Course Number: FRSHWTR-504  
An Introduction to Quantitative Analysis of the Environment  

SPRING 2017

Instructor: Dr. James T. Waples  
Office: Rm 179E (old building – west end, north wall)  
Contact Information: email works best (jwaples@uwm.edu)  
Office Hours: Any time  
Course Meeting: Thursday 3:30 PM -6:10 PM  
Location: Room 1084, School of Freshwater Sciences, Great Lakes WATER Institute  
Final Exam: TBD

Course Description

This course is designed to give graduate students and advanced undergraduate students a fundamental set of tools for the quantitative analysis of environmental data sets, with an emphasis on the calculation of reservoirs, residence times and rates in aquatic systems. The course will be devoted to the analysis of datasets, familiarization with key software programs (including spreadsheets, graphing, spatial interpolation, and quantitative image analysis software), and basic problem solving with box models. 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.

Learning Outcomes

The course is designed such that students will:

- Be familiarized with basic software programs that are commonly used in the quantitative analysis of environmental data.
- Learn the fundamentals of data display (i.e., graphing) and analysis.
- Develop the ability to calculate reservoirs, residence times and rates in aquatic systems.

On completion of the course, students should be able to:

- Demonstrate a proficiency in: the use of spreadsheets, 2D and 3D graphing, spatial interpolation and quantitative image analysis.
- Combine data sets to determine reservoirs, residence times and rates in aquatic systems.
- Demonstrate an understanding of the data required to answer a specific environmental question.
- Construct a simple box model.
Workload

This is a 3 credit-hour course. Students are to devote at least 10 hours per week to this course over the duration of the 15 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

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 will be an important part of the course and essential to complete the assignment. In particular, the course will make use of the primary scientific literature (i.e. journal articles). Note: the internet is useful, but it is not a substitution for the library.

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

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. 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.

Required Readings

Recommended Readings


Course Requirements and Grading

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<th></th>
<th>Undergraduate</th>
<th>Graduate</th>
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<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

**Computer:** WiFi enabled laptop computers with software for in-class exercises will be issued to each student for the duration of the semester.

Topics Covered* (tentative!)


**Meeting 2** Critical thinking skills and MATH

**Meeting 3** Visualizing your data and the quest for a perfect graph

**Meeting 4** Writing a report & hidden calculators

**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** Rates and residence times: basic calculations (1)
Meeting 10  Rates and residence times: basic calculations (2)
Meeting 11  Making sausage: student calculations and 5 minute presentations
Meeting 12  Non-steady state modeling (1)
             Measuring flux
Meeting 13  Non-steady state modeling (2)
Meeting 14  Radioactivity revisited
Meeting 15  Alternative tools and a review

*Most meetings will include homework review*

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)