GIS IN WATER RESOURCES
CE 413/513, 3 credits, T/TH 1-4:40pm
Prerequisites: Senior or graduate in Engineering and/or one previous GIS course

Instructor
Dr. Tracy Arras; Owen 246; Tracy.Arras@oregonstate.edu
Office hours: T/TH 12-12:50pm, by appointment and email.

Links
My COE (helpful link): http://engineering.oregonstate.edu/my-coe
Class Data via Internet: http://classes.engr.oregonstate.edu/cce/summer2017/ce413/
Class Data via COE: W:\cce\summer2017\ce413\public_html
Remote Desktop Citrix: http://it.engineering.oregonstate.edu/citrix

Course Description
The course presents the application of geographic information systems (GIS) in water resources. Development of GIS applications for hydrologic mapping and analysis. Creation of watersheds and stream networks from digital elevation models.

The course provides introduction and exercises to enable you to:
• Conduct hydrologic calculations using map algebra and spatial analysis
• Derive watersheds and streams from digital elevation models
• Build hydro networks for streams
• Prepare data in ArcGIS to export to HEC HMS and HEC RAS

CE 413/513 Learning Objectives
• Demonstrate knowledge of basic concepts of GIS for water resources, including: data models, data sources, map projections, and Arc Hydro modeling concepts
• Demonstrate ability to:
  Utilize DEMs to create watersheds, streams and drainage points
  Build a geometric network for streams
  Conduct spatial analyses with hydrologic data
  Conduct hydrologic calculations using map algebra on raster grids
  Prepare data in ArcGIS to export to HEC HMS and HEC RAS models

CE 513 Learning Objectives
• Above CE 413/513 Learning objectives and
• Demonstrate formulation, execution and presentation of original research, including the proper documentation of using GIS to solve a water resource problem.

Textbook
Method of Evaluation

Course Work 50%
Midterm Exam 20%
Class attendance and participation 10%
Final Exam 20%

Grades

Grades are calculated as follows:

97-100 A  87-90 B+  77-80 C+  67-70 D+
94-97 A  84-87 B  74-77 C  64-67 D
90-94 A-  80-84 B-  70-74 C-  60-64 D

Tentative Course Outline

- Water resources and GIS
- Data sources for water resources
- Map projections
- Raster analysis for water resources
- Watersheds and stream delineation
- Geometric Networks
- GEO HEC-HMS and GEO HEC-RAS

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<tr>
<th>Week</th>
<th>Tuesday</th>
<th>Thursday</th>
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<tr>
<td>1</td>
<td>6/27</td>
<td>6/29</td>
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<tr>
<td></td>
<td>Assigned: Lab1 – Intro to ArcGIS</td>
<td>Assigned: Lab 2 – Water resource GIS basemaps</td>
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<td>Due: Lab 1</td>
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<td>2</td>
<td>7/4</td>
<td>7/6</td>
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<td>Independence Day (4th of July, holiday, no class)</td>
<td>Assigned: Lab3 - Raster analysis, thiessen polygons</td>
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<td>Due: Lab2</td>
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<td>Assigned: Lab4 – Dem to watersheds and geometric networks</td>
<td>Assigned: Lab5 – GEO HMS-HEC</td>
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<td>Due: Lab4</td>
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<td>4</td>
<td>7/18</td>
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<td>Assigned: Lab6 – GEO HMS-RAS</td>
<td>Due: Graduate presentations</td>
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<td>Due: Lab5</td>
<td>Due: Final exam</td>
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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, maximum length 10 characters long. This includes folder names and paths. Do not work on Desktop!
- ArcGIS software is available campus (Geography, Milne, Forestry, Owen) and on Citrix.
CE 513 Term Project (graduates only)

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. In general your term project should develop a GIS prototype (a small region of your study area) to prove your methodology. Do not create a project of your entire project area. Undergraduate students may select to duplicate a lab assignment for a different region using new datasets.

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

CE 513 Project (graduates only):

The steps in carrying out the project are:

1. Establish a personal web page on “public_html” on the Engineering Unix Gateway under your engineering 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 second week of class and submit a printed version to instructor by end of class. This document provides the objective of your project, GIS steps required in order to accomplish objectives, and required data sources. This proposal defines the scope of your term project. Provide web page link in printed version.

3. Post a 2-page progress report by the third week of class on your web page and submit a printed version in class.

4. Last day of class present your final oral report, post term paper on your web page and submit printed report to instructor.

Cheating and Student Conduct:

The instructors of this class take the issue of academic honesty very seriously. You are to be honest and ethical in your academic work. There is a “zero tolerance” policy in effect for cheating in this class. Any instance in which a student is caught cheating will be handled in strict accordance with the policies outlined at http://www.orst.edu/admin/stucon/achon.htm. In order to provide students with a positive learning environment, OSU has adopted a pledge of civility, which can be found at http://osu.orst.edu/admin/stucon/index.htm.

Academic dishonesty is defined as an intentional act of deception in one of the following areas:

- Cheating- use or attempted use of unauthorized materials, information or study aids
- Fabrication- falsification or invention of any information
- Assisting- helping another commit an act of academic dishonesty. Helping another commit an act of academic dishonesty, such as emailing your solution to a friend (even
to just look at) or bribing someone to acquire a test or assignment, changing someone's grades or academic records, or taking a test/doing an assignment for someone else (or allowing someone to do these things for you). It is a violation of Oregon state law to create and offer to sell part or all of an education assignment to another person (ORS 165.114).

- **Tampering** - altering or interfering with evaluation instruments and documents
- **Plagiarism** - representing the words or ideas of another person as one's own

When evidence of academic dishonesty comes to the instructor's attention, the instructor will document the incident, permit the accused student to provide an explanation, advise the student of possible penalties, and take action. The instructor may impose any academic penalty up to and
including an "F" grade in the course after consulting with his or her department chair and informing the student of the action taken.

**Disability:**

Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.