SIO 100 Geological Field Methods Fall 2024

Overview: This class will introduce you to geologic methods. These include strategies for research design, data reduction, geological inference and use of basic instruments. The class will feature specific exercises in mapping, measuring sections, working with imagery and topographic maps, and cross-sections. In addition to field exercises, most Fridays and parts of three weekends, the course features a series of exercises where you collect data and interpret it to make measured sections, cross-sections, field maps and structural interpretations. In addition to the practical aspects of the class, we will learn about the general geology and tectonics of the American Southwest, where many of the exercises are based. We will also touch on field safety as well as the identification of sources of published and informal geological data, the integration of field data with other data sources (such as making overlay maps) and LIDAR data. The class is designed so that you will come away confident in your ability to lead your own field projects.

Instructors:

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SIO Undergraduate Office Contacts

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Class Meeting Times and Requirements:

This class will meet Wednesday (9-9:50 am) and Friday Afternoon (12-3 pm) in Eckart 225. In general, Wednesdays will be devoted to short in-class exercises or lectures on relevant material. Fridays 12-3 pm will be devoted to weekly projects or exercises (sometimes in the field).

We will not have exams. Grades will, instead, be based entirely on:
(1) weekly exercises (each worth 10-15% of the grade)
(2) short in-class exercises (whose score is incorporated in the weekly assignment grade)
(3) participation in weekend field trips.

You will typically have a week between the assignment of a project/exercise and when it is due. Late work will not be graded without prior agreement of the instructors.

A Note about Field Trips:

We will have three REQUIRED field trips. Two are overnight trips to:

Rainbow Basin: **October 12-13** and **October 26-27.**
Salton Sea (Mud Hills). **Nov 16-17**
We mention this now because all the trips are **mandatory** elements of the class and we expect you to go on all of them. Hence, please check your calendars for other classes to resolve conflicts now. Our trips are worth not only whatever the assignment is for a given trip, but also participation points; **it will be difficult to do well in the class if you don't attend all the trips.**
***Please mark these trips on your calendar as we will not have makeup times*.**

Assignments:
Your grade will depend upon:
(1) graphical work—cross-sections, maps, stereonet plots; these will be graded on accuracy, appropriate use of geological terminology and symbols, quality of presentation including neatness and artistic merits
(2) Field book notes where you will be graded on the accuracy of your geological interpretation/presentation, quality of your data reporting and outcrop drawings
(3) the Wednesday in-class exercises. We have rubrics for each assignment so if you do everything on the rubric you should score well.

Late assignments will not be accepted. It is important that you turn things in on time so that you can get feedback to incorporate into following assignments.

Course Learning Objectives:

- Learn how to read and understand information in geologic maps
- Learn basic geologic history and context of Western North America and SW US
- Use of different Data types: Digital elevation models (like LiDAR and drone-image based DEMs)
- Overlay various map types on Google Earth
- Learn basic field mapping skills: Compasses, Abney Levels, Jacob's Staff and
- Electronic mapping programs ("Clino" and "Field Move", "Google Earth", "Rockd") and graphics packages: Illustrator, Affinity Designer, or Inkscape.
- How to measure a stratigraphic section and describe rock sequences
- Mapping geologic features
- Use of graphics programs to make professional maps
- Making cross sections from a geologic map

Course Schedule

	Date	**Topic**	**Reading/lab**
Week 1	F Sept 27	SIO Entry Strike & Dip Exercise	
Week 2	W Oct 2	Rock Description	
	F Oct 4	Drawing Measured Sections; Intro Rainbow Basin; Rainbow GE Exercise Due (Sun): Strike & Dip Exercise	
Week 3	W Oct 9	Drawing Rainbow Basin Measured Section	

	F Oct 11	SIO Beach Outcrop Drawing Due (Tuesday): Rock Descriptions	Oct 12-14: Weekend Field Trip-Rainbow Basin
Week 4	W Oct 16	Stereonets	
	F Oct 18	Google Earth & GE Fold Axis Challenge Due (Sun): SIO Beach Drawing	
Week 5	W Oct 23	Drawing a map	
	F Oct 25	Preliminary Rainbow Basin Map Due (Tuesday): Rainbow Basin Measured Section	Oct 26-27: Field Trip Rainbow Basin
Week 6	W Oct 30	Rainbow Basin Mapping	
	F Nov 1	Rainbow Basin Final Map Due (Sun): Rainbow Basin Preliminary Map	
Week 7	W Nov 6	Drawing a Cross Section	
	F Nov 8	Rainbow Basin Cross Section Due (Sun): Rainbow Basin Final Map	
Week 8	W Nov 13	Intro to Mud Hills	
	F Nov 15	Mud Hills Preliminary Map Due (Tuesday): Rainbow Basin Cross Section	Nov 16-17: Field Trip Mud Hills structure
Week 9	W Nov 20	Drawing a Mud Hills Map	
	F Nov 22	Mud Hills Mapping Due (Sun): Mud Hills Map	
Week 10	W Dec 4	Mud Hills Cross Section	
	F Dec 6	LIDAR Exercise Due (Sun): Mud Hills Cross Section	

Required Materials:

- A computer with internet,
- Google Earth--a free download: http://www.google.com/earth/download/ge/
- Field move (for tablets) or Field Move Clino (for phones)--an e-mapping program; https://www.petex.com/products/move-suite/digital-field-mapping/
- Adobe Illustrator, Affinity Designer, or Inkscape,

Other useful materials:

- Protractor,
- ruler,
- colored pencils,
- pencils

- A “Brunton” Compass: [this is a Chinese knockoff, but surprisingly good quality. I bought one; I also reviewed this compass on the Amazon website] https://www.amazon.com/Geological-Compass-Harbin-DQL-8/dp/B00I4W95CK/ref=sr_1_1?dchild=1&keywords=Harbin+compass&qid=1609548999&sr=8-1 ($70.00)

Optional Reference Books:

- Baldridge, Geology of the American Southwest. Can be rented online for $12.77 for three months; used copies available for ~$20
- Blakey, R.C., and Ranney, W.D., 2018. Ancient landscapes of Western North America, Springer. 228 pp. ($20.99)
- Compton, R., 2017. Geology in the Field. CreateSpace Independent Publishing Platform **SBN-10:** 1547118776; **ISBN-13:** 978-1547118779 ($16.95)
- Lisle, R.J., Brabham, P. & Barnes, J., Basic Geological Mapping, 5th Edition, The Geological Field Guide Series, 2011. ($34)
- Stow, D. A.V., 2005. Sedimentary rocks in the field. CRC Press 320 pp. ($34 used from Amazon)

UCSD Policy on Integrity of Scholarship

UCSD has an established policy on academic honesty that we will follow in this class. Please see: http://academicintegrity.ucsd.edu/

In plain English: don't cheat, don't plagiarize.

Accessibility and Inclusion

Our goal is to provide students with effective accommodation based on law and current best practices and to promote individual growth and self-determination. We encourage full participation of all students within the university community. If there are particular things you need to help your learning in this course, we’d like to discuss it with you as soon as we can so we can talk about arrangements and support. We are committed to access for all of our students so if you need particular accommodation in this course, please let us know and also contact the Office for Students with Disabilities to get the process started. We are committed to aspiring to maintain an environment that values our diversity. We support understanding and appreciation of all members of its community, regardless of race, sex, age, color, national origin, ethnicity, creed, religion, disability, sexual orientation, gender, gender identity, marital status, pregnancy, genetic information, veteran status, or political affiliation. Accordingly, we ask that students be willing to listen to one another’s points of view, acknowledging that there may be disagreements, keep discussion and comments on topic and respectful, and use first person, positive language when expressing their perspectives.

Field Conduct

For your safety and the safety of others, and for maintaining the high-quality standard of UCSD and SIO field experiences, you must understand that your participation in a field experience requires following the rules below in regard to conduct while on the trip:

- Always following the instructions of trip leaders and never leaving the group or the camp unless you have the permission of trip leaders.
- Never initiating or being involved in any activity that is dangerous to yourself or

others, which includes:
    - Not possessing or using any illegal drugs while on the trip, and
    - Not possessing weapons, including firearms.
- Not participating in sexual misconduct of any form. Sexual harassment is a form of discrimination and is unlawful. If sexual harassment is occurring to you, or if you witness sexual harassment occurring to others on the trip, you should report this behavior to the trip leader, a UCSD representative, and/or to law enforcement.
- Respecting the properties, structures, areas, and vehicles at and on which activities occur, and observing all rules and regulations of the properties, structures, areas and vehicles. (No Geo-Vandalizing!)
- Showing respect to others, including non-participants and the general public, at all times. Always have appropriate behavior, including in the evening hours.
- Students are not allowed to bring guests, including children and pets, on course activities.