mapping and modeling will be presented using lectures, home works and project.

Objectives

The course is designed to help students to

1. acquaint themselves with geospatial tools in watershed analysis
2. create and process spatial data for hydrologic modeling
3. acquire hydrologic input parameters from remotely-sensed data
4. understand modeling protocols in geospatial hydrology
5. understand and use geospatial statistics in watershed analysis
6. analyze spatial flow, runoff and water balance

Prerequisite: EVR 4934/GIS 5050 or equivalent, EVR 4962 or equivalent or permission of instructor

Required Text:

ESRI. 2002. ArcHydro: GIS for Water Resources. Environmental Systems Research Institute, Inc. Redlands, CA.

Additional Reference

Gurnell, A. M. and D. R. Montgomery. 2000. Hydrological applications of GIS. John Wiley & Sons, Inc. N.Y., NY.

GRADING:

Attendance	5%
4 Home works	30%
Class Exercises	15%
Final Project	50%

A	90-100
B+	88-89
B	80-87
C+	78-79
C	70-77
D+	68-69
D	55-67
F	<55

- Students are required to attend classes regularly
- Late home works will be subjected to point deductions
- Two power point presentations (proposal and final result) and a final report will be required

Academic Misconduct

Florida International University is a community dedicated to generating and imparting knowledge through excellent teaching and research, the rigorous and respectful exchange of ideas, and community service. All students should respect the right of others to have an equitable opportunity to learn and honestly demonstrate the quality of their learning. Therefore, all students are expected to adhere to a standard of academic conduct, which demonstrates respect for themselves, their fellow students, and the educational mission of the University. All students are deemed by the University to understand that if they are found responsible for academic misconduct, they will be subject to the Academic Misconduct procedures and sanctions, as outlined in the Student Handbook.

COURSE OUTLINE

Lec. #	Topic
1	Course Overview Introduction to Hydrology, Hydrological cycles, processes and water balance
2	Review of ArcGIS **Homework 1**
3	Review of ArcGIS cont.
4	**Exercise 1: Displaying, querying and editing hydrological data**
5	Geodesy, coordinate systems, georeferencing and map projections: working with georeferenced data **Homework 1 Due** **Reading Assignment: GIS database and analysis**
6	**Exercise 2: Water balance of Lake Okeechobee and Water Conservation Areas in a spatial context** Creating maps and reprojection
7	Spatial and non-spatial data sources for water resources **Exercise 3: Working with hydrological data from DBHYDRO, SFWMD and other sources** **Home work 2** **Reading Assignment: Surface water hydrology and GIS**
8	Raster GIS and Geospatial data analysis
9	**Exercise 4: Spatial analysis using grids**
10	Terrain analysis using grid **Exercise 5: Terrain analysis** **Home work 2 Due**
11	Watershed and stream network delineation Digital Elevation Models Sink filling, stream burning, Flow direction, flow accumulation **Homework 3**
12	ArcHydro functions over view Contributing area and stream network Flow length Watershed delineation Model Builder **Reading Assignment: Floodplain management and GIS**
13	**Exercise 6: Sink filling, stream burning, flow direction, flow accumulation and steam delineation**
14	Project proposal presentation
15	Project proposal presentation **Homework 3 Due**
16	**Exercise 7: Watershed processing**

17	Storm runoff modeling Concept of excess rainfall Interception, infiltration Curve number **Homework 4** **Reading Assignment: Groundwater hydrology and GIS**
18	**Exercise 8: Runoff depth computation**
19	Soil erosion and water quality issues **Reading assignment: Water quality and GIS**
20	**Exercise 9: Soil erosion estimation using GIS tools**
21	**Exercise 10: Water quality analysis using the Simple Method**
22	GIS and Remote sensing integration Electromagnetic spectrum Sensors and platform
23	Impervious surface area mapping and storm runoff response **Homework 4 Due**
24	Evapotranspiration (ET) modeling Empirical techniques Soil water balance Surface energy balance, remote sensing based ET **Reading assignment: water resources monitoring and forecasting**
25	Project preparation
26	Final project presentation
27	Final project presentation
28	Final project presentation **Paper Due on the final week**