Course Syllabus

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Structural Geology (EART-150)
Fall Quarter 2019
Course Information and Outline

Structural geology is concerned with describing and quantifying the **strain** (deformation) observed in rocks and relating that deformation to tectonic **stresses** in the past. In this course you will learn to recognize and describe a wide variety of tectonic structures and interpret the geologic history of rocks based on your observations and measurements. You will hone your field observational skills and improve your ability to visualize structures in three dimensions.

Instructor: Jeremy Hourigan
Office: E&MS A221
Office Hours: M,W 2:30 – 3:30 PM (or by appt.)
Contact: 650.269.6259
email: hourigan@ucsc.edu (mailto:hourigan@ucsc.edu)

Lecture
Meeting Time: MWF 1:20 – 2:25 AM
Location: E&MS D226

Laboratory

	Section 1	**Section 2**
T**A**	Kellen Martin	Will Chapman
Time	Tu 9:00-12:00	Th 4:30-7:30
Location	D226	D226
Office	TBA	TBA

Office Hours	TBD	TBD
Contact	knmartin@ucsc.edu **(mailto:knmartin@ucsc.edu)**	wachapma@ucsc.edu **(mailto:wachapma@ucsc.edu)**

TAA: Skylar Strange

Final Exam: M December 9th, 2019 8:00-11:00 AM

Lecture: This course is fast-paced and the lecture material is challenging. To succeed you will need to keep ahead on your reading, attend all lectures and take good notes. Please, ask questions in class if you don't understand something. Structure really challenges your ability to visualize problems in three dimensions. For some this comes naturally, for others it presents a real challenge. If you are struggling, we have a veteran crew with lots of tricks and tools to help you.

Laboratory: There will be a ~30-minute lecture at the beginning of each lab with instructions on how to complete your lab. In many cases, there will be a pre-lab on Canvas that you should complete these exercises prior to attending your section. You will need to be on time to these sections to gain full advantage of the lecture material. Chronic tardiness will result in the devaluation of your class participation grade. It is very important that you work on a given weeks lab during that lab section so that your TAs can efficiently answer inevitable questions about how to tackle problem sets. Your previous week's problems set is due at the beginning of the lab, so if you are working on it during lab it's already late. Get to the lab on time and be prepared to work on your new lab.

Field Trips: Completion of this course requires participation in four weekend-field exercises at Natural Bridges, Pescadero State Beach, the Marin Headlands, and at the alter of extensional tectonics – Death Valley. Mark your calendar now.

Trip	Date(s)	Times	Meeting Spot
Faults Field Trip	Saturday, October 5th	9 AM - 5 PM	TAPS Lot
Folds Field Trip	Sunday, October 27th	7 AM - 7 PM	TAPS Lot
Death Valley Field Trip	Thursday, November 7th - Monday, November 11th	TBD	EMS Loading Dock

Course Text:

Structural Geology of Rocks and Regions, *3rd Edition* by Davis, Reynolds, and Kluth

Online suppliers have new, used, rental and electronic versions.

Further reading and otherwise decent structural geology resources:

1. *Earth Structure, 2nd Edition* by Ben A. Van der Pluijm and Stephen Marshak
2. *Structural Geology, 2nd Edition*, by Haakon Fossen
3. *The Techniques of Modern Structural Geology, Vol. 1-2* by Ramsay and Huber
4. *Microtectonics, 2nd Edition,* by Passchier and Trouw
5. *Basic Methods of Structural Geology* by Marshak and Mitra (Optional)

Course Website

I will post my structure lectures to Canvas (https://canvas.ucsc.edu/) hopefully in movie form (technology willing). Be mindful that the lectures can be very large, so you will need a fast internet connection to download them. Reviewing my Powerpoint presentations is not an adequate substitute for good note-taking or reading the textbook. If you miss something in lecture raise your hand and ask me to go back. If I write something on the board, it is important! Practice good note-taking. Read the book. Use the e-modules. Seek help early and often. If you follow these guidelines you will succeed in this class.

Personal Supplies:

-field notebook – (e.g. 109 field books if you have them. A small spiral bound notebook will do).
-clipboard for maps, either your 109 map board or a clipboard
-smartphone with FieldMove Clino or Stereonet Mobile
-fine mechanical pencils for drafting (no bics!)
-set of colored pencils
-erasers
-protractor
-ruler
-calculator

Provided in labs but helpful to have your own supply:

-graph paper (10 division per inch)
-tracing paper

Grading

Concurrent enrollment in lecture (EART-150) and lab (EART-150L) is required as the exercises and field trips in lab are essential to gaining a command of the material. You will receive the same grade for both sections broken down as follows:

EXERCISE	VALUE
Midterm Exam(October 18th, in class)	10%
Final Exam (December 9th)	25%
Quizzes/Homework	18%
Faults Field Trip Report	17%
Folds Field Trip Report	15%
Death Valley "Project"	15%
TOTAL	**100%**

Laboratory Grade: Regular Lab Exercises (7 weighted by total points and effort required) **100%**

Lateness Policy: Lab exercises and reports are due at the beginning of your lab section. Your maximum possible score on the lab will be discounted at a rate of 5% per day late The grade is calculated using G = Go*(1-0.05*t), where t is the number of weekdays late and Go is your starting actual score. Work that is more than a week late will not be accepted for credit.

Policy on Academic Integrity: Please review the University's policy on Academic Misconduct at: https://www.ue.ucsc.edu/academic_misconduct **(https://www.ue.ucsc.edu/academic_misconduct)** . Structural geology is a challenging class and we fully expect that students will share thoughts on how to tackle specific problems; however, we also fully expect that the solutions you provide to the problems will ultimately reflect your own careful work. In terms of the structure reports you will be expected to cite all sources of information that is not "common knowledge" and the general rule of thumb is when in doubt, provide a reference.

FIELD TRIP RULES

Alcohol: We have one multi-day overnight field trip in this class. Alcohol consumption in moderation will be permitted at the conclusion of the workday (NO DAY DRINKING) in camp provided that you are over 21. Consumption of alcohol or other intoxicants during any of the one-day field trips is strictly prohibited. Absolutely no open containers in vehicles participating on field trips. If empties are discovered in the vans there will be disciplinary action for all students in the van. Hard alcohol is not permitted on the Death Valley Field Trip.

Drugs: The use of illegal drugs is strictly prohibited.

Driving: Drive university and rental vehicles safely. Speeding, tailgating or other type of vehicular misbehavior will result in loss of driving privileges. Egregious infractions may result in university-level discipline and your dismissal from class.

Guidelines regarding the use of University vehicles:

1. Return the vehicle immediately following the trip.
2. Record the mileage at the beginning and end of the trip.
3. Refuel the vehicle prior to returning to campus.
4. Make sure the vehicle is in reasonably clean condition.
5. Fill out a damage report if any has occurred and notify the instructors.
6. Return the keys to the drop box.

Use of personal automobiles: On rare instances, when a student needs to travel to a field trip independently they may drive their own car to the field. However, other EART150 students will not be permitted to ride as passengers in these private automobiles. Please communicate your plan to travel independently to Jeremy well in advance of the field trip.

Course Summary:

Date	Details	
Mon Sep 30, 2019	**#1: Structural Analysis (https://canvas.ucsc.edu/courses/25054/assignments/97806)**	due by 11:59pm
Fri Oct 4, 2019	**Faults Pre-Trip Preparation Assignment (https://canvas.ucsc.edu/courses/25054/assignments/93803)**	due by 11:59pm
Mon Oct 7, 2019	**#2 Strain / Strain Analysis (https://canvas.ucsc.edu/courses/25054/assignments/98112)**	due by 11:59pm
Fri Oct 11, 2019	**#3 Stress (https://canvas.ucsc.edu/courses/25054/assignments/98116)**	due by 11:59pm
Mon Oct 14, 2019	**#4 Faults / Fault Mechanics (https://canvas.ucsc.edu/courses/25054/assignments/98119)**	due by 11:59pm
Wed Oct 16, 2019	**Faults Report Draft (https://canvas.ucsc.edu/courses/25054/assignments/98122)**	due by 11:59pm

Date	Details	
Fri Oct 18, 2019	Mid-Term Exam (https://canvas.ucsc.edu/courses/25054/assignments/98132)	due by 11:59pm
Wed Oct 23, 2019	#5: Folds (https://canvas.ucsc.edu/courses/25054/assignments/98148)	due by 11:59pm
Fri Oct 25, 2019	Faults Report (https://canvas.ucsc.edu/courses/25054/assignments/98123)	due by 1:20pm
Sat Oct 26, 2019	Folds: Prep Trip Exercise (https://canvas.ucsc.edu/courses/25054/assignments/98128)	due by 11:59pm
Wed Oct 30, 2019	Death Valley Pre-Trip: Eastern California Shear Zone (https://canvas.ucsc.edu/courses/25054/assignments/98140)	due by 11:59pm
Fri Nov 1, 2019	Death Valley Pre-Trip: Rhombocasm / Black Mountains (https://canvas.ucsc.edu/courses/25054/assignments/98142)	due by 11:59pm
Wed Nov 6, 2019	Death Valley Pre-Trip: Metamorphic Core Complexes / Funeral Mountains (https://canvas.ucsc.edu/courses/25054/assignments/98144)	due by 11:59pm
Mon Nov 11, 2019	Death Valley "Report" (https://canvas.ucsc.edu/courses/25054/assignments/98158)	due by 11:59pm
Wed Nov 13, 2019	#6: Rock Fabrics / Shear Zones (https://canvas.ucsc.edu/courses/25054/assignments/98150)	due by 11:59pm
Wed Nov 20, 2019	#7: Extensional Tectonics (https://canvas.ucsc.edu/courses/25054/assignments/98151)	due by 11:59pm
Fri Nov 22, 2019	Folds Poster Due (https://canvas.ucsc.edu/courses/25054/assignments/98143)	due by 11:59pm
Wed Nov 27, 2019	#8: Fold and Thrust Belts (https://canvas.ucsc.edu/courses/25054/assignments/98153)	due by 11:59pm
Wed Dec 4, 2019	#9: Transform Tectonics (https://canvas.ucsc.edu/courses/25054/assignments/98155)	due by 11:59pm

Date	Details	
Mon Dec 9, 2019	**Final Exam** (https://canvas.ucsc.edu/courses/25054/assignments/98134)	due by 11:59pm