Geog 515 Watershed Analysis and Modeling

Time and location
TBD; meeting twice a week

Instructor
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Office hours: TBD
Office phone: 229-2671
E-mail: choiw@uwm.edu

Course Description
Theories and applications of analytical and modeling techniques for watershed processes, including geographic information systems (GIS), statistics, and computer simulations.

Learning outcome
The course is intended to enable students to be able to:
- Create a base map of a study region including watersheds, streams, and lakes;
- Analyze a digital elevation model of land surface terrain to derive watershed and stream networks;
- Conduct basic statistical analysis of hydrological data, both temporal and spatial;
- Set up a watershed model for a particular study region and calibrate it;

Class Attributes
3 units Consent required to audit
Undergraduate-Advanced NS
Undergraduate/Graduate
Not open to Undergrad Univ Special Students.

Prerequisite
Junior standing; or graduate standing. Geog 415, Geo Sci 463 or Geo Sci 562 recommended. Working knowledge of GIS required.

Course materials
- Customized course packet
- Computer software: ArcGIS, Matlab, WinHSPF
- Reading list for graduate students

Time commitment for the course
Credit hours: 3
- Time in classroom: 1.25hrs*2*15 = 37.5 hrs
- Time for completing bi-weekly assignments: 5 hrs*7 = 35 hrs
- Time to study for exams: 5 hrs*2 = 10 hrs
- Time for preparation and study: 2 hrs*2*15 = 60 hrs
- Time to prepare for article review: 5 hrs
- Time for graduate project: 30 hrs (graduate student only)
- Time for graduate presentation: 5 hrs (graduate student only)
Total hours for undergraduate: 147.5 hrs
Total hours for graduate: 182.5 hrs

Course topic

Geographic Information System for hydrology
- Re-introduction to GIS
- Watershed and stream network delineation
- Calculating watershed’s physiographic parameters
- Spatial analysis

Statistical analysis
- Frequency analysis
- Probability distribution of hydrological variables
- Objective functions

Dynamic modeling
- Introduction to dynamic modeling
- Modeling building process
- Model calibration and validation

Requirements

- Exams: Mid-term and final exams will be given. Students are allowed to use their books and other materials for the exam. Questions generally require either calculation or interpretation of data. A review session will be offered before each exam.
- Assignments: Assignments will be given approximately every other week to provide students with opportunities to apply concepts and practice skills. Students will solve specific problems using the techniques taught in the class.
- Article review: undergraduate students will have to write a review of an article presented by a graduate student. Each written discussion is due within two weeks from the article’s presentation. Up to three students can discuss the same article. You have to sign up to the article group on a first-come first-served basis. There is an example of a written discussion to an article on D2L-Content. The grading rubric is on D2L-Content.
- Requirements for **graduate students** only
  o Presentation: graduate students will have to read at least two articles from the reading list and present in class for discussion. One should give presentations in separate weeks.
  o Term paper: graduate students will have to write a term paper either of extensive literature review or research project. There is an example of a literature review paper on D2L-Content. A term paper consists of a proposal, a preliminary report, a presentation, and a final paper, each of which has a different deadline and is graded separately. Each graduate student must make an appointment with the UWM Writing Center after submitting a proposal and before submitting a final paper to discuss his/her term paper. The grading rubric is on D2L-Content.
Evaluation

Final grades will be made based on the accumulated total points throughout the course.

<table>
<thead>
<tr>
<th></th>
<th>Undergraduate</th>
<th>Graduate</th>
<th>Grading scale</th>
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</thead>
<tbody>
<tr>
<td>Exams</td>
<td>180</td>
<td>200</td>
<td>A: 90-100%, A-: 87-89%</td>
</tr>
<tr>
<td>Assignments</td>
<td>200</td>
<td>200</td>
<td>B+: 83-86%, B: 80-82%, B-: 77-79%</td>
</tr>
<tr>
<td>Presentation</td>
<td>N/A</td>
<td>100</td>
<td>C+: 73-76%, C: 70-72%, C-: 67-69%</td>
</tr>
<tr>
<td>Term paper</td>
<td>N/A</td>
<td>100</td>
<td>D+: 63-66%, D: 60-62%</td>
</tr>
<tr>
<td>Article review</td>
<td>20 (20)</td>
<td></td>
<td>F: 0-59%</td>
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<tr>
<td>TOTAL</td>
<td>400</td>
<td>600</td>
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Other course policy

- **Academic Integrity**: Plagiarism will not be tolerated in this class and students involved will receive a *zero* grade. Severer cases will be submitted to the University for further scrutiny. The scope and disciplines of student academic misconducts are specified in Chapter UWS 14 and UWM implementation provisions (Faculty Document 1686) and [http://www4.uwm.edu/secu/SyllabusLinks.pdf](http://www4.uwm.edu/secu/SyllabusLinks.pdf). UWM Disciplinary Guidelines can be found in the Office of the Dean of Students, Mellencamp Hall, Rm118.

- **Class Etiquette**: I expect that you will conduct yourself in both lecture and lab in the same manner that you yourself would like to be treated. Class disruptions will not be tolerated as it erodes the educational environment for everyone.

- **Finality of Grade**: All grades, once released on D2L or PAWS, are final except in cases of clerical error.

- **Late penalty**: 10% deduction of your score you would receive with an on-time submission per each full day from the deadline. No score after seven full days from the deadline.

- **Special Accommodation**: Any student who feels he or she may need an accommodation based on the impact of disability, religion, or other civic duty should contact Instructor privately as early as possible to discuss his or her specific needs. A student should notify Instructor, within the first three weeks of the beginning of class, of the specific days or dates on which he or she will request relief from an examination or academic requirement for a religious observance. The student notification will be kept confidential.

- **Other Notice**:
  - Make-ups will be allowed at the discretion of Instructor when a pre-approval has been obtained or in case of emergency with written proof
  - Other unspecified matters will be handled according to the University policies listed on [http://www4.uwm.edu/secu/SyllabusLinks.pdf](http://www4.uwm.edu/secu/SyllabusLinks.pdf)
  - If you are having any trouble in class, please see Instructor as soon as possible

Tentative course schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Class content</th>
<th>Reading</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Course introduction</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Re-introduction to GIS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Watershed and stream network delineation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Calculating watershed’s physiographic</td>
<td>1</td>
<td>#1 handed out</td>
</tr>
</tbody>
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### Reading list for graduate students