**GLY 4930: Groundwater Geology**
**Prof. Liz Screaton, screaton@ufl.edu. Office hours: T 1:55-2:45 pm; Weds 10-11 am**
**TA Stephanie James, srjames88@ufl.edu Office hours: M: 11-noon; F 10-11 am**

## Course Objectives

- Provide an overview of the basic concepts of groundwater flow and its relationship to the hydrologic cycle
- Emphasize the interrelationship of geology and groundwater flow, with case studies.
- Introduce Florida hydrogeology basics and current groundwater issues

**Textbook**: *Groundwater Science, 2nd edition (Fitts)*

## Class Organization

The class is organized in 10 modules. In each module, there will be:

- A background reading assignment to introduce the concepts, terms, and skills. This reading will generally be from the text but will sometimes include outside reading.
- One to two 10-15 minute video lectures which will reinforce material.
- A quiz which consists of 10 multiple choice questions. Quizzes are not timed, are open book and open notes, and you can seek help from classmates and the prof/TA. Quizzes will be scored immediately and you can take a second attempt. The highest grade will be counted.
- A 20-point assignment in each module will provide practice with the concepts and skills**.** The assignment will often include calculations and drawings. For calculations, you will "show your work" on paper and submit a clear photo. Unless otherwise specified, working with other students on assignments is encouraged, but **all answers must be written in your own words, all shown work must be written by you, and all figures must be created by you.**
- The online Discussion for each module is an important part of your learning. We will pose questions for you to answer. This is also your opportunity to ask questions of your classmates and the Prof/TA. To prepare for the discussion, you should complete the background reading, view the video(s), and have begun the quiz and assignment. You will assess your participation in the discussions each week. The lowest two modules of discussion participation can be dropped. If we (TA and/or prof) observe significant discrepancies, we will adjust your total. Repeated discrepancies will result in zero credit for ALL discussions.

- During the semester, there will also be:

  - Two 3-5 minute **presentations** for your classmates. These will be part of the online discussion and should be posted at least 2 days before the discussion closes. We'll provide some topic ideas for each discussion, but you are also welcome to suggest your own.
  - Three **reports**, which will integrate skills learned and provide experience in technical writing. Turnitin is an online service to help prevent and identify student plagiarism. The reports will be evaluated using Turnitin to determine the originality of your work.
  - Three 90-minute **exams**. Your three exams in this course will be proctored using ProctorU. ProctorU is a service that allows students to complete their assessment at any location while still

ensuring the academic integrity of the exam for the institution. Using almost any web cam and computer, you can take exams at home, at work, or anywhere you have internet access. As you proceed through the modules, you will be alerted as to which equations should be memorized and which will be provided on the exam. If you have any questions, just ask! During the exam, you will be allowed to use a calculator and scratch paper.

- This course is co-listed with GLY 5827. In the graduate-level course, the presentations are longer (5-10 minutes) and must be based on a scientific publication and the three reports have greater length and difficulty.

**Grading (675 pts total):**

- Introductory Quiz and Discussion: 15 pts
- Presentations (2@10 pts): 20 pts
- Quizzes (best 9 of 10@10 pts): 90 pts
- Participation/Discussion (best 8 of 10@5 pts): 40 pts
- Exams 240 pts (3@80 pts)
- Reports 105 pts (3@35 pts)
- Assignments (best 9 of 10@20 pts): 180 pts

**Grades. These grade criteria are firm.** A: ≥93%; A- 90.0-92.9%; B+ 87– 89.9%, B: 83 – 86.9 %, B-: 80.0 – 82.9%, C+ 77 – 79.9 %; C: 73 – 76.9%, C-: 70.0 – 72.9 %, D+: 67 – 69.9%, D: 63 – 66.9%, D- 60.0 – 62.9%; 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.

**Academic Honor Code:** As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity. " You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at 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." It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: http://www.dso.ufl.edu/SCCR/honorcodes/honorcode.php

**Getting answers to your questions:** This class is at a 4000 level, which means it is aimed at senior-level students (although open to others). **Expect to have questions** as you read the course notes, work through the assignments, and prepare for the exams. Questions are part of the learning process! Therefore it is very important to complete assignments well before the deadline and to actively join the discussions.

- For content questions on each module, the first place to go is to the module's Discussion board. First check whether other students have asked the same question and, if not, pose the question to the class. Help your classmates, increase your learning, and keep the discussion moving by answering questions. Discussion posts will be reviewed by the TA/professor daily M-F and additional questions or information may be added.
- For problems with Canvas: call 352-392-4357 or via e-mail at helpdesk@ufl.edu.
- To report course-specific errors (a typo in an assignment or a bad link), notify both the TA (srjames@ufl.edu) and prof (screaton@ufl.edu ).
- An email to the TA or the prof is the best way to ask questions that are specific to you, such as about your grade or an upcoming conflict with a deadline.

**Course announcements and email:** When you log in to Canvas, please ensure that your Notification Preferences are set to "ASAP" for Announcements and for Conversation Messages. These tools will be used to inform you of any updates or changes in the course or to contact you.

**Deadlines** are firm and are your responsibility. Quizzes and assignments will be available 1 to 2 weeks prior to the deadline**. We have set deadlines for Tuesdays and Thursdays at midnight but *strongly* recommend you aim to complete work by the end of Mondays and Wednesdays.** This leaves you time to ask questions and for unexpected computer/network problems. Waiting to do quizzes or assignments in the last hours is at your own risk. ***We will not be responsible for any problems encountered after 3 pm on the due dates.***

**Attendance and conflicts:** *Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx*

Exams:

- For pre-existing conflicts (e.g., athletic, religious, academic), you are responsible for providing notification no later than 1 week in advance, and making arrangements for an alternate date within one week of the exam date.
- With documentation of sudden illness or other unexpected major event, you may make up the exam if you notify TA/prof prior to exam time (or as soon as you are physically able) and arrange a makeup within a reasonable time frame (generally 1 week). **Issues that arise after 3 pm on the due date are not considered valid reasons for missing a deadline.**

Quizzes and Assignments:

Because quizzes and assignments are available for 1 to 2 weeks and you can drop the lowest grade of each, only very major conflicts will be considered to allow deadline extensions or make-ups.

- For *pre-existing conflicts* (e.g., athletic, religious, academic), **you are responsible** for providing me with email or written notification and making arrangements with me (screaton@ufl.edu) for an alternate date as soon as you are aware of the conflict, **but no later than 1 week before a deadline.**

- For *sudden, unexpected **major** issues that cause you to need additional time* **you are responsible** for providing me (screaton@ufl.edu) with written notification and making arrangements. Documentation will be requested. **Issues that arise after 3 pm on the due date are not considered valid reasons for missing a deadline.** You should plan your time to complete assignments well prior to the deadline.

**Accommodations for Disabilities**: Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, www.dso.ufl.edu/drc/ ) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be provided to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

**Course Evaluations:** Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at http://evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at https://evaluations.ufl.edu/results

**Course Schedule**

| **Deadlines** | Topic | Reading |
|---|---|---|
| Aug 27<br>Sep 1 | **Introduction** provides class logistics and reviews geology basics most relevant to groundwater flow. | Syllabus<br>Outside reading |
| Sep 3<br>Sep 10 | **Module 1 Basic Principles** introduces Darcy's Law and the basics of groundwater flow. | Ch 2 and 3.1-3.4 |
| Sep 15<br>Sep 17 | **Module 2 Hydraulic Conductivity and Permeability** examines controls on permeability and how it is measured. Mapping of hydraulic head is introduced. | Ch. 3.5 to 3.9<br>Outside reading |
| Sep 22<br>Sep 24 | **Module 3 Geologic Information for Groundwater Studies** covers how geologic information is obtained and interpreted and how geophysics can be applied to groundwater studies. | Ch. 4 |
| Sep 29<br>Oct 1 | **Module 4 Geology of Groundwater and Florida's Hydrogeology** examines how major aquifer characteristics are controlled by their geologic setting. Current state of knowledge about Florida's aquifers. | Ch 5.3-5.6<br>Outside reading |
| Oct 6<br>Oct 8 | **Report 1 due**<br>**Exam 1** | |
| Oct 13<br>Oct 15 | **Module 5 Storage and Groundwater Flow equations** focuses on how water is stored in confined and unconfined aquifers and develops groundwater flow equations from Darcy's law and conservation of mass. | Ch. 6.1-6.3, 6.7-6.9.2 |
| Oct 20<br>Oct 22 | **Module 6 Potentiometric surface maps and Groundwater/surface water exchange** covers how water levels from wells can be contoured and interpreted to understand groundwater flow directions and exchange of water between surface and subsurface. | Ch. 5.1.1, 5.1.3, 5.2.1 to 5.2.3 |

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| Oct 27<br>Oct 29 | **Module 7 Recharge and Groundwater Flow Patterns** examines how recharge occurs and is quantified and how topography and heterogeneity impact flow directions. | Ch. 1.4.1, 1.4.2, 3.10, 5.1.2, 5.1.4, 5.2.5, 5.2.6, and 10.10.2 |
| Nov 3<br>Nov 5 | **Report 2 Due**<br>**Exam 2** | |
| Nov 10<br>Nov 12 | **Module 8: Flow to Wells** introduces the prediction of drawdown due to pumping and use of aquifer tests to determine aquifer properties. | Ch 7.2.2, Ch. 8.2-8.5 |
| Nov 17<br>Nov 19 | **Module 9: Freshwater/Saltwater and Groundwater Modeling** covers two topics: 1) How density differences and mixing affect groundwater at the coast and 2) how numerical models are used for groundwater flow problems. | Ch 3.11, 9.1-9.3, 9.5-9.6 |
| Nov 24<br>Dec 1 | **Module 10: Groundwater Contamination** focuses on the movement of solutes and non-aqueous phase liquids in groundwater and how contaminated sites are investigated. | Ch 11 |
| Dec 3<br>Dec 8 | **Report 3 Due**<br>**Exam 3** | |