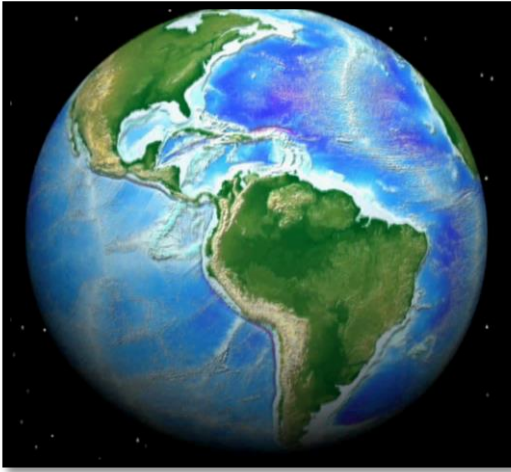
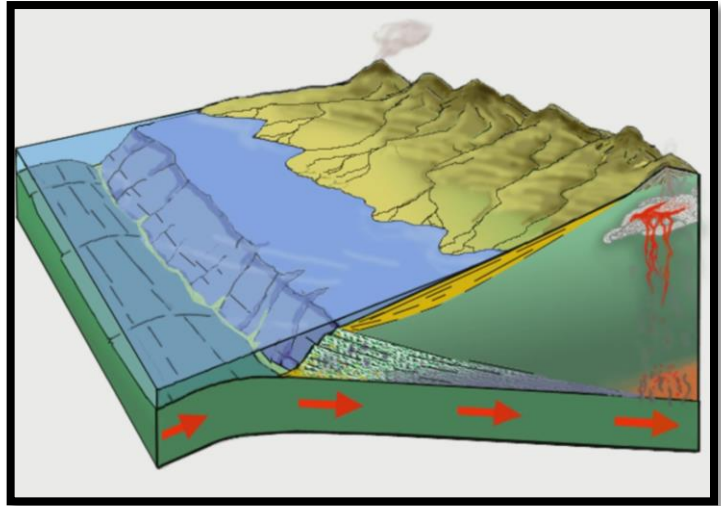


GEODYNAMICS - SPRING 2016



<http://emvc.geol.ucsb.edu/>



Basic Course Information:

Course number: GEOL 4302-001 (Undergrad) and GEOL 5302-001 (Grad)

Time: Lecture MWF 2:00 – 3:20 PM

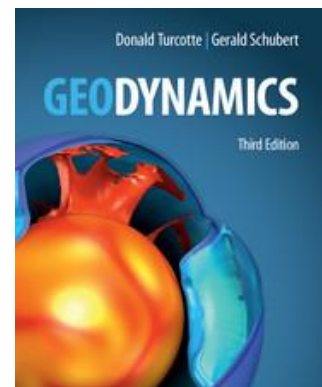
Location: GS 233

Primary Text: Turcotte, D. L., & Schubert, G. (2014). *Geodynamics*, 3rd edition. Cambridge University Press. (2nd edition is OK too if you can find it cheaper)

Instructor Information:

Dr. W. Ashley Griffith

- **Faculty Profile:** <https://www.uta.edu/profiles/william-griffith>
- **Office:** GS 233A
- **Office hours:** Wednesday, noon-3:00PM or by appointment
- **Phone:** 817-272-9666
- **email:** wagriff@uta.edu



Course Description: A comprehensive and quantitative study of fundamental aspects of plate tectonics. Introduction to heat flow, elasticity and flexure, fluid mechanics, and faulting, with a wide range of geological applications. Includes collaborative problem solving using Matlab® and peer presentations.

Prerequisites: Structural Geology, but Engineering Geology, or Engineering Statics and/or Mechanics will be helpful for students not coming from a geological background. Basic topics from Linear Algebra and Differential Equations will be used, however the relevant tools will be discussed in the class and course notes.

Learning Outcomes: Upon successful completion of this course, students should be able to:

- Idealize complicated plate tectonic problems by reducing them to essential, constrainable elements
- Apply principals of continuum and fluid mechanics to construct and solve boundary value problems related to plate tectonics
- Understand and manipulate field quantities and scalar, vector, and tensor data
- Use Matlab as an aid to solve, visualize, and analyze quantitative problems
- Communicate complex scientific concepts in writing and oral presentation

Grading:

Grades will be determined by problem sets, a short oral presentation on a topic from plate tectonics, and a final term project. The grade breakdown is as follows:

Problem Sets	60%
Final Exam	10%
Term Project	30%
Total	100%

Problem sets turned in late will be dropped one letter grade for each business/school day they are late. It is the student's responsibility to turn assignments in and to write the date the assignment is turned in next to their names on the top of the assignment. No-shows for presentations & late Term projects will not be accepted.

Plate Tectonics Presentation:

Early in class students will make short ~15 minute presentations on specific topics in plate tectonics, based largely on material in Chapter 1 of the Geodynamics book. There will NOT be a written portion for this presentation. This presentation will count as the first problem set. The details of the presentation will be provided in a **separate handout**.

Term Project:

The term project will be discussed more detail in a **separate handout**, but it will (A) consist of a written paper and (B) have intermediate due dates throughout the semester. The objective of this term project will be for each student to conduct a quantitative analysis of some problem related to one of the chapters in the Geodynamics book. These should not be problems we cover directly in class. I **strongly** encourage you to choose a project that complements your own research or interests. I will consider it a true success if it becomes part of your thesis: I don't want to waste your time any more than I

want to waste my own. In order to ensure that everyone uses time wisely, there are several due dates on the course schedule below.

Exams

There will be one (final) exam in this class. The final exam will focus on conceptual questions, intended for you to show that you understand how to go about solving problems rather than testing your ability to “do the math”. You will be given a list of exam questions in advance to facilitate studying, and the final exam questions will be chosen from this list of questions.

Tentative Schedule of Topics

Date	Topic	Reading	Due Dates
January 19	No Class – Work on PT Presentation	Chp 1	
January 21	No Class – Work on PT Presentation	“	
January 26	Introduction	“	
January 28	PT Presentations	“	PT Presentations
February 2	PT Presentations	“	PT Presentations
February 4	Stress, Static Equilibrium, and Isostasy	Chp 2	
February 4	Global pressure gradient, Basic 2D stress relationships	“	
February 9	Strain: Volumetric & Shear Components	“	
February 11	Introduction to Differential Equations		
February 16	ELASTICITY & FLEXURE – Hooke’s law: general, uniaxial strain, plane strain, and plane stress	Chp 3	Problem Set 1 Due
February 18	Governing Equation for Elastic Flexure	“	
February 23	Some simple examples	“	
February 25	Plate bending in the lithosphere	“	
March 1	HEAT TRANSFER – Fourier’s Eq & 1D conductive heat flow	Chp 4	
March 3	The continental geotherm, 2D heat flow	“	Problem Set 2 Due
March 8	Time-dependent 1D heat flow	“	Final Project Topic & Brief Outline Due
March 10	The age of the earth & cooling of the oceanic lithosphere		
March 15	No Class – Spring Break	“	
March 17	No Class – Spring Break		
March 22	FLUID MECHANICS – 1D Linear Viscous Flow	Ch 6	
March 24	2D Flow – Introduction to Corner Flow	“	Problem Set 3 Due

March 29	Corner Flow Problem	“	Final Project Abstract & Detailed Outline Due
March 31	RHEOLOGY	Chp 7	
April 5	“		
April 7	“	“	
April 12	“	“	
April 14	FAULTING	Chp 8	Rough Draft Due
April 19	Guest Lecture	“	
April 21	Guest lecture	“	
April 26	Guest lecture		Peer Review of Rough Draft Due
April 28	FAULTING (continued)	“	
May 3	“	“	Problem Set 4 Due
May 5	“	“	All final papers due
May 10 (Tuesday)	Final Exam – 2:00PM-4:30PM		

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 University Catalog.

Attendance:

At The University of Texas at Arlington, taking attendance is not required. Rather, 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 this course, 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.

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://www.uta.edu/aao/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.

Title IX: The University of Texas at Arlington is committed to upholding U.S. Federal Law “Title IX” such that no member of the UT Arlington community shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity. For more information, visit www.uta.edu/titleIX.

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 as they see fit in their courses, including (but not limited to) 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.

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 contact the Maverick Resource Hotline by calling 817-272-6107, sending a message to resources@uta.edu, or visiting 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>.

Student Feedback Survey: At the end of each term, students enrolled in classes categorized as “lecture,” “seminar,” or “laboratory” shall be directed to complete an online 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.