Spring 2017 Syllabus
GEOL 309/L: Earth Tectonics and Structure

COURSE STRUCTURE
GEOL 309/309L is a three-unit lecture and one-unit lab course; three hours of lecture and three hours of lab work a week. The field trip associated with the course is an essential learning experience.

GENERAL MANAGEMENT
Contacts: Prof. Elena Miranda
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Office hours: Wednesdays 10 a.m. -11:00 a.m.
or by appointment

Textbook: Earth Portrait of a Planet, by Steven Marshak, 4th edition, 819 pages. Additional articles and text chapters from other sources (see bibliography) will supplement this text.

Bibliography: (the following will be placed on reserve in the library)
The Solid Earth, C.M.R. Fowler, Published by Cambridge.
Regional Geology and Tectonics, 1st edition. Edited by D.G. Roberts and A.W. Bally. Published by Elsevier.
Folds and Faults—a mobile app and e-book by Dennis Tasa, Michael Collier, and Ed Tarbuck. Published by Tasa Graphic Arts, Inc. Available for iPad on the Apple App Store, Android devices via Google play, and on Amazon for the Kindle Fire.

Attendance: The amount of what you will learn, both in course material and in critical reasoning skills, depends upon your regular attendance, which includes attending for the entire class period, and keeping up with all assignments. The benefit and success of the group exercises depend on team efforts and require you to be in class. If you are absent and miss quizzes and exercises, there are NO MAKEUPS. There is no make up for the field trip. You must make arrangements to have this weekend free.

Grades: There are distinctions between lecture and laboratory work related to this course structure, so you will receive different grades for each. A plus/minus grading scale will be used.

EVALUATION AND GRADES
The proportion that each task will count toward your final grades in GEOL 309 is:
One-page written summaries of reading assignments (due on Wed. of weekly assigned) and in-class quizzes (announced or pop quizzes) 10%

Signature assignment:
Tectonics research report: written 10-page report (due April 6) 15%
Tectonics research report: oral (last week of class) 15%
Lecture Mid-terms (2) and Final Exam 50%
Professionalism in the classroom, online, and in the field 10%
The proportion that each task will count toward your final grades in GEOL 309/L is:

- quizzes on laboratory assignments: 20%
- weekly laboratory exercises: 60%
- field-trip exercise (‘Resident Expert’ poster): 20%

Course objectives:
This course is an introductory-level class for students majoring in the B.S. in Geology, or the B.S. in Geophysics. This course will introduce students to the forces that drive plate tectonics and the surface expressions of deformation structures associated with modern and ancient tectonic plate boundaries. Topics featured in the course include: Earth’s compositional and mechanical layers; the development of Plate Tectonics Theory; features of divergent, convergent and transform plate boundaries; sedimentary basin development, patterns of folding and faulting, and earthquakes and associated hazards at plate boundaries and in intra-plate settings; geophysical techniques including seismic wave reflection and refraction, isostasy, and magnetism; tectonic stresses and the strength of the lithosphere; and orogenesis through geologic time.

Students will learn to:
1) distinguish geophysical and geologic techniques that allow geoscientists to interpret the structure of Earth’s interior layers and the patterns of mantle convection.
2) identify the distinctive geologic structures and sedimentary basins associated with the three types of plate boundaries.
3) relate the driving forces of plate tectonics to the surface development of these distinctive features of plate boundaries.
4) identify evidence for plate boundary interaction in the geologic past and interpret the evolution of plate movement through geologic time.
5) examine the tectonic history of Western North America as a case study of plate boundary evolution through time.

Textbook Material (Marshak):
- Part I: Chapter 2, Journey to the Center of the Earth
- Part I: Chapter 3, Drifting Continents and Spreading Seas
- Part I: Chapter 4, The Way the Earth Works: Plate Tectonics
- Part II: Chapter 7, Pages of Earth’s Past: Sedimentary Rocks (emphasize stratigraphy; hook with seismic reflection)
- Part III: Chapter 10, A Violent Pulse: Earthquakes with Interlude D The Earth’s Interior (geophysics)
- Part III: Chapter 11, Crags, Cracks and Crumple: Crustal Deformation and Mountain Building

NOTE: A significant amount of supplemental reading will be assigned weekly (see Bibliography).

Lecture Topics (dates in bold-face = assignments due/exams):
1. **Plate Tectonics** - 3 weeks
   - Week 2 (Jan 30, Feb 1) Earth’s compositional and mechanical layers (Chapter 2, Marshak)
   - Week 3 (Feb 6, 8) Drifting Continents and Spreading Seas (Chapter 3, Marshak)
   - Week 4 (Feb 13, 15) The Way the Earth Works: Plate Tectonics (Chapter 4, Marshak)

2. **Stratigraphy** - 2 weeks
   - Week 5 (Feb 20, 22) Sedimentary Basins at Plate Boundaries (Chapter 7, Marshak)
   - Week 6 (Feb 27, **Mar. 1**) Sedimentary Basins in Intraplate Settings (Chapter 7, Marshak)

**MIDTERM Mar. 6** (Covers material in weeks 1-5)

Mar. 6 Deadline for selecting ‘Tectonics’ topic for written and oral research report
written report due April 5
oral presentations in class during the final week of class – May 8 and 10

3. Geophysics – 3 weeks
   • Week 7 (Mar 8) Tectonics on a Globe: Euler poles (Chapter 2 in Fowler Text)
   • Week 8 (Mar 13, 15) Earthquakes: Focal Mechanisms & Plate Boundaries (Class Notes)
   • Week 9 (Mar 20, 22) NO CLASS – Spring break recess
   • Week 10 (Mar 27, 29) Seismology: Body, Surface Waves, ETS (Chapter 4 in Fowler Text)

   MIDTERM April 3 (Covers material in weeks 7-10)

4. Structural Geology - 3 weeks
   • Week 11 (Apr 5) Stress, Strain, and Plate Bending (Chapter 11) (written reports due on April 5)
   • Week 12 (April 10, 12) Lithospheric Strength Envelopes; Folds, Faults and Shear Zones (Chapter 11)
   • Week 13 (April 17, 19) more Faults and Shear Zones (Chapter 11)

5. Plate Boundaries and Orogenesis through Time (team research reports) (DY) – 3 weeks
   • Week 14 (April 24, 26) Tectonic History of North America (Chapter 11)
   • Week 15 (May 1, 3) Tectonic History of North America (supplementary reading)
   • Week 16 (May 8, 10) ‘Tectonics’ oral presentations during class time
   • Week 17 (May 17) – Final Exam 10:15 AM – 12:15 PM (50% on weeks 11-13, 50% comprehensive)

Laboratory Exercises:
1. Week 2 (Feb 1) – Earth composition and structure (core, mantle, crust; Mohorovicic discontinuity; asthenosphere, lithosphere, definition of a plate)
2. Week 3 (Feb 8) – Nuts and bolts of plate tectonic theory part 1(magnetic reversals, paleomagnetism, triple junctions, types of plate boundaries, etc)
3. Week 4 (Feb 15) – Nuts and bolts of plate tectonic theory part 2 (rates of motion, forces of motion, and more)
4. Week 5 (Feb 22) – Sedimentary basin analysis 1 (forearc vs back-arc basins)
5. Week 6 (Mar 1) – Sedimentary basin analysis 2 (foreland basin vs strike-slip basins)
6. Week 7 (March 8) – Euler Poles on a Globe (Real World Globes)
7. Week 8 (March 15) – Earthquakes, focal mechanisms, paleoseismology, hazard, and plate boundaries
8. Week 9 (March 22) – NO LAB, Spring Recess
9. Week 10 (March 29) – Seismology, Reflection, Refraction, Snell's Law
10. Week 11 (April 5) - Gravity, isostasy, plate bending (applications)
11. Week 12 (April 12) – Calculating stress, measuring strain, select ‘Resident Expert’ topic for poster presentation on field trip.

12. Week 13 (April 19) – Quantifying deformation via fold analysis (concentric vs similar folds)

13. Week 14 (April 26) – Determining fault displacements (fault separation vs fault slip)

14. Week 15 (May 3) – Reading geologic maps and cross sections, preparing for field trip

15. Field Trip Weekend May 6 & 7 (‘Resident Expert’ poster presentations)

16. Week 16 (May 10) – No laboratory (in exchange for weekend field trip)

POLICIES

It is the student’s responsibility to know and follow the rules and policies that I have outlined in this syllabus. You agree to abide by these policies by accepting this syllabus and any subsequent updated syllabi. At times through the semester, it may become necessary for me to update the syllabus to match the topics and pace that we cover the material. Therefore, future syllabi may replace this version that you have received on the first day of class. You will find the updated syllabi on the Moodle page for this course.

No later work will be accepted or graded for feedback. I am extremely strict about this policy. An assignment is considered ‘late’ whether it is turned in one minute or one hour after a deadline. Pay close attention to due date instructions given orally in class, embedded within lectures, or noted in assignments.

I will often send important course information via email or Moodle. Check your account or Moodle for important ‘GEOL 309’ messages. University policy states that you are responsible for course information sent via email. Your responsibility includes understanding how to forward mail to an off-campus account (if you choose to do so), understanding how to download and save files sent via email and Moodle forum, and following instructions for assignments and deadlines sent via email and/or Moodle.

You can email me about course material or questions that you may have, but I will not be able to respond to your email immediately. Many times, a question can be clarified with a detailed review of the syllabus; check it before emailing me. For all other questions, I will usually be able to respond to your email inquiry within 1 business day and during typical business hours, so keep this in mind when emailing me prior to a due date, an exam date, or on the weekend. Please keep in mind that email is a formal mode of correspondence, and it is not to be used in a casual manner as you would for text messaging or instant messaging. I expect that you will write in a professional manner, which includes using standard salutations, professional titles, and formal language when corresponding via email.

**You are required to take the exams as they are scheduled. I do not give make-up exams.** Therefore, if you miss an exam, a grade of ‘0’ will be recorded. Be sure to check the exam schedule immediately so that you avoid missing any exams; buying a plane ticket home prior to the final exam time, or failing to show up to the designated exam time are not valid excuses, and will result in you receiving a grade of ‘0’. If you miss an exam due to an extraordinary circumstance (such as a serious illness or a medical or family emergency), you must have official documentation available for me to verify those circumstances, and you must supply that documentation within 24 hours of the exam date. In the event of such an emergency, the suitability of the documentation and administration of make-up exams is entirely at my discretion. You are required to contact me well in advance of such an event, or within 24 hours of an unforeseen event. You will not be eligible to take a make-up exam if you do not follow these directions.

**ACADEMIC DISHONESTY**

Official California State University policy states: “The maintenance of academic integrity and quality education is the responsibility of each student within this university and the California State University system. Cheating or plagiarism in connection with an academic program at a campus is listed in Section 41301, Title 5, California Code of Regulations, as an offense for which a student may be expelled, suspended, or given a less severe disciplinary sanction. Academic dishonesty is an especially serious offense and diminishes the quality of scholarship and defrauds those who depend upon the integrity of the campus programs. Such dishonesty includes but is not limited to: cheating, fabrication, facilitating academic dishonesty, and plagiarism.”
I do not tolerate any form of academic dishonesty. I expect that you will uphold the integrity of the academic environment here at CSUN; however, if I find evidence of academic dishonesty, we will report such evidence to the Office of the Vice President for Student Affairs and recommend disciplinary action. If you are caught cheating in my class, you will be given a failing grade for the assignment, and possibly a failing grade for course depending on the severity of the incident (what constitutes a serious offence is at my discretion). This includes, but is not limited to, plagiarism, facilitating cheating by another student, using electronic files from peer or former student assignments, lying about an excuse for missing an assignment deadline, copying answers during an exam, facilitating cheating by another student, altering a test grading sheet after the exam, or lying about an excuse for missing the exam. Plagiarism also includes the use of paragraphs or even long phrases and diagrams or parts of diagrams from peer or former student reports/labs/maps in your own assignment without proper acknowledgement of the source. Proper acknowledgement of sources clears the student from academic dishonesty charges, but does not fulfill the work obligations of the student and the acknowledged item will count “0” points on the report.