Course Description

This course will expose graduate students and advanced undergraduate students to a fundamental set of tools for the quantitative analysis of environmental data, with an emphasis on the calculation of reservoirs (inventories) and flows (fluxes) in environmental systems.

The core of the course is devoted to problem solving and the development of basic problem solving skills. Graduate and undergraduate students will both be required to complete a problem set each week. All students will be required to prepare and orally present findings using techniques and tools presented in class.

Students will be loaned a laptop computer for the duration of the semester. The computers include spreadsheet, graphing/visualization, spatial interpolation/contour mapping, and systems dynamics software.

Learning Outcomes

This course is designed to improve a student’s ability to understand: (1) what data are required to answer a specific environmental question; (2) what mathematical operations are required to interpret the data; (3) how to apply (the above-mentioned) tools to mathematically solve problems related to the quantitative analysis of environmental systems; and finally (4) how to present (visualize) the data analysis itself.
Required Readings


Recommended Readings


Course Requirements and Grading

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<thead>
<tr>
<th></th>
<th>Undergraduate</th>
<th>Graduate</th>
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</thead>
<tbody>
<tr>
<td>Problem sets</td>
<td>100%</td>
<td>70%</td>
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<tr>
<td>Advanced problem sets</td>
<td>NA</td>
<td>30%</td>
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Problem sets may include a writing assignment or oral presentation

Workload

This is a 3 credit-hour course. Students are to devote at least 9 hours per week to this course over the duration of the 16-week semester. Expectations requiring time commitment include:

- Class time (up to 2.5 hours per week)
- Completion of take-home assignments
- Proficiency in course related computer software use

Topics Covered*

Meeting 2  Critical thinking skills and MATH – you know more than you think
Meeting 3  Visualizing your data and the quest for a perfect graph (1)
Meeting 4  Visualizing your data and the quest for a perfect graph (2)
Meeting 5  Data interpolation and grid manipulation: calculating inventories Getting comfortable with geographic space
Meeting 6  Online datasets & analysis
An introduction to the steady state box model

Meeting 7  An introduction to vector analysis
The power of simple

Meeting 8  Wally Broecker and Stella!

Meeting 9  SPRING BREAK

Meeting 10  Rates and residence times: basic calculations (1)

Meeting 11  Rates and residence times: basic calculations (2)

Meeting 12  Making sausage: student calculations and 5 minute presentations

Meeting 13  Steady state modeling (1)

Meeting 14  Steady state modeling (2)

Meeting 15  Steady state modeling (3)

Meeting 16  Alternative tools and a review

*Most meetings will include homework review*

**Resources**

**Class Website.** The course will use a Desire 2 Learn (D2L)-based website in order to coordinate the class, communicate information, and also to deliver assignments and feedback. Details are provided at the end of the syllabus. **Please check the website and your email frequently because you are responsible for all announcements and changes to the syllabus posted there.** If you need assistance with D2L, you can:

- send an email to help@uwm.edu
- pick up a phone and call 229-4040 (or 4040 on a campus phone)
- go to Bolton 225 (this lab is not open all day -- check for specific hours)
- if you are calling from outside the 414 or 262 area codes, call 1-877-381-3459

**The Library.** Library work can be an important part of the course and essential to completing the assignment.

**Class Notes:** Homework assignments and related material will be available on the D2L site.

**Students with Special Needs:** Students with special needs should arrange to speak with me during the first week of classes so we can best accommodate your learning style. Note University
Policies: *Students with disabilities.* Verification of disability, class standards, the policy on the use of alternate materials and test accommodations can be found at the following: [http://www.uwm.edu/Dept/DSAD/SAC/SACltr.pdf](http://www.uwm.edu/Dept/DSAD/SAC/SACltr.pdf)

**The Writing Center** welcomes writers at all skill levels, inexperienced through advanced, freshmen through graduate students. FYI--over 1/3 of the students who visited in the past 4 yrs were juniors, seniors or grad students. Whether still exploring a reading, brainstorming, drafting or revising, writers can benefit from talking one with one of our well-qualified and well-trained tutors. Make appointments online 24/7: [http://www.writingcenter.uwm.edu](http://www.writingcenter.uwm.edu). Even if you do not need the Writing Center for this course, you should still make an effort to see what they have to offer.

**Course Policies**

**Attendance:** Some of the material for this course will be made accessible through the D2L website. This material is meant to help the student prepare for class, but it does not replace the material presented in class.

**Late assignments** will be downgraded for each day past the due date.

**Academic Misconduct:** In this course, you are expected to perform to the best of your ability in an honest manner. Cheating, plagiarism, or other acts of misconduct will result in a severe penalty to you, as per University of Wisconsin System Chapter 1.

**Other University Policies:** Various policies related to this course can be found on the Secretary of the University’s website at [http://www4.uwm.edu/secu/SyllabusLinks.pdf](http://www4.uwm.edu/secu/SyllabusLinks.pdf)