Applied Hydrogeology

GEOL 4315 (CRN 25603), ESCI 4315 (CRN 27531)
GEOL 5315 (CRN 26799) ESCI 5315 (CRN 27532)
GEOL 6315 (CRN 26388)

Geology Building, Room 302/Rio Bosque Wetlands Park
Fridays from 9:00AM-11:50AM

Spring 2023

Instructor: Dr. Mark Engle (maengle@utep.edu)
Office: Geology Building 302A

Course Description
This course will provide you with practical knowledge and skills to perform investigations of aquifers, water-bearing units, and hydrogeologic systems. Topics covered include a review of hydrogeologic concepts, well drilling and coring, water level monitoring, water quality sampling, aquifer testing, well log interpretation, and report preparation. The project will include 3-4 trips to Rio Bosque to perform field investigations. By the end of the course you should have a basic skill set to allow you to perform hydrogeologic studies.

Learning Outcomes
At the end of the course, students will:
• Understand key processes in groundwater systems
• Be knowledgeable of basic well drilling and coring techniques
• Perform basic field hydrogeology procedures
• Interpret geologic well log data
• Generate a hydrogeologic report

**Recommended textbooks (there is no required textbook for the course):**

**Groundwater & Wells,** 3rd edition by Robert Sterrett. Johnson Screens, 812 p. This (like its predecessors) is the bible for working hydrogeologists. *If you anticipate working as a hydrogeologist, I strongly suggest that you buy this book* (preferably from the National Groundwater Association).


**Attendance/Lectures:**
Attendance, which is key to success in this class, is mandatory. Partly, because of the size of the class, I hope for quite a bit of discussion. In addition, we will have 3-4 trips to Rio Bosque park (see schedule) to perform fieldwork. On those dates we will meet at Rio Bosque at 9AM – you are responsible for your own transportation to Rio Bosque Park.

**Course Communication:**
Because this is an online class, we won’t see each other in the ways you may be accustomed to: during class time, small group meetings, and office hours. However, there are a number of ways we can keep the communication channels open:

- **Email:** UTEP e-mail is the best way to contact me ([maengle@utep.edu](mailto:maengle@utep.edu)). I will make every attempt to respond to your e-mail within 24-48 hours of receipt. Note that I cannot provide some information if you email from a non-UTEP email address.
- **Office Hours:** 8AM – 9AM on Mondays; otherwise send me an e-mail to set up a web meeting.
- **Announcements:** Check the Blackboard announcements frequently for any updates, deadlines, or other important messages.
**Grading:**
In-class exercises and field assignments: 25%; Mid-term and final exam: 25%; Attendance/concept sketches: 25%; Final presentation & report: 25%.
   A-100-85%; B- 84-75%; C-74-65%, D- 64-55%; F-below 55%.

There will be no make-up exams, unless you have a documented health issue. Assignments will be docked by 10% of their score for each 24 hours they are late (nothing accepted beyond 5 days late).

**Exams:**
There will be 2 exams. They will be take-home style that are both open-note and open-book. You will have 1 week after I assign the exam to upload it to BlackBoard. Feel free to work together, if you wish, but you must turn in your own work.

**Concept sketches:**
Most weeks, I will ask you to draw a sketch (that is, don’t copy and paste the digital image – I literally want you to draw it), label the relevant features, and describe in complete sentences you’re the important processes and events occurring. You will need to upload these to BlackBoard by 5PM on the following Wednesday.

**In class exercises and field assignments:**
Each week, you will have either an in-class exercise or a field assignment to do. Please complete the assignment during the time in class and submit it via Black BlackBoard by 5PM on the following Wednesday.

Getting dropped from class: If you are severely failing the class (grade <40%) at the Drop Date or miss 3 or more assignments/lectures in a row, I may drop you course. If you would like to remain in the class and are under one or more of those conditions, please contact me prior to the drop date (see schedule).

**Students with Disabilities**
If you have a disability or if you are experiencing learning difficulties, please contact the Center for Accommodations and Support Services (CASS) or visit their portal (cassportal.utep.edu). You may contact them Monday through Friday 8:00a.m.-5:00p.m. Phone:(915) 747-5148. Union Building East Room 106 cass@utep.edu. They provide any necessary accommodations. You should also meet with me in order to facilitate your needs. You are expected to provide documentation of your disability in order to make special arrangements in this class.

**Academic Misconduct/Dishonesty**
Academic dishonesty will be not tolerated in this class (please refer to the student conduct code handbook for details regarding university policy and definitions). Dishonesty includes, but is not limited to, plagiarism on term papers, unauthorized notes brought into an exam; copying answers from another student or letting another student copy your answers. The penalty for the first offense will be a grade of zero points on the exam or assignment. Penalty for the second offense will be an F for the course.
**Helpful Hints:**

- Attend the lectures!
- Review material regularly - multiple short study sessions over a period of weeks are more effective than a single "cram" the night before an exam.
- Form a study group. Each member should study material on their own before meeting with the group for discussion and comparison.
- Ask questions if you don’t know or are confused.
- Combine class notes, textbook, and web materials when studying. Each provides a different perspective.

**Campus Carry**

For more information on campus carry, see [http://sa.utep.edu/campuscarry/]; for more information on overall campus safety, see [http://admin.utep.edu/emergency].

**Rio Bosque Wetlands Park**

The Rio Bosque Wetlands Park is a 372-acre park owed by the city of El Paso but is managed by the UTEP Center for Environmental Resource Manager. There are several shallow monitoring wells which we can utilize and at least one pumping well, to allow us to perform a pump test. It is located of Americas Ave. and is about a 20-minute drive from UTEP. See [https://www.utep.edu/cerm/rio-bosque/location-and-hours.html] for directions.
# TENTATIVE COURSE SCHEDULE

<table>
<thead>
<tr>
<th>Week (date indicates Monday of that week)</th>
<th>Topic</th>
<th>Location</th>
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<tbody>
<tr>
<td>Week 1 (1/20)</td>
<td>Intro to the course - class outline, hydrogeologic concepts, infiltration</td>
<td>GEOL 302</td>
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<tr>
<td>Week 2 (1/27)</td>
<td>Introduction to Rio Bosque and Well Water Levels</td>
<td>GEOL 302</td>
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<tr>
<td>Week 3 (2/3)</td>
<td>Water level monitoring and hydraulic head mapping</td>
<td>Rio Bosque Park</td>
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<tr>
<td>Week 4 (2/10)</td>
<td>Drilling, coring, and well construction</td>
<td>GEOL 302</td>
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<tr>
<td>Week 5 (2/17)</td>
<td>Introduction to water quality and requirements</td>
<td>GEOL 302</td>
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<tr>
<td>Week 6 (2/24)</td>
<td>Groundwater sampling, field parameters</td>
<td>GEOL 302</td>
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<td>Week 7 (3/3)</td>
<td>Groundwater sampling in the field</td>
<td>Rio Bosque Park</td>
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<td>Week 8 (3/10)</td>
<td>Aquifer Properties - <strong>Exam 1 assigned</strong></td>
<td>GEOL 302</td>
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<tr>
<td>Week 9 (3/17)</td>
<td>Spring Break (no class) - Hydrogeology of the Hueco Bolson (video)</td>
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<td>Week 10 (3/24)</td>
<td>Darcy’s Law, Aquifer Parameters, and Slug Testing</td>
<td>GEOL 302</td>
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<td>Week 11 (3/31)</td>
<td>No class (Cesar Chavez Day) – <strong>Exam 2 assigned</strong></td>
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<td>Week 12 (4/7)</td>
<td>Performing slug tests</td>
<td>Rio Bosque Park</td>
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<td>Week 13 (4/14)</td>
<td>Interpreting slug test data</td>
<td>GEOL 302</td>
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<td>Week 14 (4/21)</td>
<td>Writing hydrogeologic reports</td>
<td>GEOL 302</td>
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<td>Week 15 (4/28)</td>
<td>Geophysical well logging for hydrologists</td>
<td>GEOL 302</td>
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<tr>
<td>Final Exam</td>
<td>Present/Submit Hydrogeologic Report</td>
<td>GEOL 302</td>
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* Spring drop date is March 30th.

**UPDATED 12/15/22**