

Spring 2015 GLY 6826--Hydrogeologic Modeling

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Class: M 3 to 6 pm; Office Hours: M 10 to 11 am; Weds 3 to 4 pm, or by appt.

Web Page: UF Elearning site (Canvas)

Course Objectives:

- Introduce the basics of hydrogeologic modeling and its uses and limitations.
- Provide experience in translating the geology and hydrology of field problems into numerical simulations
- Provide a better understanding of fluid flow processes through numerical modeling examples.
- Provide experience in reading and writing technical reports and scientific papers

Textbook: Outside readings will be used. Unfortunately, the most appropriate text, Applied Groundwater Modeling by M. P. Anderson and W.W. Woessner is now >22 years old. Although the basics are still relevant, a lot of the text is too out of date. It will be on reserve at Marston Science Library.

Expected Background: An upper-level undergraduate or graduate class that covered the basics of groundwater flow.

Software/laptop: The GroundwaterVistas interface that we'll use is designed for PC (dual-boot Macs also work). We'll get started on assignments in class, so a laptop is ideal. If you don't have one, it is fine to work with another student during class. You should have access to a PC to complete the assignments. We will work with the "student" version of the software the first part of the semester and obtain temporary licenses for the remainder of the semester when needed for larger models.

Class Format: Each class will consist of lecture or discussion of modeling concepts and examples followed by modeling exercises using MODFLOW and the GroundwaterVistas interface. Grades will be based on online quizzes, assignments, and a presentation.

Grades (670 pts total) A: $\geq 93.4\%$; A- 90.0-93.3%; B+ 86.7 – 89.9%, B: 83.4 – 86.6 %, B-: 80.0 – 83.3 %, C+ 76.7 – 79.9 %; C: 73.4 – 76.6%, C-: 70.0 – 73.3%, D+: 66.7 – 69.9%, D: 63.4 – 66.6%,. D- 60.0 – 63.3%; E 59.9% and below. *Information on how UF calculates GPA based on letter grades can be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>.*

- **Assignments (460 pts)** will include modeling practice and evaluation of modeling reports or modeling-related papers.
- **Online quizzes (160 pts) 8 @20 pts each** Quizzes will be online (Canvas) and will generally consist of essay questions. These quizzes are open book and resource and questions can be discussed with other students or me *but answers must be in your own words*. The quizzes will be available for a week and close at 2 pm on Monday. The objectives of the quizzes are to: 1) assess your understanding of material from previous classes and readings; and 2) provide me with information on what concepts are most challenging so that we can use class time most effectively.
- **Presentation (20 pts)** There will be a project presentation to the class that will be graded on content (8 points), organization (2 pts), visuals (4 pts) and delivery (4 pts). There will be other brief presentations as part of the assignments.
- **Class participation (30 pts).** The "default" class participation grade is 25 points. This assumes that you are present for classes and answer questions when asked. Earning 30 points requires active participation (e.g., asking questions and volunteering answers). You will receive considerably less

than 25 points if you are frequently absent, not prepared, or not paying attention. You will receive 0 participation points if your class behavior distracts others.

Expectations:

- Learning is an active process. It is expected that you prepare for class by completing readings, and that you participate during class through answering and asking questions, contributing to discussions, and working through in-class problems and calculations.
- Texting, email checking, and non-class web browsing are not part of class participation or learning. Behavior that distracts others during class will not be tolerated and may result in loss of all class participation points and being asked to leave the class. *When working in class on your computer, I strongly recommend that you turn off any interruptions or notifications except during breaks. During past classes, students that frequently checked emails and other messages got much less completed during class time (sometimes ½ as much as other students!).*
- Students must follow the University of Florida Honor Code. On all work submitted for credit by students of the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." Before submitting any work for this class, please read the policies about academic honesty at <http://www.dso.ufl.edu/scctr/process/student-conduct-honor-code/> . Please be aware that these policies specify that "submitting a document or assignment which in whole or in part is identical or substantially identical to a document or assignment not authored by the student" is considered plagiarism. Collaboration with your classmates is an important part of the class and is strongly encouraged. Discussion of quiz and assignment questions is allowed. However, unless otherwise specified, all submitted answers must be written in your own words. Violations will be reported to the Dean of Students Office and will result in lost quiz or assignment points.

Policy on quizzes and in-class assignments:

- Late quizzes and assignments will lose 20% of possible points and will not be accepted more than 1 week after the deadline. Exceptions:
 - *For pre-existing conflicts* (e.g., athletic, religious, academic), **you are responsible** for providing me with email or written notification as soon as you are aware of the conflict, but no later than 1 week in advance, and making arrangements with me for an alternate deadline.
 - *For sudden illness or other major event*, **you are responsible** for providing me with email or written notification prior to the deadline or as soon as reasonably possible and making arrangements for completion.

Accommodations for Disabilities: Students with disabilities needing academic accommodations should **1)** Register with and provide documentation to the Disability Resources Center , **2)** Bring a letter to the instructor from this office detailing the necessary academic accommodations.

Course Schedule/Topics

Date	Due	Class
Jan 12		Introduction to Groundwater Modeling Begin Assignment 1: Spreadsheet Finite-Difference Model
Jan 19		<i>No Class</i>
Jan 26	Quiz 1 Assignment 1 (30 pts)	Conceptual Models and Assigning Parameters Begin Assignment 2: 2D Simulation using MODFLOW
Feb 2	Quiz 2 Assignment 2 (30 pts)	Boundary Conditions Begin Assignment 3: Boundary conditions in MODFLOW
Feb 9	Quiz 3 Assignment 3 (40 pts)	Calibration and Sensitivity Begin Assignment 4: Model Calibration
Feb 16	Quiz 4 Assignment 4 (50 pts)	Transient Simulations Begin Assignment 5: Transient model
Feb 23	Quiz 5 Assignment 5 (50 pts)	Solute Transport Modeling, Particle Tracking Begin Assignment 6: Modeling transport
Mar 2		<i>Spring Break</i>
Mar 9	Quiz 6 Assignment 6 (30 pts)	Examining and working with an existing model Begin Assignment 7
Mar 16	Quiz 7 Assignment 7 (50 pts)	Working with an existing model Begin Assignment 8
Mar 23	Quiz 8 Assignment 8 (50 pts)	Begin Project
Mar 30		Project Work
Apr 6	Project Report (60 pts)	Automated Model Calibration Begin Assignment 9
Apr 13	Assignment 9 (30 pts)	Project Work
Apr 20		Final Project Presentations (20 pts)
Apr 27	Revised Project Report (40 pts)	<i>No Class</i>