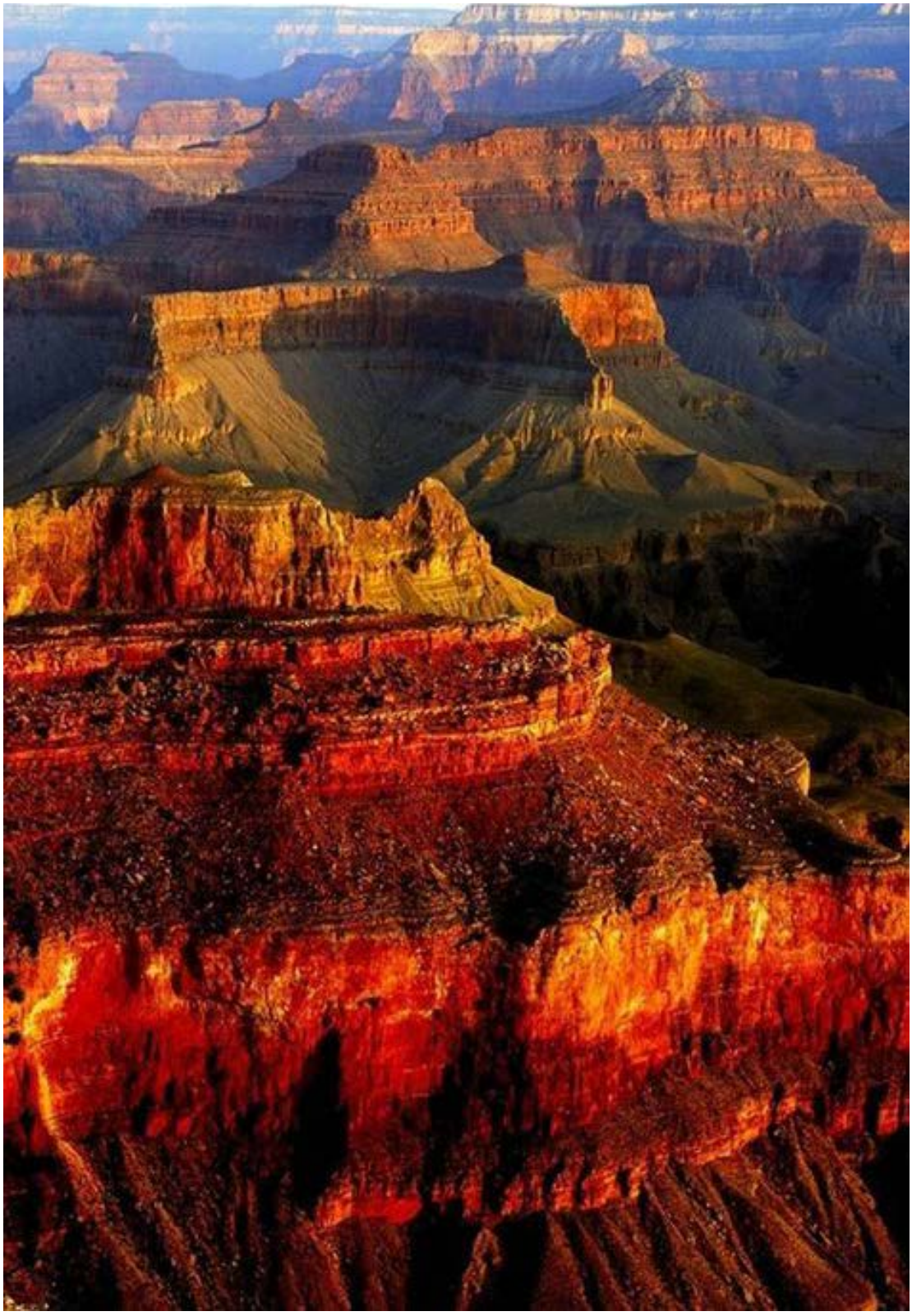
GEOL 1301 - 002 (87128); Earth Systems
Fall 2018, 08/22/2018 - 12/04/2018

The Grand Canyon



GEOL 1301 - 001 (84914); Earth Systems
Fall 2018, 08/22/2018 - 12/04/2018

Instructor: Andrew Hunt, PhD

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Office Hours: Tuesday 2.00 – 4.00 pm

Section Information: GEOL 1302-002 (87128) (Texas Common Course Number GEOL 1303)

Time and Place of Class Meetings: Geosciences Building (GS), Room 100
Tuesday and Thursdayt – 11.00 am - 11:50 am

Description of Course Content: Fundamentals of Geology using a "systems approach." Students will learn geological concepts, principles, and related scientific terms. Students will learn about active geologic processes and the driving force of plate tectonics. Students will be exposed to the principles behind the formation of different rock types, and the nature of the earth's interior.

Student Learning Outcomes: On completion of the course it is expected that: (I) The students will be able to describe the structure of the earth. (II) The students will be able to identify the characteristics of different rock types, how they are formed, and what minerals they are composed of. (II) The students will be able to explain plate tectonics and how associated processes lead to the cycling of rock. (IV) The students will be able to understand the concept of the geosphere as a set of distinct systems. (V) The students should be able to synthesize what the learn in the lectures and apply this knowledge to thr problems they will be presented with in the Laboratory section of the course.

Required Textbook: Understanding Earth, J. Grotzinger & T Jordan, 7de W.H. Freeman and Company, NY, ISBN-13: 978-1464138744, ISBN-10: 1464138745

Descriptions of major assignments and examinations: There will be 5 exams during the course (as marked on the syllabus), the results from the four exams with the highest grades will be used to calculate the student's final grade. There will be additional extra credit exercises online through Launchpad. The results from the class exams will make up 75% of the final grade (25% will be determined from effort in the Labs)

Attendance: At The University of Texas at Arlington, taking attendance is not required but attendance is a critical indicator in student success. Each faculty member is free to develop his or her own methods of evaluating students' academic performance, which includes establishing course-specific policies on attendance**.** As the instructor of for this section I allow students to attend class at their own discretion. However, I have established the following attendance policy: attendance will be taken and if a student attends all lectures they will be eligible for a half letter grade extra credit. In some circumstances a record of attendance is essential. The U.S. Department of Education requires that the University have a mechanism in place to mark when Federal Student Aid recipients "begin attendance in a course." Attendance is kept in this course so it is possible to report when students begin attendance in the course as part of the final grading process. Specifically, when assigning a student a grade of F, faculty report the last date a student attended their class based on evidence of participation in class.

Other Requirements: Lab attendance is expected. Please remember 25% of the final grade comes from your efforts in the lab class.

Grading: A final letter grade will be assigned to each student in the following manner based on the cumulative percentage score from the class exams plus the score from the Lab exercises. A Grade => 90%, B Grade 80-89%, C Grade 70-79%, D Grade 60-69%, F grade <60%. Students are expected to keep track of their performance throughout the semester and seek guidance from available sources

(including the instructor) if their performance drops below satisfactory levels. Students are expected to keep track of their performance throughout the semester and seek guidance from available sources (including the instructor) if their performance drops below satisfactory levels; see "Student Support Services," below.

Expectations for Out-of-Class Study: Beyond the time required to attend each class meeting, students enrolled in this course (which is highly condensed) should expect to spend at least an additional nine hours per week of their own time in course related activities, including reading required materials, completing assignments, preparing for exams, and preparing for lab.

Make-up Exams: There will be NO make-up exams unless the need is critical.

Grade Grievances: Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current undergraduate catalog. See: http://wweb.uta.edu/catalog/content/general/academic_regulations.aspx#10;

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/aao/fao/).

Disability Accommodations: UT 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), The Americans with Disabilities Amendments Act (ADAAA),* and *Section 504 of the Rehabilitation Act.* 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 disability. Students are responsible for providing the instructor with official notification in the form of **a letter certified** by the Office for Students with Disabilities (OSD). Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting: **The Office for Students with Disabilities, (OSD)** http://www.uta.edu/disability/ or calling 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability.

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.

Counseling and Psychological Services (CAPS) www.uta.edu/caps/ or calling 817-272-3671 is also available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

Non-Discrimination Policy: The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos.

Title IX Policy: The University of Texas at Arlington ("University") is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in

educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. For information regarding Title IX, visit www.uta.edu/titleIX or contact Ms. Michelle Willbanks, Title IX Coordinator at (817) 272-4585 or titleix@uta.edu

Academic Integrity: All students enrolled in this course are expected to adhere to the UT Arlington Honor Code:

> *I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.*
>
> *I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

As the instructor of record may employ the Honor Code as they see fit in their courses, as part of each exam students should acknowledge the honor code as indicated. Per UT System *Regents' Rule* 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) 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. Additional information is available at https://www.uta.edu/conduct/. Faculty are encouraged to discuss plagiarism and share the following library tutorials http://libguides.uta.edu/copyright/plagiarism and http://library.uta.edu/plagiarism/

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.

Campus Carry: Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit http://www.uta.edu/news/info/campus-carry/

Active Shooter/Threat Resources: the UTA Police Department strives to educate our community in a wide range of issues that have the potential to affect our campus, including active shooter/threat and workplace violence incidents. There is a quick guide at the end of this syllabus relating to an active shooter threat. The resources in the link below provide information on response considerations and intervention awareness should someone encounter this type of situation on or off campus https://police.uta.edu/activeshooter

Student Feedback Survey: At the end of each term, students enrolled in classes categorized as lecture, seminar, or laboratory shall be directed to complete a Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit http://www.uta.edu/sfs.

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.

Emergency Exit Procedures: Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit. There are three immediate exits. One is located in the lecture hall itself. The other two are immediately to the left and right of the lecture hall main entrance. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities. A map and directions are set out below.

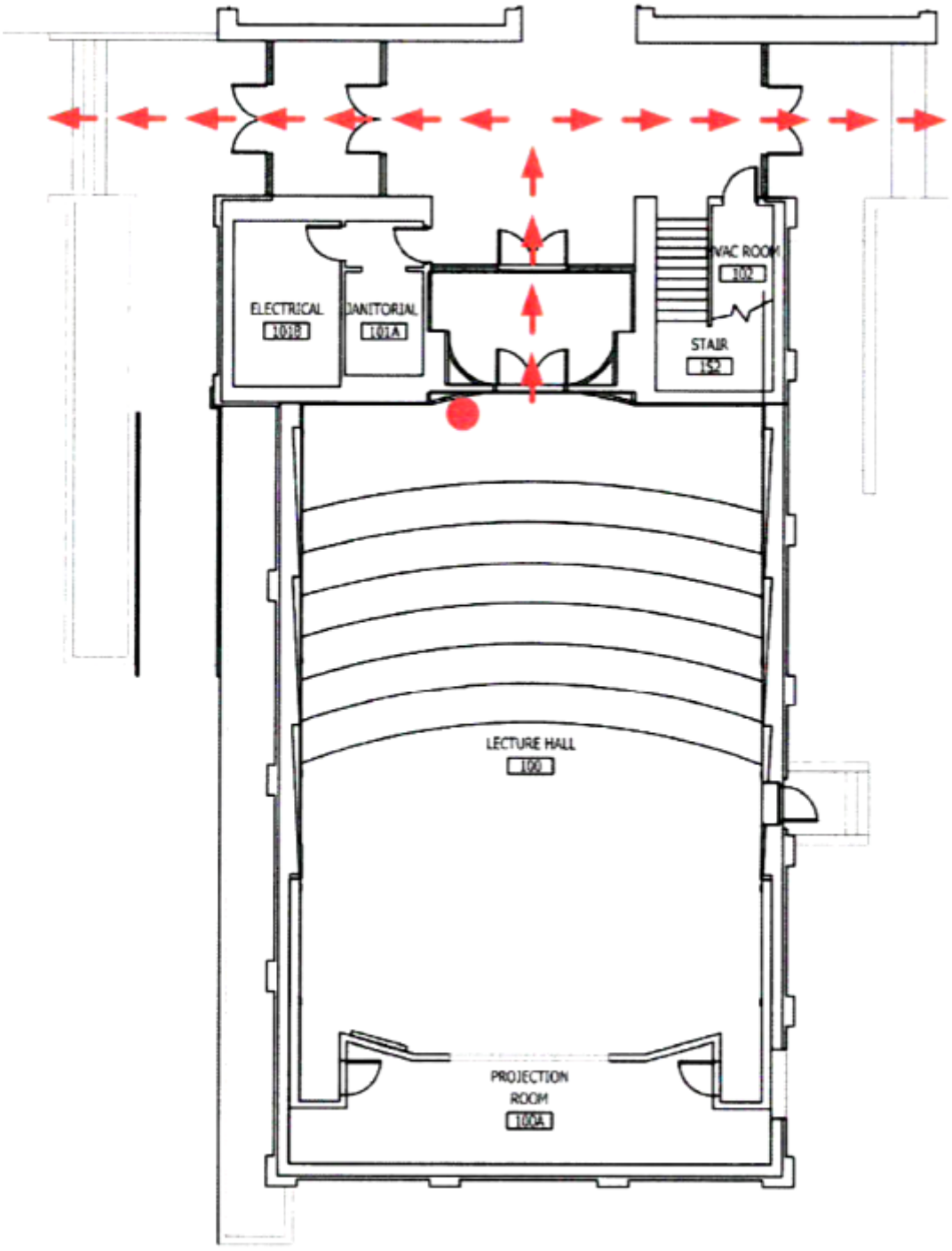
Student Support Services: UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at http://www.uta.edu/studentsuccess/success-programs/programs/resource-hotline.php

The IDEAS Center (2nd Floor of Central Library) offers FREE tutoring to all students with a focus on transfer students, sophomores, veterans and others undergoing a transition to UT Arlington. Students can drop in, or check the schedule of available peer tutors at www.uta.edu/IDEAS, or call (817) 272-6593.

The English Writing Center (411LIBR): The Writing Center offers FREE tutoring in 15-, 30-, 45-, and 60-minute face-to-face and online sessions to all UTA students on any phase of their UTA coursework. Register and make appointments online at https://uta.mywconline.com . Classroom visits, workshops, and specialized services for graduate students and faculty are also available. Please see www.uta.edu/owl for detailed information on all our programs and services.

The Library's 2nd floor Academic Plaza offers students a central hub of support services, including IDEAS Center, University Advising Services, Transfer UTA and various college/school advising hours. Services are available during the library's hours of operation. http://library.uta.edu/academic-plaza

Evacuation Plan: Should we experience an emergency event that requires the class to vacate the building, students should exit the room and move toward the nearest exit. In an orderly manner proceed to the main entrance at the back of the lecture, exit through this entrance and then proceed to the building exits to the immediate left and right. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities. Further Information on Evacuation procedures are set out at the end of the syllabus.



Course Schedule: *As the instructor of record for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. – Andrew Hunt, PhD.*

DAY	DATE	Week	SESSION	TOPIC	BOOK CHAPTER
Thursday	8/23/18	1	1	Earth Systems	1
Tuesday	8/28/18	2	2	Plate Tectonics I	2
Thursday	8/30/18		3	Plate Tectonics II	2
Tuesday	9/04/18	3	4	Earth Materials	2
Thursday	9/06/18		5	(***EXAM 1 Covering Sessions 1-5***)	
Tuesday	9/11/18	4	6	Igneous Rocks I	4
Thursday	9/13/18		7	Igneous Rocks II	4
Tuesday	9/18/18	5	9	Sedimentary Rocks I	5
Thursday	9/20/18		9	Sedimentary Rocks II	5
Tuesday	9/25/18	6	10	Metamorphic Rocks I	6
Thursday	9/27/18		11	Metamorphic Rocks II	6
Tuesday	10/02/18	7	12	***EXAM 2 Covering Sessions 8-13***)	
Thursday	10/04/18		13	Clocks in Rocks I - Relative Age	8
Tuesday	10/09/18	8	14	Clocks in Rocks II – Absolute Age	8
Thursday	10/11/18		15	History of the Continents	10
Tuesday	10/16/18	9	16	Volcanoes	12
Thursday	10/18/18		17	Earthquakes	13
Tuesday	10/23/18	10	18	(***EXAM 3 Covering Sessions 15-18***)	
Thursday	10/25/18		19	The Climate System	15
Tuesday	10/30/18	11	20	Climate Change	15
Thursday	11/01/18		21	The Hydrologic Cycle	17
Tuesday	11/06/18	12	22	Stream Transport I	18
Thursday	11/08/18		23	Stream Transport II	18
Tuesday	11/13/18	13	24	***EXAM 4 Covering Sessions 20-24***)	
Thursday	11/15/18		25	Coastlines and Ocean Basins	20
Tuesday	11/20/18	14	26	Winds and Deserts I	19
Thursday	11/22/18		27	Thanksgiving	
Tuesday	11/27/18	15	28	Winds and Deserts II	19
Thursday	11/29/18		29	Glaciers I	21
Tuesday	12/04/18	16	30	Glaciers II **[last day of classes**]	21
Thursday	12/06/18			***11.00 – 1.30*** ***(Final exam Covering Sessions 25-28)***	

****Actual timing in finals week may quiet possibly change***

SESSION	Session Content

1	**Earth System I**
	• GEODESY – study of Earth's shape and surface
	• The GEOLOGICAL RECORD
	  • James Hutton's principle uniformitarianism
	  • Speed of geological processes
	• Discovery of a layered Earth
	  • Differences in elemental compositions
	  • Differences in mechanical properties
	• Earth as a system of interacting components
	• The Geo-System
	  • The plate tectonic system
	  • the geodynamo system

2	**Earth System II**
	• The Climate System
	  • Hydrosphere
	  • Cryosphere
	  • Biosphere
	  • Lithosphere
	• The Plate Tectonic System
	  • Ridged Lithospheric Plates
	  • Plastic Asthenosphere
	  • Convective processes in the Mantle
	• The Geodynamo System
	  • The Earth's Magnetic Field
	  • History of the Earth's Magnetic field and the Geological record
	• Overview of Geologic Time

4	**Plate Tectonics I**
	• The Theory of Plate Tectonics
	  • Evolution of the Theory
	  • Jigsaw fit of Continents
	  • Continental Drift
	  • Seafloor Spreading
	• Plate Boundaries
	  • Convergent Plate Boundaries
	  • Divergent Plate Boundaries
	  • Transform Fault Boundaries

5	**Plate Tectonics II**
	• Mantle Hot Spots
	• Oceanic Crust
	  • Formation
	  • Magnetic Time Scale
	• Grand Reconstruction
	  • Reconstructing the history of plate motions
	  • Transform Faults
	  • Seafloor Isochrons

	• **Pangaea** • **Supercontinents before Pangaea** • **Assembly of Pangaea** • **Breakup of Pangaea** • **Supercontinent Cycles**
6	(***EXAM 1 Covering Sessions 1-5***)

7	**<u>Igneous Rocks I</u>**
	• **Classification of Rocks**
	  • **Igneous, Sedimentary, and Metamorphic Rocks**
	  • **Common Minerals in Igneous, Sedimentary, and Metamorphic Rocks**
	• **About Igneous Rocks**
	  • **How do igneous rocks differ from one another**
	  • **Where do igneous rocks form**
	  • **How do rocks solidify from a melt**
	  • **Where do melts form**

8	**<u>Igneous Rocks II</u>**
	• **Magmatic Differentiation**
	  • **Fractional Crystallization**
	  • **Bowen's Reaction Series**
	  • **Granite and Basalt Magmatic Differentiation**
	• **Forms of Igneous Intrusions**
	• **Igneous Processes and Plate Tectonics**
	  • **Magma factories**
	  ▪ **Spreading centers**
	  ▪ **Subduction zones**
	  ▪ **Mantle plumes**
	  • **Origin of magma in magma factories**

9	**<u>Sedimentary Rocks I</u>**
	• **Processes forming sedimentary rock**
	  • **Weathering**
	  • **Erosion**
	  • **Transportation**
	  • **Deposition (sedimentation)**
	  • **Burial and compaction**
	  • **Diagenesis**
	• **Sedimentary environments**
	  • **Glacier**
	  • **River**
	  • **Delta**
	  • **Desert**
	  • **Lakes and playas**
	  • **Marine shelf**
	• **Classification of sediments**
	  • **Siliciclastic sediments**
	  • **Chemical sediments**
	  • **Biological sediments**
	• **Current strength and distance of transport**

	• **Size of clastic particles** • **Sorting of clastic particles** • **Rounding of clastic particles** • **Sedimentary basins**
10	**<u>Sedimentary Rocks II</u>** • **Sedimentary environments – location** **1. Continental** • **Lake** • **River (alluvial)** • **Desert** • **Glacier** **2. Shoreline** • **Delta** • **Tidal flat** • **Beach** **3. Marine** • **Continental shelf** • **Organic reef** • **Continental margin** • **Continental slope** • **Deep sea** • **Sedimentary structures** • **Bedding (stratification)** • **Cross-bedding** • **Graded bedding** • **Ripples** • **Bioturbation structures** • **Burial and diagenesis** • **Classification of Siliciclastic Sediments and Sedimentary Rocks** • **Coarse: gravel and conglomerate** • **Medium: sand and sandstone** • **Fine: silt and siltstone; mud, mudstone, and shale; clay and claystone** • **Classification of Chemical &Biological Sediments and Sedimentary Rocks**
11	**<u>Metamorphic Rocks I</u>** • **Metamorphism and the Earth system** • **Driven by Earth's internal heat** • **Closely related to plate tectonics** • **Releases gasses into atmosphere** • **Grades of metamorphism** • **Low** • **Intermediate** • **High** • **The Role of Temperature** • **The Role of Pressure** • **Confining Pressure** • **Directed Pressure** • **Role of Fluids** • **Metasomatism**

	• **Accelerated chemical reactions**
	• **Types of metamorphism**
	  • **Shock metamorphism**
	  • **Regional metamorphism**
	  • **Contact metamorphism**
	  • **Burial metamorphism**
	  • **Sea-floor metamorphism**

12	**<u>Metamorphic Rocks II</u>**
	• **Metamorphic textures**
	  • **Foliated rocks**
	  ▪ **Slate**
	  ▪ **Phyllite**
	  ▪ **Schist**
	  ▪ **Gneiss**
	  ▪ **Migmatite**
	  • **Granoblastic (non-foliated) metamorphic rocks**
	  ▪ **Hornfels**
	  ▪ **Quartzite**
	  ▪ **Marble**
	  ▪ **Greenstone**
	  ▪ **Amphibolite**
	  ▪ **Granulite**
	• **Regional Metamorphism and Metamorphic Grade**

13	(***EXAM 2 Covering Sessions 7-12***)

14	**<u>Clocks in Rocks I - Relative Age</u>**
	• **Principles of stratigraphy**
	  • **Original horizontality**
	  • **Superposition**
	  • **Faunal succession**
	• **Index fossils**
	• **Unconformities – gaps in the record**
	  • **Disconformity**
	  • **Angular unconformity**
	• **Cross-cutting relationships**
	• **Divisions of geologic time**
	  • **Eras**
	  • **Periods**
	  • **Epochs**

15	**<u>Clocks in Rocks II – Absolute Age</u>**
	• **Measuring Absolute Time - Early Calculations**
	  • **By the salinity of the oceans**
	  • **By the Cooling of the planet**
	  • **Radioactive decay**
	• **Isotopic dating methods**
	  • **Uranium-lead**
	  • **Potassium-argon**
	  • **Rubidium-strontium**
	  • **Carbon-nitrogen**

	• **Geologic Time Scale: Absolute Ages**
	  • **Four Eons of geologic time**
	  ▪ **Hadean**
	  ▪ **Archean**
	  ▪ **Proterozoic**
	  ▪ **Phanerozoic**
	• **Advances in Timing the Earth System**
	  • **Sequence stratigraphy**
	  • **Chemical stratigraphy**
	  • **Paleomagnetic stratigraphy**
	  • **Clocking the climate system**

16	**<u>History of the Continents</u>**
	• **The Tectonics of North America**
	  • **The Stable Interior**
	  • **The Appalachian Fold Belt**
	  • **The North American Cordillera**
	• **Tectonic Provinces Around the World**
	• **Tectonic Age**
	• **How Continents Grow**
	  • **Continental Accretion**
	• **Orogeny**

17	**<u>Volcanoes</u>**
	• **Volcanoes As Geosystems**
	  • **Parts of the geosystem**
	  ▪ **Rocks**
	  ▪ **Magmas and lavas**
	  ▪ **Processes of melting and eruption**
	• **Volcanoes As Chemical Factories**
	• **Lavas And Other Volcanic Deposits**
	• **Flood Basalts**

18	**<u>Earthquakes</u>**
	• **WHAT IS AN EARTHQUAKE?**
	  • **Stress**
	  • **Strain**
	  • **Strtength**
	• **Why earthquakes occur**
	  • **Elastic rebound theory**
	  • **Fault rupture**
	  • **Epicenter**
	  ● **Focus**
	• **Aftershocks**
	• **Foreshocks**
	• **Seismographs**
	  • **Vertical ground Movements**
	  • **Horizontal ground movements**
	• **Seismic wave types**
	  • **P waves (primary waves)**
	  • **S waves (secondary waves)**

	• **Surface waves**
	• **The size of an earthquake**
	  • **Richter magnitude**
	  • **Moment magnitude**
	  • **Shaking (Mercalli) intensity**

19	(***EXAM 3 Covering lectures 14-18***)

20	**<u>The Climate System</u>**
	• **Atmospheric zones**
	  • **Troposphere**
	  • **Stratosphere**
	  • **Mesosphere**
	  • **Thermosphere**
	• **Atmosphere composition**
	• **Components of the climate system**
	  • **Hydrosphere**
	  ▪ **Ocean circulation**
	  • **Cryosphere**
	  ▪ **Ice caps**
	  ▪ **Mountain glaciers**
	  • **Lithosphere**
	  ▪ **Orographic rainfall**
	  ▪ **Sea floor spreading**
	  ▪ **Volcanism**
	  • **Biosphere**
	  • **Global distribution of plant life**
	  • **Greenhouse gas regulation**
	• **Greenhouse effect**
	• **Climate variability**
	  • **Ice ages**

21	**<u>The Hydrologic Cycle</u>**
	• **Flows and reservoirs**
	• **Hydrological cycle**
	  • **Precipitation**
	  • **Infiltration and runoff**
	  • **Evaporation, transpiration, and sublimation**
	  • **Groundwater flow**
	• **Key climatic factors**
	  • **Relative humidity**
	  • **Rainfall**
	  • **Landscape**
	• **Key tectonic factors**
	  • **Ocean–land relationships**
	  • **Mountain rain shadows**
	• **The runoff–precipitation relationship**
	• **Surface storage of water runoff**
	  • **Lakes and reservoirs**
	  • **Wetlands and swamps**
	• **Groundwater**

	• **Groundwater flow through soil and rock**
	  ▪ **Porosity and permeability**
	  ▪ **Groundwater table**
	• **Water table**
	  ▪ **Vadose zone**
	  ▪ **Phreatic zone**
	• **Aquifers**
	  ▪ **Unconfined aquifers**
	  ▪ **Aquicludes**
	  ▪ **Artesian flow**

22	**<u>Stream Transport I</u>**
	• **Stream valleys, Channels, & Floodplains**
	  • **Basic parts of a stream**
	  • **Valley**
	  • **Channel**
	  • **Floodplain**
	  • **Channel patterns**
	  ▪ **Meanders**
	  ▪ **Braids**
	  • **Floodplains**
	• **Drainage networks**
	• **Stream erosion**

23	**<u>Stream Transport II</u>**
	• **Kinds of fluid flow**
	  • **Laminar**
	  • **Turbulent**
	  • **Factors affecting laminar/turbulent**
	  ▪ **Velocity, depth, and viscosity**
	• **Erosion and sediment transport**
	  • **Suspended load**
	  • **Bed load**
	• **Competence and capacity**
	  • **Velocity**
	  • **Volume of flow**
	• **River bed-forms**
	  • **Dunes**
	  • **Ripples**
	• **Deltas**
	  • **Delta bedding structure**
	  ▪ **Topset beds**
	  ▪ **Foreset beds**
	  ▪ **Bottomset beds**

24	(***EXAM 4 Covering Sessions 20-23***)

25	**<u>Winds and Deserts I</u>**
	• **Wind as a flow of air**
	  • **Turbulence**
	  • **Wind belts**
	  ▪ **Trade winds**

	▪ **Westerlies** • **Wind transport** • **Wind strength** • **Particle size** • **Surface material** • **Wind as an agent of erosion** • **Ventifacts** • **Yardangs** • **Deflation hollows** • **Desert pavement**
26	**<u>Winds and Deserts II</u>** • **Wind as an agent of deposition** • **How sand dunes form and move** • **Types of dune** • **Dust falls and Loess** • **Where deserts are found** • **Location** • **Role of plate tectonics** • **Role of climate change** • **Desert weathering** • **Color of deserts** • **Desert varnish** • **Streams as agents of erosion** • **Desert sediments** • **Evaporite deposits**
27	**<u>Glaciers I</u>** • **Valley glaciers** • **Ice caps** • **How glaciers form** • **Accumulation** • **Ablation** • **Snow line** • **Sublimation** • **Wind erosion** • **Glacial budgets** • **How glaciers move** • **Plastic flow** • **Basal slip** • **Formation of crevasses** • **Glacial landscapes** • **Erosion** ▪ **Grinding** ▪ **Plucking** ▪ **Striations** • **Landforms** ▪ **Roche Moutonees** ▪ **Circues** ▪ **Aretes**

	▪ **Horns** ▪ **U-sahped valleys** ▪ **Hanging valleys**
28	**Glaciers II** ▪ **Glacial landscapes** • **Sedimentation (ice deposits)** ▪ **Drift** ▪ **Till** ▪ **Morraines** ▪ **Erratics** • **Landforms (Ice deposited)** ▪ **End Morraines** ▪ **Ground Morraines** ▪ **Lateral Morraines** ▪ **Drumlins** • **Landforms (water formed)** ▪ **Kames** ▪ **Kettles** ▪ **Eskers** ▪ **Varves** ▪ **Permafrost** • **Extent and landforms** ▪ **Pingos** ▪ **Glaciations and climate** • **Orbital forcing of ice ages** • **Greenhouse gas controls** • **Tectonic controls** ▪ **Snowball earth**

Lab Schedule (provided as a courtesy)

GEOL 1301 Lab Syllabus
Course Information for All Sections
Fall 2018

Coordinator Contact Information

Name: Cornelia Winguth, Ph.D.
Office Number: GS 233A
Office Telephone: 817-272-0366
Email: cwinguth@uta.edu
Faculty Profile: https://mentis.uta.edu/explore/profile/cornelia-winguth

Graduate Teaching Assistants Contact Information

GTAs can be contacted by the departmental phone: 817-272-2987

GTA Name	GTA Email	Office GS	Office Hours		Sections Taught
			Day	Time	
Christopher Borjas	christopher.borjas@uta.edu	142	will be announced	will be announced	021
Mikaela Brown	mikaela.brown@mavs.uta.edu	240	will be announced	will be announced	014, 018
Emmanuel Higa	emmanuel.higa@uta.edu	142	will be announced	will be announced	023, 024
Sasha Jones	sasha.jones@mavs.uta.edu	223	will be announced	will be announced	019
Nabil Mzee	nabil.mzee@mavs.uta.edu	will be announced	will be announced	will be announced	020, 022
Sadananda Silwal	ssilwal@uta.edu	144	will be announced	will be announced	011, 013
Daniel Valencia	daniel.valencia@mavs.uta.edu	247	will be announced	will be announced	025, 026
Qiming Wang	qiming.wang@mavs.uta.edu	will be announced	will be announced	will be announced	015
Shawn Zhang	yuxiang.zhang@uta.edu	142	will be announced	will be announced	016, 017

For issues that cannot be resolved by the GTA, contact the Coordinator.

Time and Place of Class Meeting

Section	Day	Time	Room
011	Monday	11:00am –	GS 243
013	Tuesday	9:30-10:50am	GS 243
014	Tuesday	12:30-1:50pm	GS 243
015	Tuesday	2:00 – 3:20pm	GS 243
016	Wednesday	11:00am –	GS 243
017	Wednesday	1:00 – 2:20pm	GS 243
018	Thursday	12:30-1:50pm	GS 243
019	Monday	2:30 – 3:50 pm	GS 243
020	Thursday	2:00-3:20pm	GS 243
021	Monday	6:30-7:50 pm	GS 243
022	Friday	9:00-10:20am	GS 243
023	Monday	4:00-5:20pm	GS 243
024	Tuesday	4:00-5:20pm	GS 243
025	Wednesday	4:00-5:20pm	GS 243
026	Thursday	9:30-10:50am	GS 243

Lab Goals

To learn selected topics of Earth History by collecting and analyzing data and information. Most of these topics will supplement material from the lecture portion of the course.

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., Fall through Summer II) 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. In Blackboard, click on "Lab Safety Training" under "My Blackboard". Click "Welcome" from the left pane to start and follow the instructions. Send your certificate of completion to your lab GTA. Please note that Firefox is the recommended browser for the training.

Due Dates

Labs are due one week from the day the lab is assigned, at the beginning of your scheduled lab time. The due date for the last lab of the semester will be set by your lab instructor. 20% will be taken off for each day the lab is late. If the lab is more than 5 days late, a zero is recorded.

Lab Materials

Students are responsible for downloading and printing the labs from Blackboard before coming to class, if they don't use a laptop to access them during class. Labs will have to be submitted in printed form to the GTA.

Signature Project

A mandatory project over three weeks is part of the lab. Groups will be arranged by the lab instructors and are expected to collaborate and present their work in class. Students will submit individual reports. More information is available on Blackboard.

Optional Lab Field Trip (Extra Credit)

This optional field trip will be in the Arbuckle Mountains of Oklahoma, about 2 hours north of Arlington. More information about the trip and how to sign up is available on Blackboard.

Grading

The lab counts as 25% of the total course grade. Your lecture instructor will average your weighted lab score with the lecture assessments. The lab portion has a maximum of 100 points distributed as follows:

- Labs 1 through 9: 72 points. Each lab will receive a maximum of 8 points (partial credit given).
- Signature Project: 28 points.
- Field Trip (optional): 20 points (extra credit). These points will only be given if the signature project has been completed.

Attendance

Attendance is required in order to complete the hands-on work. If one week you are not able to come to your regularly scheduled lab, please attend a different lab section and let both your lab instructor as well as the other lab instructor know about that. The due date for your lab doesn't change.

Drop Policy

GEOL 1302 consists of a lecture portion and a lab portion. To drop the lab, you must drop the whole course. 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/aao/fao/).

Disability Accommodations

UT 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), The Americans with Disabilities Amendments Act (ADAAA),* and *Section 504 of the Rehabilitation Act.* 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 disability. Students are responsible for providing the instructor with official notification in the form of **a letter certified** by the Office for Students with Disabilities (OSD). Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting:

> **The Office for Students with Disabilities, (OSD)** www.uta.edu/disability or calling 817-272-3364. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability.
>
> **Counseling and Psychological Services, (CAPS)** www.uta.edu/caps/ or calling 817-272-3671 is also available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

Non-Discrimination Policy

The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos.

Academic Integrity

Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

> *I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.*
>
> *I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

UT Arlington faculty members may employ the Honor Code in their courses by having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents' Rule* 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) 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. Additional information is available at https://www.uta.edu/conduct/.

Title IX Policy

The University of Texas at Arlington ("University") is committed to maintaining a learning and working environment that is free from discrimination based on sex in accordance with Title IX of the Higher Education Amendments of 1972 (Title IX), which prohibits discrimination on the basis of sex in educational programs or activities; Title VII of the Civil Rights Act of 1964 (Title VII), which prohibits sex discrimination in employment; and the Campus Sexual Violence Elimination Act (SaVE Act). Sexual misconduct is a form of sex discrimination and will not be tolerated. *For information regarding Title IX, visit* www.uta.edu/titleIX or contact Ms. Michelle Willbanks, Title IX Coordinator at (817) 272-4585 or titleix@uta.edu.

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, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at www.uta.edu/resources.

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. Please also check announcements on Blackboard regularly.

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 efforts to solicit, gather, tabulate, and publish student feedback data is required by state law; student participation in the SFS program is voluntary.

Campus Carry

Effective August 1, 2016, the Campus Carry law (Senate Bill 11) allows those licensed individuals to carry a concealed handgun in buildings on public university campuses, except in locations the University establishes as prohibited. Under the new law, openly carrying handguns is not allowed on college campuses. For more information, visit http://www.uta.edu/news/info/campus-carry/

Emergency Exit Procedures

Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit. Leave through the main class door and follow the stairs down to the entrances of the Geoscience Building. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist handicapped individuals.

Emergency Phone Numbers: In case of an on-campus emergency, call the UT Arlington Police Department at **817-272-3003** (non-campus phone), **2-3003** (campus phone). You may also dial 911. Non-emergency number 817-272-3381

Schedule

GEOL 1301 (Earth Systems) Labs

Date	Topic
08/27-08/31/18	Introduction/Lab Safety Training Safety Training has to be completed online before attending the following lab sessions! You find a link to the training in Blackboard. If you have already completed the training for another class during this academic year, you are exempt.
09/04-09/10/18*	Lab 1: Minerals
09/11-09/17/18	Lab 2: Igneous Rocks
09/18-09/24/18	Lab 3: Sedimentary Rocks
09/25-10/01/18	Lab 4: Metamorphic Rocks
10/02-10/08/18	Lab 5: Topographic Maps
10/09-10/15/18	Lab 6: Geologic Structures and Maps
10/16-10/22/18	"Discovering Plate Boundaries" Signature Project
10/23-10/29/18	"Discovering Plate Boundaries" Signature Project
10/30-11/05/18	Project Presentations
11/06-11/12/18	Lab 7: Geologic Time
11/13-11/19/18	Lab 8: Streams
11/20-11/30/18**	Lab 9: Glaciers and Climate

*Please note that our regular lab weeks (starting on September 4) begin on Tuesdays and end on Mondays (because of Labor Day). That means that Monday labs are the last ones to finish the weekly assignment (except for the last week).

**Our last lab week is interrupted by the Thanksgiving Break. Therefore, Tuesday labs will take place on 11/20, Monday labs on 11/26, Wednesday labs on 11/28, Thursday labs on 11/29, and Friday labs on 11/30.

Labs are due at the beginning of your following lab session. Lab instructors will let you know when and how to hand in the final lab (Lab 9).

When law enforcement arrives:

- Remain calm and follow instructions
- Drop items in your hands (e.g., bags, jackets)
- Raise hands and spread fingers
- Keep hands visible at all times
- Avoid quick movements toward officers, such as holding on to them for safety
- Avoid pointing, screaming or yelling
- Do not ask questions when evacuating

Information to provide to 911 operations:

- Location of the active shooter
- Number of shooters
- Physical description of shooters
- Number and type of weapons shooter has
- Number of potential victims at location

ACTIVE SHOOTER EVENT

QUICK REFERENCE GUIDE

For questions or additional assistance contact:
Your local law enforcement authorities or FBI Field office :

Department of Homeland Security
3801 Nebraska Ave, NW
Washington, DC 20528

ACTIVE SHOOTER EVENTS

When an Active Shooter is in your vicinity, you must be prepared both mentally and physically to deal with the situation.

An "active shooter" is an individual who is engaged in killing or attempting to kill people in a confined and populated area; in most cases, active shooters use firearms(s) and there is no pattern or method to their selection of victims.

- ☐ *Victims are selected at random*
- ☐ *Event is unpredictable and evolves quickly*
- ☐ *Knowing what to do can save lives*

You have three options:

1 RUN

- Have an escape route and plan in mind
- Leave your belongings behind
- Evacuate regardless of whether others agree to follow
- Help others escape, if possible
- Do not attempt to move the wounded
- Prevent others from entering an area where the active shooter may be
- Keep your hands visible
- Call 911 when you are safe

2 HIDE

- Hide in an area out of the shooter's view
- Lock door or block entry to your hiding place
- Silence your cell phone (including vibrate mode) and remain quiet

3 FIGHT

- Fight as a last resort and only when your life is in imminent danger
- Attempt to incapacitate the shooter
- Act with as much physical aggression as possible
- Improvise weapons or throw items at the active shooter
- Commit to your actions . . . your life depends on it

The first officers to arrive on scene will not stop to help the injured. Expect rescue teams to follow initial officers. These rescue teams will treat and remove injured.

Once you have reached a safe location, you will likely be held in that area by law enforcement until the situation is under control, and all witnesses have been identified and questioned. Do not leave the area until law enforcement authorities have instructed you to do so.

EVACUATION PROCEDURES: The following procedures are presented as general guidelines. Each building and work area should establish procedures specific to the facility to ensure safe evacuation of employees, students, and visitors.

WHEN TO EVACUATE

- In the event of a fire alarm, complete evacuation of the building will be IMMEDIATE AND MANDATORY.
- For other emergencies that may require partial or total evacuation, Police or other responsible authority will notify you.
- The method of NOTIFICATION of an evacuation will be identified and included in the evacuation plan.

EVACUATION ROUTES

- Primary evacuation routes for each floor of each building will be the nearest safe stairwell.
- Elevators should not be used for evacuation. They may become inoperative or a smoke hazard may develop.
- All occupants should be familiar with the evacuation routes, which are posted on each floor.
- Evacuees should meet at designated areas for accounting reasons.
- “Assembly points” to be used during an evacuation will be identified and included in the facility evacuation plan.

TOTAL EVACUATION

- If a condition exists that requires total evacuation of the building, the fire alarm should be used for notification.
- In buildings without a standard fire alarm system, a voice alert will be used to alert occupants

METHOD OF EVACUATION

- Evacuation should begin with those persons not requiring assistance. This avoids the possibility of the disabled being injured.
- Position persons with disabilities near a safe stairwell farthest from danger.
- If possible, designate one person to stay with disabled and another to notify emergency responders of their location.
- Elevators will not be used during an evacuation.
- Flashlights or emergency lights will be useful in case of electrical power failure.
- Occupants will proceed to the nearest stairwell in an orderly manner, staying to the right side of the stairs and exiting the building on the ground floor.
- Close office doors and windows as you leave.
- Occupants should be informed to take personal items only if there is time.
- Occupants should remain quiet in the evacuation process in order to hear directions.

BOMB THREAT EVACUATION

- If the evacuation is due to a bomb threat, be alert to make note of any unusual packages that may be in or near your office area.
- Do not touch the package but report it to authorities immediately.

CONDUCT FOLLOWING EVACUATION

- DO NOT PANIC.
- Once in the safe area, stay visible.
- Occupants not accounted for will be submitted to the fire fighters as missing.
- Occupants will proceed to the area outside identified as the assembly area. This will allow for an accounting of personnel that have been evacuated from the building.
- All personnel should follow instructions given by those in charge.

- Do not return to an evacuated building unless authorities give the “ALL CLEAR” designation.
- Instructors and supervisors should make an accounting of occupants from their respective area.

EVACUATION PLANS FOR PERSONS WITH DISABILITIES

- See UTA Campus Safety Plan.
- Develop an evacuation plan for each building to meet specific conditions and existing needs
- “Areas of Refuge” should also be identified.
- Instructors and staff are responsible for aiding disabled persons.

The University of Texas at Arlington Police Department
Non-Emergency: 817-272-3381
Emergency: 817-272-3003