

AST 599: Planetary Analogs Field Course

College of the Environment, Forestry, and Natural Sciences
Department of Astronomy and Planetary Science



College of the
Environment, Forestry,
and Natural Sciences

Semester:	Fall 2023
Prerequisites:	None
Location:	Physical Sciences Bldg. (#19), Rm. 111
Meeting Time & Format:	Meet weekly (Class Wed 1:40-2:30 pm), one field trip.
Instructors:	Dr. Christopher Edwards, christopher.edwards@nau.edu , (928) 523-7234
Office Location:	205 Physical Sciences Bldg. (#19)
Office Hours:	By Appointment Only

Course Purpose

This course will focus on a variety of field sites relevant for understanding planetary processes and interpretation of data from our solar system. Each field site, which will rotate on every offering, will be designed to provide specific insight into a process, formation mechanism, geologic expression, or remote sensing technique that has direct relevance for planetary science investigations. Particular emphasis will be placed on student-led field plans, where students will develop a thorough understanding of the field site, lead the field trip, and develop assignments. This class is **Pass/Fail** in format.

Course Description

The use of field sites as a proxy for understanding planetary surface processes is a tried and true methodology in planetary science. We use these well-chosen, unique field sites to illuminate processes, formation, and resulting alteration of planetary surfaces where they can be more easily studied on Earth. Many different planetary analog field sites are available within a day's drive of Northern Arizona University. Prior to the start of the semester, the lead faculty will select a site and goal from a set of well-documented field sites which could investigate volcanos, impact craters, sedimentary layered deposits, channels, sapping features, lava flows, etc. In addition, the style of field trip may be variable where students will create a field guide, science implementation plan, or other products.

In this class, we will work to refine a geologic field guide for two classic field analog sites in northern Arizona where astronauts still train today. Students will:

- (1) Evaluate the current field guide for completeness and clarity.*
- (2) Present a paper from the existing field guide (or a new paper) to the class in small groups.*
- (3) Determine areas where the field guide should be augmented or clarified, producing a new, updated field guide for broad use by the planetary science community wishing to explore these sites.*

Students will break up into small teams, each team having a unique section of the field guide to update.

Assessment

This is a PASS/FAIL course. Course assessment will include the following:

- **Literature Review (30%):** Groups will prepare for and lead a discussion of a key paper from the field area. This should include a simple visual presentation of key figures & take-home messages (deliverable) along with a discussion of figures, findings, and how they may affect the field guide and/or interpretations of the field sites.
- **Field Guide Updates (30%):** Students will use track changes (or similar) to update the provided field guide based on their new data collected at the site (photos, samples, spectra, etc.). These updates will be completed by the small groups formed during the literature review.
- **Field Notes (10%):** Notes should be recorded at each study site to provide context for the images and data that are acquired. These notes will also provide the foundation for

interpreting the analyzed data upon return from the field. Remember that good field notes are more than simply writings and recordings from the field. They include thoughts recorded prior to field work, observations made during field work, and synthesizing these notes following field work. Good field notes allow you to revisit these notes years later and make sense of what was observed, why it was observed, and how it was observed.

- **Final Debrief (30%):** Students will participate in a round-table discussion where they reflect on their field experience, emphasizing their group's topic of interest, their observations in the field, and their synthesis of all available data, observations, and reviews. Each student is expected to contribute to this final discussion. Groups will be evaluated on the clarity of the discussion, the clear and well-defined contributions of each team member, and the ability to link and associate the literature review with the questions addressed in the field, and to the relevant field data and remote sensing measurements.

Assignments will be evaluated by Edwards, and guest assessors. Grading/assessment criteria will be provided prior to each assignment. A passing grade is $\geq 65\%$ while a failing grade is $< 65\%$.

Required Materials & Technology: None.

Class Schedule and Expectations

As a one-credit pass/fail course, this class is designed to consist of a minimum of 15 "contact hours" and 30 "non-contact hours" throughout the course of the semester in order to satisfy NAU's course requirements. Considering the duration of the field trip, this course will be providing approximately 32 contact hours throughout the semester.

Course Schedule

Week	Date	Topics & Content	Materials Due
1	08/30/2023	Course Introduction	
2	09/06/2023	Field Guide Review	
3	09/13/2023	<i>Develop Groups, Roles</i>	
4	09/20/2023	<i>Literature Review Prep</i>	
5	09/27/2023	<i>Literature Review Prep</i>	
6	10/04/2023	Literature Review Presentation 1	Presentation
7	10/11/2023	Literature Review Presentation 2	Presentation
8	10/18/2023	~Field Trip Dates	
9	10/25/2023	<i>Field Guide Updates</i>	
10	11/1/2023	<i>Field Guide Updates</i>	
11	11/08/2023	<i>Field Guide Updates</i>	
12	11/15/2023	<i>Field Guide Updates</i>	
13	11/22/2023	No Class	
14	11/28/2023	<i>Field Guide Updates</i>	
15	11/29/2023	<i>Field Guide Updates</i>	
15	12/06/2022	Field Trip Debrief	Field Notes & Updated Field Guide Due

Bold denotes in-class participation

Department and University Policy Statements

COVID-19 Requirements and Information:

Additional information about the University's response to COVID-19 is available from the **Jacks are Back!** web page located at <https://nau.edu/jacks-are-back>.

Academic Integrity:

NAU expects every student to firmly adhere to a strong ethical code of academic integrity in all their scholarly pursuits. The primary attributes of academic integrity are honesty, trustworthiness, fairness, and responsibility. As a student, you are expected to submit original work while giving proper credit to other people's ideas or contributions. Acting with academic integrity means completing your assignments independently while truthfully acknowledging all sources of information, or collaboration with others when appropriate. When you submit your work, you are implicitly declaring that the work is your own. Academic integrity is expected not only during formal coursework, but in all your relationships or interactions that are connected to the educational enterprise. All forms of academic deceit such as plagiarism, cheating, collusion, falsification or fabrication of results or records, permitting your work to be submitted by another, or inappropriately recycling your own work from one class to another, constitute academic misconduct that may result in serious disciplinary consequences. All students and faculty members are responsible for reporting suspected instances of academic misconduct. All students are encouraged to complete NAU's online academic integrity workshop available in the E-Learning Center and should review the full *Academic Integrity* policy available at <https://policy.nau.edu/policy/policy.aspx?num=100601>.

Course Time Commitment:

Pursuant to Arizona Board of Regents guidance (ABOR Policy 2-224, *Academic Credit*), each unit of credit requires a minimum of 45 hours of work by students, including but not limited to, class time, preparation, homework, and studying. For example, for a 3-credit course a student should expect to work at least 8.5 hours each week in a 16-week session and a minimum of 33 hours per week for a 3-credit course in a 4-week session.

Disruptive Behavior:

Membership in NAU's academic community entails a special obligation to maintain class environments that are conducive to learning, whether instruction is taking place in the classroom, a laboratory or clinical setting, during course-related fieldwork, or online. Students have the obligation to engage in the educational process in a manner that does not interfere with normal class activities or violate the rights of others. Instructors have the authority and responsibility to address disruptive behavior that interferes with student learning, which can include the involuntary withdrawal of a student from a course with a grade of "W". For additional information, see NAU's *Disruptive Behavior in an Instructional Setting* policy at <https://nau.edu/university-policy-library/disruptive-behavior>.

Nondiscrimination and Anti-Harassment:

NAU prohibits discrimination and harassment based on sex, gender, gender identity, race, color, age, national origin, religion, sexual orientation, disability, or veteran status. Due to potentially unethical consequences, certain consensual amorous or sexual relationships between faculty and students are also prohibited as set forth in the *Consensual Romantic and Sexual Relationships* policy. The Equity and Access Office (EAO) responds to complaints regarding discrimination and harassment that fall under NAU's *Nondiscrimination and Anti-Harassment* policy. EAO also assists with religious accommodations. For additional information about nondiscrimination or anti-harassment or to file a complaint, contact EAO located in Old Main (building 10), Room 113, PO Box 4083, Flagstaff, AZ 86011, or by phone at 928-523-3312 (TTY: 928-523-1006), fax at 928-523-9977, email at equityandaccess@nau.edu, or visit the EAO website at <https://nau.edu/equity-and-access>.

Title IX:

Title IX is the primary federal law that prohibits discrimination on the basis of sex or gender in educational programs or activities. Sex discrimination for this purpose includes sexual harassment, sexual

assault or relationship violence, and stalking (including cyber-stalking). Title IX requires that universities appoint a “Title IX Coordinator” to monitor the institution’s compliance with this important civil rights law. NAU’s Title IX Coordinator is Elyce C. Morris. The Title IX Coordinator is available to meet with any student to discuss any Title IX issue or concern. You may contact the Title IX Coordinator by phone at 928-523-3515, by fax at 928-523-0640, or by email at elyce.morris@nau.edu. In furtherance of its Title IX obligations, NAU will promptly investigate and equitably resolve all reports of sex or gender-based discrimination, harassment, or sexual misconduct and will eliminate any hostile environment as defined by law. Additional important information about Title IX and related student resources, including how to request immediate help or confidential support following an act of sexual violence, is available at <https://in.nau.edu/title-ix>.

Accessibility:

Professional disability specialists are available at Disability Resources to facilitate a range of academic support services and accommodations for students with disabilities. If you have a documented disability, you can request assistance by contacting Disability Resources at 928-523-8773 (voice), 928-523-6906 (TTY), 928-523-8747 (fax), or dr@nau.edu (e-mail). Once eligibility has been determined, students register with Disability Resources every semester to activate their approved accommodations. Although a student may request an accommodation at any time, it is best to initiate the application process at least four weeks before a student wishes to receive an accommodation. Students may begin the accommodation process by submitting a self-identification form online at <https://nau.edu/disability-resources/student-eligibility-process> or by contacting Disability Resources. The Director of Disability Resources, Jamie Axelrod, serves as NAU’s Americans with Disabilities Act Coordinator and Section 504 Compliance Officer. He can be reached at jamie.axelrod@nau.edu.

Responsible Conduct of Research:

Students who engage in research at NAU must receive appropriate Responsible Conduct of Research (RCR) training. This instruction is designed to help ensure proper awareness and application of well-established professional norms and ethical principles related to the performance of all scientific research activities. More information regarding RCR training is available at <https://nau.edu/research/compliance/research-integrity>.

Misconduct in Research:

As noted, NAU expects every student to firmly adhere to a strong code of academic integrity in all their scholarly pursuits. This includes avoiding fabrication, falsification, or plagiarism when conducting research or reporting research results. Engaging in research misconduct may result in serious disciplinary consequences. Students must also report any suspected or actual instances of research misconduct of which they become aware. Allegations of research misconduct should be reported to your instructor or the University’s Research Integrity Officer, Dr. David Faguy, who can be reached at david.faguy@nau.edu or 928-523-6117. More information about misconduct in research is available at <https://nau.edu/university-policy-library/misconduct-in-research>.

Sensitive Course Materials:

University education aims to expand student understanding and awareness. Thus, it necessarily involves engagement with a wide range of information, ideas, and creative representations. In their college studies, students can expect to encounter and to critically appraise materials that may differ from and perhaps challenge familiar understandings, ideas, and beliefs. Students are encouraged to discuss these matters with faculty.