GEOL 2404: Geologic Hazards

Core Curriculum Application

Course Information

Core area: Life and Physical Sciences
Course type: Existing Course (number being changed from 2000 level to 1000 level)
Course ID: GEOL 2404
TCCN: none
School or College: Science
Department: Earth and Environmental Sciences
Course title: Geologic Hazards

Course catalog description: Processes producing earthquakes, floods, eruptions and landslides, and their effect on people

Number of sections to be offered per year: 1

Estimated enrollment per year: 50

Total enrollment 2012-2013 (Fall/Spr/Sum): not taught

Contact information: Dr. W. Ashley Griffith
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817-272-9666

Requestor: Dr. W. Ashley Griffith
wagriff@uta.edu
817-272-9666

Assessment for this course: The objectives will be assessed through communal assessment using signature assignments.
GEOL 2404: Geologic Hazards

Basic Course Information:

Course number: GEOL 2404-001

Time:
- Lecture:
- Lab Sec 001:
- Lab Sec 002:

Location:
- Lecture:
- Lab:

Primary Text:

Instructor Information:

- **Instructor:** Dr. W. Ashley Griffith
  - **Office:** GS 233A
  - **Office hours:** Phone: 817-272-9666
  - **email:** wagriff@uta.edu
- **TA:** TBD
  - **Office:** TBD
  - **Office hours:**
  - **email:**

Course Description:
Processes acting on the earth for billions of years provide the driving force for natural hazards we hear about in the news on a regular basis. Whether or not these hazards turn into catastrophes, however, depend in large part on human activities and choices. The primary objective of this course is to explore how scientists, engineers, and policy makers utilize geologic concepts to understand, predict, assess the potential risk of, and mitigate natural hazards.

Student Learning Objectives:
Students successfully completing this course should be able to:

- Communicate how surface processes are driven by interactions among Earth’s systems (e.g., the geosphere, hydrosphere, biosphere, atmosphere, and cryosphere)
- Describe the theory of plate tectonics and its relationship to the formation and distribution of Earth’s crustal features
- Explain how natural hazards, including earthquakes, tsunami, volcanic eruptions, flooding, mass wasting, subsidence, and extreme weather events, are linked to Earth’s systems
- Quantify the relationship between magnitude and frequency of natural hazards
- Identify the primary components of risk assessment
- Understand how human activity can exacerbate or mitigate the effects of natural hazards
- Analyze risk factors associated with natural hazards to create a hazard mitigation plan
GEOL 2404: Geologic Hazards

Texas Higher Education Coordinating Board Objectives

Critical Thinking Skills: The focus of the class is less on content itself than on using a geological understanding of earth’s processes to evaluate their impact on natural hazards. Questions posed during lectures and labs will require students to observe, analyze, and synthesize data using inductive reasoning to reach some conclusion about the content being covered. Deductive reasoning will also be practiced using concepts and examples introduced during lectures. The extent to which critical thinking skills are developed in the class will be assessed globally by a signature assignment, and locally within the class by questions on quizzes and exams aimed at higher levels of Bloom’s taxonomy of cognition.

Communication Skills: The course will target students’ ability to convey scientific concepts in writing through laboratory reports and the written portion of the final signature assignment. In the meantime, students’ ability to convey these concepts orally by inter-personal conversation will be practiced during laboratory and lecture periods. Their ability to convey these concepts orally by presentations to large groups will be practiced and assessed by oral presentations of their signature assignments. During lectures, questions posed by the instructor will be answered based on small group discussions among students. All laboratory exercises will be completed in teams of two, and students will be required to present the results of their final signature assignment to their entire laboratory sections.

Teamwork: Teamwork will be promoted and practiced in lecture and lab through discussion and review of the lecture material and through empirical and quantitative laboratory exercises. All laboratory exercises will be completed in teams of two. The teamwork skills will be assessed by the signature project.

Empirical and Quantitative Skills: Laboratory exercises will require reading, interpretation, calculation, and plotting of data related to geologic hazards. Students will be required to use this data to complete laboratory exercises, and their ability to analyze data and apply results to hazard assessment and mitigation strategies is essential to their completion of the signature assignment. Microsoft Excel will be utilized in laboratory exercises to organize and analyze geologic data as part of hazard analysis.

Social Responsibility: Although social responsibility is not a required coordinating board objective for the natural and physical sciences, it is interwoven throughout the geological hazards course as society’s interaction with nature is a critical component of how geologic hazards are mitigated or translated into catastrophes.

Required Equipment:
Each of the following pieces of equipment should be brought to all lectures & labs:

- Mechanical pencil
- Colored pencils
- Ruler
- Textbook
- Calculator

Grading Policy:

- Weekly quizzes: 30%
- Lab Exercises: 40%
- Signature Assignment: 15%
- Final Exam: 15%

Late Policy: Late assignments are not accepted

Attendance:
As noted below, attendance in lab is mandatory. Attendance in lecture is up to you, but if you miss class, you are responsible for learning the material. I will not take extra time to teach you things you should have learned by coming to class.

3
GEOL 2404: Geologic Hazards

Labs:
Because this is a 3 credit laboratory-based course, lab sections will only meet every-other week for two hours at a time (see course schedule). Labs will incorporate online modules of “Hazard City” (http://wps.prenhall.com/wps/media/access/Pearson_Default/11422/11697106/login.html) with independent hazard analysis exercises utilizing Microsoft Excel as a tool for organizing and analyzing geological data. Laboratory exercises constitute the largest part of your grade. This reflects the importance I place on them, the time I expect, on average, you will need to spend on them, and the care with which you will complete them. All lab assignments are due at the beginning of class, one week from their assignment. Attendance is mandatory. Failure to show without making prior arrangements will result in a zero for that lab. You may drop your lowest lab/problem set score.

Signature Assignment:
The final two lab periods will be designated for completing a final, signature assignment which is intended to allow you to spend more time focusing on and learning the subject matter from the course that you find the most intriguing. The final, signature project will be a research-based assessment of a geologic hazard from a geologic perspective. Students will work in teams of two (no solo projects and no larger groups). You and your partner will submit a 2-page proposal of your topic midway through the quarter and a final written report and oral presentation at the end of the quarter. The final project will be in the form of a professional hazard assessment at a particular site, such as would be conducted by a hired geological consultant.

Similarly, the oral presentation will be organized as a presentation to the agency, company, or public interest group that could have hired you to do the work. The proposal should be 2 pages with at least 3 cited references to published papers on the topic. The 2500 word report should include a statement of the problem, description of the site (including figures), original analysis and interpretation of the geologic hazard, and a discussion and recommendation of strategies for mitigation of the hazard. Each team will turn in a single joint copy of the proposal and report. Both members of each team will receive the same grade, and are expected to contribute equally to the project. Details of the project will be discussed in class and described on a separate handout. Both the written and oral (Powerpoint) presentations will be completed for a grade in the class, but they will also be uploaded to Blackboard and evaluated by an independent group of people to assess how well the assignment demonstrates that you have demonstrated your development of critical thinking, communication, teamwork, and quantitative skills as they apply to geologic hazards.

Final Exam: The final exam will be cumulative and will be held at the appropriate time as assigned on the university exam schedule.

Weekly Quizzes
Quizzes will be given in lab throughout the semester specifically on the material covered during the preceding two weeks, including all reading for the week. These will consist of a few very simple questions, the goal of which is to demonstrate you have done the reading and have internalized information covered in class. Like the labs, you may drop your lowest quiz score.
GEOL 2404: Geologic Hazards

**Tentative Lecture Schedule:**

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Chapter(s)</th>
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<tbody>
<tr>
<td>1</td>
<td>Natural Hazards</td>
<td>1</td>
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<tr>
<td>2</td>
<td>Plate Tectonics</td>
<td>2</td>
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<tr>
<td>3</td>
<td>Rocks &amp; minerals</td>
<td>Appendix A</td>
</tr>
<tr>
<td>4</td>
<td>Earthquakes &amp; Tsunami</td>
<td>3, 4</td>
</tr>
<tr>
<td>5</td>
<td>Earthquakes &amp; Tsunami</td>
<td>3, 4</td>
</tr>
<tr>
<td>6</td>
<td>Volcanic Hazards</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>Volcanic Hazards</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>Flooding</td>
<td>6</td>
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<tr>
<td>9</td>
<td>Flooding</td>
<td>6</td>
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<tr>
<td>10</td>
<td>Mass Wasting</td>
<td>7</td>
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<tr>
<td>11</td>
<td>Mass Wasting &amp; Subsidence</td>
<td>7, 8</td>
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<tr>
<td>12</td>
<td>Weather &amp; Climate</td>
<td>9</td>
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<tr>
<td>13</td>
<td>Weather &amp; Climate</td>
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<td>14</td>
<td>Climate Change</td>
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<td>15</td>
<td>Impacts &amp; Extinctions</td>
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**Tentative Lab Schedule:**

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<tr>
<th>Week</th>
<th>Topic</th>
<th>Chapter(s)</th>
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<td>1</td>
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<td>2</td>
<td>Rocks &amp; minerals</td>
<td>Appendix A</td>
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<td>3</td>
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<tr>
<td>4</td>
<td>Hazard City: Earthquakes</td>
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<td>5</td>
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<tr>
<td>6</td>
<td>Hazard City: Volcanic Hazards</td>
<td>5</td>
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GEOL 2404: Geologic Hazards

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<tr>
<th></th>
<th>Hazard City: Flooding</th>
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<tbody>
<tr>
<td>8</td>
<td>Hazard City: Landslides</td>
<td>7</td>
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<tr>
<td>10</td>
<td>Hazard City: Extreme Weather</td>
<td>9</td>
</tr>
<tr>
<td>14</td>
<td>ePortfolio Signature Assignment Presentations</td>
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**Drop Policy:** Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student’s responsibility to officially withdraw if they do not plan to attend after registering. Students will not be automatically dropped for non-attendance. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (http://wweb.uta.edu/ses/fao).

**Americans with Disabilities Act:** The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the Americans with Disabilities Act (ADA). All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

**Academic Integrity:** At UT Arlington, academic dishonesty is completely unacceptable and will not be tolerated in any form, including (but not limited to) “cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts” (UT System Regents’ Rule 50101, §2.2). Suspected violations of academic integrity standards will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student’s suspension or expulsion from the University.

**Student Support Services:** UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers,
GEOL 2404: Geologic Hazards

developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may contact the Maverick Resource Hotline by calling 817-272-6107, sending a message to resources@uta.edu, or visiting www.uta.edu/resources.

Lab Safety Training: Students registered for this course must complete all required lab safety training prior to entering the lab and undertaking any activities. Once completed, Lab Safety Training is valid for the remainder of the same academic year (i.e., through the following August) and must be completed anew in subsequent years. There are no exceptions to this University policy. Failure to complete the required training will preclude participation in any lab activities, including those for which a grade is assigned.

Electronic Communication: UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at http://www.uta.edu/oit/cs/email/mavmail.php.

Student Feedback Survey: At the end of each term, students enrolled in classes categorized as lecture, seminar, or laboratory will be asked to complete an online Student Feedback Survey (SFS) about the course and how it was taught. Instructions on how to access the SFS system will be sent directly to students through MavMail approximately 10 days before the end of the term. UT Arlington’s effort to solicit, gather, tabulate, and publish student feedback data is required by state law; student participation in the SFS program is voluntary.

Final Review Week: A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week unless specified in the class syllabus. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.