GIS IN WATER RESOURCES, Summer 2019
CE 413/513, 3 credits, Tuesday and Thursday – 1:00 pm – 4:50 pm
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 12-1 pm, by appointment and email

TA
Efrain Noa-Yarasca; Owen 233; noayarae@oregonstate.edu
Office hours: F 10-12, 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/summer2019/ce413/
Class Data via COE: W:\cce\summer2019\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

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

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
- No textbook is required.
• ESRI is an excellent source: http://help.arcgis.com/en/arcgisdesktop/10.0/help/.

Method of Evaluation

<table>
<thead>
<tr>
<th>Course Work</th>
<th>50%</th>
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<tbody>
<tr>
<td>Midterm Exam</td>
<td>20%</td>
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<tr>
<td>Class attendance and participation</td>
<td>10%</td>
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<tr>
<td>Final Exam</td>
<td>20%</td>
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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
- Flood Inundation

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<thead>
<tr>
<th>Week</th>
<th>Lecture</th>
<th>Exercise (**)</th>
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<tbody>
<tr>
<td>1</td>
<td>Intro to GIS and Water Resources</td>
<td>Lab1 – Intro to ArcGIS** just need to skim and produce map</td>
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<td></td>
<td>Map Projections</td>
<td>HW1: map projections</td>
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<td></td>
<td>Data Sources</td>
<td>Lab2 – Water resource GIS basemaps</td>
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<td>2</td>
<td>Terrain Analysis</td>
<td>Lab3 - Raster analysis, Thiessen polygons</td>
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<td>Slope vs Flow Direction</td>
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<td></td>
<td>Model Builder</td>
<td>Thursday is July 4th - holiday</td>
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<td>3</td>
<td>DEM to Watersheds</td>
<td>Lab4 – DEM to watersheds and geometric networks</td>
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<tr>
<td></td>
<td>Geometric Networks</td>
<td>HW2: Hand cals of DEM to Watersheds</td>
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<td></td>
<td>Height above Nearest Drainage Flood Inundation</td>
<td>Lab5 - Height above Nearest Drainage Flood Inundation Analysis.</td>
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<td>4</td>
<td>Final Exam – Take Home (Due: Friday, noon)</td>
<td>Course requirement: all students must be present in class on Tuesday and Thursday of week 4.</td>
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<td>Midterm Exam (Tuesday)</td>
<td>All course materials must be submitted by Friday, July 19th, noon.</td>
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<td>Graduate Presentations (Thursday)</td>
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<td>Graduate web pages posted by Thursday, noon</td>
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** Labs may be moved to earlier dates to accommodate summer schedule.
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.

2. To provide experience in the formulation, execution and presentation of research, including the proper documentation of a GIS project. Documentation includes – (1) written paper, (2) presentation to class and (3) web page.

Academic Integrity

Students are expected to comply with all regulations pertaining to academic honesty. For further information, visit Student Conduct and Community Standards, or contact the office of Student Conduct and Mediation at 541-737-3656.

OAR 576-015-0020 (2) Academic or Scholarly Dishonesty:

a) Academic or Scholarly Dishonesty is defined as an act of deception in which a Student seeks to claim credit for the work or effort of another person, or uses unauthorized materials or fabricated information in any academic work or research, either through the Student's own efforts or the efforts of another.

b) It includes:

i) **CHEATING** - use or attempted use of unauthorized materials, information or study aids, or an act of deceit by which a Student attempts to misrepresent mastery of academic effort or information. This includes but is not limited to unauthorized copying or collaboration on a test or assignment, using prohibited materials and texts, any misuse of an electronic device, or using any deceptive means to gain academic credit.

ii) **FABRICATION** - falsification or invention of any information including but not limited to falsifying research, inventing or exaggerating data, or listing incorrect or fictitious references.

iii) **ASSISTING** - helping another commit an act of academic dishonesty. This includes but is not limited to paying or bribing someone to acquire a test or assignment, changing someone's grades or academic records, taking a test/doing an assignment for someone else by any
means, including misuse of an electronic device. It is a violation of Oregon state law to create and offer to sell part or all of an educational assignment to another person (ORS 165.114).

iv) TAMPERING - altering or interfering with evaluation instruments or documents.

v) PLAGIARISM - representing the words or ideas of another person or presenting someone else's words, ideas, artistry or data as one's own, or using one's own previously submitted work. Plagiarism includes but is not limited to copying another person's work (including unpublished material) without appropriate referencing, presenting someone else's opinions and theories as one's own, or working jointly on a project and then submitting it as one's own.

c) Academic Dishonesty cases are handled initially by the academic units, following the process outlined in the University's Academic Dishonesty Report Form, and will also be referred to SCCS for action under these rules.

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.