

GLG494/598 (ASU) and GEOL 701J (UNR): Mapping tectonic faults from geomorphology

Instructors:

Chelsea Scott (cpscott1@asu.edu), Ramon Arrowsmith (ramon.arrowsmith@asu.edu), Richard Koehler (rkoehler@unr.edu)

Teaching Assistant:

Rachel Adam (rnadam@asu.edu)

3 credits (full class)

Course Description: The class focuses on geomorphic fault mapping. Students will learn techniques for mapping tectonic faults in different geomorphic and tectonic environments. They will complete several short projects and then a longer independent project on fault mapping that includes a final presentation and written report. Students will collaborate with students at other universities and with industry geologists. Students can complete the course working virtually, with a computer and internet.

Prerequisites: Geology graduate student standing. Senior undergraduate students who have completed Structural Geology and Geomorphology can enroll with instructor permission.

Learning outcomes:

- Students will learn about fault zone mapping from weekly lectures, assignments and class discussions.
- Students will learn about Probability Fault Displacement Hazard Assessment and how fault mapping contributes to better understanding seismic hazard
- Students will collaborate with other students and industry partners
- Students will practice public speaking, writing, and scientific literature reading skills
- Students will learn to use QGIS or similar software for fault mapping
- Students will learn tools to map faults based off observable evidence from data and reduce conclusions based on mappers' bias.

Meeting schedule:

Tuesday and Thursday, 10:30-11:45 am MST/PDT (i.e., Arizona and Pacific time). The class will be virtual with meetings on Zoom (link sent in email). Students can complete the course at home with a computer that can run QGIS and decent internet.

Office hours: TBD

Voluntary Participation in Graduate Study: The teaching assistant, Rachel Adam, is pursuing an M.S. in ASU's School of Earth and Space Exploration (SESE) on this topic. As part of her research, she will invite students to participate in the following activities:

- 1) a mapping exercise at the beginning and repeated at the end of the course (30 minutes of work each time). It will be digital and entail identification of point, line, and polygon features, rating their quality, and assessing their potential to indicate earthquake rupture.
 - 2) a student inquiry (simple multiple choice questions) on their awareness and experience on relevant topics administered at the beginning and end of the course (15 minutes each time).
 - 3) A 30-minute recorded listening session with the students as they work (during one of the smaller mapping assignments), during which Adam will observe and listen to their strategies and tactics for the mapping (you will be sharing your QGIS—mapping software—screen)
- You have the right not to answer any question, and to stop participation at any time.
 - Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty, for example, it will not affect your grade. There is no compensation.

Reading assignments: You will have a number of reading assignments throughout the semester. For each reading assignment, send an email to Rachel Adam (rnadam@asu.edu) by 5 pm the day before we discuss in the reading in class with the following:

- A one paragraph summary of the reading.
- 4 questions that you have about the reading
- For papers (i.e., not textbook readings), what do you anticipate is the lasting impact of this paper? Why will people remember and cite this paper 10 years after it was written? Explain in one sentence.

Late homework assignments: Please speak with an instructor ASAP if you anticipate having an issue with submitting a homework assignment on time. We can work with you to make accommodations. Follow the appropriate University policies to request an [accommodation for religious practices](#) or to accommodate a missed assignment [due to University-sanctioned activities](#).

Late and unexcused homework assignments will lose 10% of the total possible grade each day. We will often discuss homework assignments in class the day after they are due so it is important that they are submitted on time.

Technology:

You will learn how to use QGIS and Google Earth for the mapping. No previous experience expected. We prefer this software because it is open source and works across platforms. If you prefer and have the appropriate licenses, you may use ArcMap or other products.

Textbook:

We will use a combination of reading from Paleoseismology by McCalpin and readings from the literature.

Mapping projects:

Students will complete several mapping projects over the semester. Exact locations and datasets are TBD. Importantly, the mapping will not all be in California. Instead, it will cover pre-rupture faults in a variety of climates with different types of deformation (simple vs. complex fault geometry, rupture ends, different types of faults, fault with varying maturity and slip rate). Students will map from a combination of lidar topography (when available) and aerial photography.

Deliverables:

- Several mapping projects
- Short weekly presentations
- Final report and presentation
- Well documented data for final project uploaded to project server
- (*If opted in*) Small mapping exercise at beginning and end of course with a recorded 30-minute Zoom session and survey.

Grading (pass-fail or letter grades):

3 short projects (80 points each):	240 points
Final project	660 points
Class participation/presentations/reading summaries, etc:	100 points

Plan for the mapping results: Following this course, we plan to use the fault maps to write a peer-reviewed manuscript about the next generation of fault displacement models. There may be additional opportunity for students participation in either a follow on seminar or additional independent mapping.

Outline:

The first five weeks are dedicated to teaching fault mapping. The entire class will map several areas and we will discuss the results in class. We anticipate that the first areas will be

fairly easy in terms of mapping with a larger focus on learning new technology. The later two will be more involved (e.g., students will use a quality ranking and include attributes of primary/secondary fault, sense of slip, etc. in junction with a Geomorphic Indicator Ranking system).

In the remainder of the course, students will map more independently. The exact mapping assignments are still to be determined, but likely students will map portions of faults with a variety of complexity and will map faults in at least two geomorphic climates. We anticipate having most areas mapped twice so we can compare the results from different mappers.

We will continue to have two weekly meetings-- in one, a student will lead a discussion about a paper relevant to fault mapping. In the second, students will give a short presentation (less than five minutes) about their progress and any issues and there will likely be 30 minutes lectures.

Technology Requirements

If you are not able to personally finance the equipment you need to attend class via ASU Sync, ASU has a laptop and WiFi hotspot checkout program available through [ASU Library](#).

Who is eligible?

- Any currently enrolled ASU student is eligible to checkout a laptop. The current availability of laptops can be found [here](#).
- Borrowing and returning laptop rules
- Laptops are lent on a first-come, first-serve basis, and cannot be reserved in advance. They can be returned at any time, but will be due at the conclusion of the fall 2020 semester.
- Rentals are limited to one laptop per student.
- Laptops are available for checkout at the following libraries on all four campuses.
([Please check online for current library hours](#))
 - Downtown Phoenix campus Library
 - Polytechnic campus Library
 - Tempe: Hayden and Noble Libraries
 - West campus: Fletcher Library
- Return laptops to any ASU Library Information Desk (not at the drop box or other location)
- [Refer to ASU Library Computer Use Policy and ASU Computer, Internet, and Electronic Communications Policy](#).
- Borrowers are responsible for loss, damage, and theft of the laptop while in their possession. Borrowers should verify the condition of the laptop at the time of check-out and upon check-in.

Additional Requirements:

This course requires the following technologies:

- Web browsers ([Chrome](#), [Mozilla Firefox](#), or [Safari](#))
- [Adobe Acrobat Reader](#) (free)
- [Adobe Flash Player](#) (free)
- Webcam, microphone, headset/earbuds, and speaker
- Microsoft Office ([Microsoft 365 is free](#) for all currently-enrolled ASU students)
- Reliable broadband internet connection (DSL or cable) to stream videos.
- QGIS: we will provide instructions for how to download and use.

Student Success

To be successful:

- check the course daily
- read announcements
- read and respond to course email messages as needed
- complete assignments by the due dates specified
- communicate regularly with your instructor and peers
- create a study and/or assignment schedule to stay on track
- access [ASU Student Resources](#)
- [review the Student Tips for Learning with Zoom, https://uto.asu.edu/zoom-learning](https://uto.asu.edu/zoom-learning)

Grading

Grades reflect your performance on assignments and adherence to deadlines. Grades on assignments will be available within 1 week of the due date.

This course will be graded on an A-E plus/minus scale.

%	Grade
97 to 100%	A+
93 to < 97%	A
90 to < 93%	A-
87 to < 90%	B+

83 to < 87%	B
80 to < 83%	B-
77 to < 80%	C+
70 to < 77%	C
60 to < 70%	D
Below 60 %	E
-	EN - Failing for Not Participating
-	EU - Failing for Incomplete Participation
-	XE - Academic Dishonesty

Submitting Assignments

All assignments must be submitted to rnadam@asu.edu and cpscott1@asu.edu

Assignment due dates follow Arizona Standard time. Click the following link to access the [Time Converter](#) to ensure you account for the difference in Time Zones. Note: Arizona does not observe daylight savings time.

Communicating With the Instructor

Email questions of a personal nature to your instructor. You can expect a response within 24 hours (much less if you email during working hours).

Email

ASU and UNR email is an [official means of communication](#) among students, faculty, and staff. Students are expected to read and act upon email in a timely fashion. Students bear the

responsibility of missed messages and should check their ASU or UNR-assigned email regularly.

All instructor correspondence will be sent to your ASU email account.

Syllabus Disclaimer

The syllabus is a statement of intent and serves as an implicit agreement between the instructor and the student. Every effort will be made to avoid changing the course schedule but the possibility exists that unforeseen events will make syllabus changes necessary. Remember to check your ASU or UNR email and the course site often.

Academic Integrity

Academic honesty is expected of all students in all examinations, papers, and laboratory work, academic transactions and records. The possible sanctions include, but are not limited to, appropriate grade penalties, course failure (indicated on the transcript as a grade of E), course failure due to academic dishonesty (indicated on the transcript as a grade of XE), loss of registration privileges, disqualification and dismissal. For more information, see <http://provost.asu.edu/academicintegrity>

Disability Resources

Students who feel they will need disability accommodations in this class but have not registered with the Disability Resource Center (DRC) should contact DRC immediately. The DRC Tempe office is located on the first floor of the Matthews Center Building. DRC staff can also be reached at: (480) 965-1234 (V) or (480) 965-9000 (TTY). For additional information, visit: www.asu.edu/studentaffairs/ed/drc.

Expected Classroom Behavior - Campus Courses

Arrive on time for class. Excessive tardiness will be subject to sanctions. Under no circumstances should you allow your cell phone to ring during class. Any disruptive behavior, which includes ringing cell phones, listening to your mp3/iPod player, text messaging, constant talking, eating food noisily, reading a newspaper will not be tolerated. The use of laptops (unless for note taking), cell phones, MP3, IPOD, etc. are strictly prohibited during class.

Policy Against Threatening Behavior

All incidents and allegations of violent or threatening conduct by an ASU student (whether on-or off campus) must be reported to the ASU Police Department (ASU PD) and the Office of the Dean of Students. If either office determines that the behavior poses or has posed a serious threat to personal safety or to the welfare of the campus, the student will not be permitted to

return to campus or reside in any ASU residence hall until an appropriate threat assessment has been completed and, if necessary, conditions for return are imposed. ASU PD, the Office of the Dean of Students, and other appropriate offices will coordinate the assessment in light of the relevant circumstances. For more information please visit

<https://eoss.asu.edu/dos/srr/PoliciesAndProcedures> and

<https://eoss.asu.edu/dos/safety/ThreateningBehavior>.

Reporting Title IX Violations

Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at

<https://sexualviolenceprevention.asu.edu/faqs>.

Policy on Sexual Discrimination

Arizona State University is committed to providing an environment free of discrimination, harassment, or retaliation for the entire university community, including all students, faculty members, staff employees, and guests. ASU expressly prohibits [discrimination](#), [harassment](#), and [retaliation](#) by employees, students, contractors, or agents of the university based on any protected status: race, color, religion, sex, national origin, age, disability, veteran status, sexual orientation, gender identity, and genetic information.

As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, <https://eoss.asu.edu/counseling>, is available if you wish discuss any concerns confidentially and privately.

Copyrighted Materials

Students must refrain from uploading to any course shell, discussion board, or website used by the course instructor or other course forum, material that is not the student's original work, unless the students first comply with all applicable copyright laws; faculty members reserve the right to delete materials on the grounds of suspected copyright infringement.

Supplementary syllabus information for UNR students

Student absences

University policies regarding absence from class are provided at <https://www.unr.edu/administrative-manual/3000-3999-students/3020-class-absence-policy> and the Student Health Center policy on medical excuses is provided at <https://med.unr.edu/student-health-center/insurance-records-and-policies>. If you cannot make it to class please inform me by email prior to class.

Statement on Academic Dishonesty

The University of Nevada, Reno has established policies related to class conduct and academic dishonesty. A student may be dropped from class at any time for misconduct, disruptive behavior in the classroom, or non-attendance, upon recommendation of the instructor and with approval of the college dean. A student may also receive disciplinary sanctions for misconduct or disruptive behavior in the classroom. A student may receive academic and disciplinary sanctions for cheating, plagiarism or other attempts to obtain or earn grades under false pretenses. Full definitions of all of these items can be found on the UNR website at: <https://www.unr.edu/administrative-manual/6000-6999-curricula-teaching-research/instruction-research-procedures/6502-academic-standards>

Statement on Disability Services

Any student with a disability needing academic adjustments or accommodations is requested to speak with the Disability Resource Center (Pennington Student Achievement Center, Suite 230) as soon as possible to arrange for appropriate accommodations.

Statement on Audio and Video Recording

Surreptitious or covert video-taping of class or unauthorized audio recording of class is prohibited by law and by Board of Regents policy. This class may be videotaped or audio recorded only with the written permission of the instructor. In order to accommodate students with disabilities, some students may be given permission to record class lectures and discussions. Therefore, students should understand that their comments during class may be recorded.

Statement on Equal Opportunity, Title IX, and Safe Learning

The University of Nevada, Reno is committed to providing a safe learning and work environment for all. If you believe you have experienced discrimination, sexual harassment, sexual assault, domestic/dating violence, or stalking, whether on or off campus, or need information related to immigration concerns, please contact the University's Equal Opportunity & Title IX office at 775-784-1547. Resources and interim measures are available to assist you. For more information, please visit: <https://www.unr.edu/equal-opportunity-title-ix> .

Academic Success Services

Your student fees cover usage of the [University Math Center](#) (775) 784-4433, [University Tutoring Center](#) (775) 784-6801, and University [Writing Center](#) (775) 784-6030. These centers support your classroom learning; it is your responsibility to take advantage of their services. Keep in mind that seeking help outside of class is the sign of a responsible and successful student.

