

Earth Sciences 4001Y – Planetary Science Field School



1. Course Information

When: May 01 to May 13 2022. Note: a 3-hour introductory lecture will be held in January 2022 (date to be decided upon in discussion with registered students) and one of the main assignments (see below) must be completed *prior* to the field school.

Where: Arizona, Utah and Nevada, USA (various locations).

Cost: \$1,900 (\$1,650 for undergraduate students enrolled in an Earth Sciences module). A **\$500 deposit** is required by **January 11 2022**. The price includes return flights to Las Vegas, Nevada, plus all accommodation, vehicle rental, park access, course material costs, and evening meals. The full amount is payable by **March 15 2022**. Note that a limited number of \$1,000 to \$2,000 scholarships are available to students through the [Global Opportunities Awards](#) program (deadline December 31 2021).

Logistics: Travel details will be shared with participants once confirmed. Accommodation in the field will mainly be tents with one or two nights in shared motel rooms. Students should be prepared for camping, long days in the field and the potential for no showers or proper toilet facilities for up to 3 nights in a row. On some days there will be hikes of up to 18 km in length so students are encouraged to prepare accordingly. A limited amount of camping equipment is available for rent to those students who do not possess their own.

List of Prerequisites

One of ES 2001, 2200 or 2232. Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites. If this occurs after the deadline (see below), you will lose your deposit.

2. Instructor Information

Dr. Gordon Osinski (gosinski@uwo.ca; +1-519-661-4208; room 1050 B&G). Students must use their Western (@uwo.ca) email addresses when contacting their instructors.

3. Course Syllabus, Schedule, Delivery Mode

Course Objectives and Description:

The principal objective of this course is to provide participants with an interdisciplinary field studies experience with an emphasis on comparative planetology through the study of terrestrial analogues. Students will learn the following skills: 1) the synthesis, understanding and presentation of "state of the art" knowledge on planetary surface processes; 2) an ability to draw together information from a wide variety of subject areas in planetary sciences to address issues relevant to the discipline; and 3) field training in the recognition and mapping of various different rock types and of the relationships between them. At the end of the course, students will be able to: 1) assimilate information and data from a wide range of planetary science disciplines (astronomy, geochemistry, geography, geology, geophysics, and physics); 2) understand how complex problems in planetary sciences are tackled by scientists and determine the present flaws in our understandings; 3) prepare field guides on relevant topics; and 4) generate simple interpretive geological maps of planetary bodies.

The goal of this course is to provide students with an interdisciplinary field studies experience with an emphasis on comparative planetology through the study of terrestrial analogues. Terrestrial analogues are places on Earth that approximate the geological and environmental conditions on the Moon, Mars and other planetary bodies, either at the present-day or in the past. This course will introduce students from a wide range of backgrounds to various aspects of planetary science, with an emphasis on planetary surface processes. The topics of astrobiology and planetary materials will also be integrated into this field program. This course will develop relationships and collaboration between students from very different backgrounds, unified in their pursuit of planetary science.

One of the major areas of research in planetary science is in the acquisition and compilation of data from spacecraft in orbit around a particular planetary body and the subsequent interpretation of these images in a geological context. On Earth, this technique is typically called Remote Predictive Mapping (RPM) and is commonly used in regions of the world that are large, difficult to access and under-explored (e.g., Canadian Arctic). The "predictive maps" can be used to guide geologists during fieldwork, which is obviously not currently possible in planetary science. During this course, students will generate a map of a field area that will be submitted prior to the field section of this course. The site will then be visited in order to provide students with the important ground-truth data that invariably is lacking in planetary science studies.

Course Format:

The main focus of the course will be a 13-day residential field experience examining various localities in northern Arizona (AZ) and southern Utah (UT), to take place in May 2022. This region of the Midwestern United States is a world-renowned environment for comparative planetology. Field stops will focus on meteorite impact cratering (e.g., Meteor Crater, AZ; Upheaval Dome crater, UT), volcanism (e.g., Sunset Crater volcanic field, AZ), and canyon and valley formation (e.g., Canyonlands National Park, UT). Many of the locations to be visited are considered world-class terrestrial analogues for the Moon and Mars. Images from previous field schools can be found here:

<https://www.flickr.com/photos/gordonosinski/albums/72157644546108913>

4. Course Materials

Readings will be provided to students in the introductory lecture. A field guide will be provided for the course. Students will be responsible for compiling some of the content for the field guide (see below).

5. Methods of Evaluation

Students registered in the course will be evaluated as follows:

Course Participation	10%
Presentation	10%
Image Interpretation Exercise	30%
Field Exercises	20%
Field Notebooks	<u>20%</u>
	100%

Class Participation – 10%

Each student is expected to actively contribute to all class discussions. Students are encouraged to read widely beyond the content of the field guide and prescribed readings and bring own readings and experiences into the class discussions. It is expected that each student will come prepared to debate, defend, and critique the readings and the field guide content. Participation also includes contributing to the daily life of the field school (e.g., cooking, cleaning dishes, putting up tents, etc.).

Presentation – 15%

Each student will give a short 5 minute presentation in the field on a topic provided by the Instructor at the January meeting.

Image Interpretation Exercise – 30%

For this exercise, students will be provided with a suite of satellite images of a site in northern Arizona or southern Utah. Students will use these images to generate an interpretive geological map – a.k.a remote predictive map – and a simple geological history of the area. This map and geological history are due **5 pm May 01 2022 (i.e., the first day of the field school)**. Any work not handed in by the deadline will automatically be deducted 5% within the first 24 hours and 5% for each subsequent day late. The map and geological history will account for 20% of the final mark. During the course, the site will then be visited and students will be asked to provide a brief (2 page) report as to how their image-based map differed, or not, from their interpretations following fieldwork. This report will be worth 10% and is due **5 pm June 01 2022**.

Field Exercises – 20%

A series of short exercises will be handed out in the field at the various stops. Together, these exercises will be worth 20% of the final mark.

Field Notebooks – 25%

Students will be expected to take detailed notes and sketches while in the field. These notebooks will be collected on the final day of the course and graded.

6. Accommodation and Accessibility

Accommodation Policies

Students with disabilities work with Accessible Education (formerly SSD) which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The Academic Accommodation for Students with Disabilities policy can be found at:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf

Academic Consideration for Student Absence

Students will have up to two (2) opportunities during the regular academic year to use an on-line portal to self-report an absence during the semester, provided the following conditions are met: the absence is no more than 48 hours in duration, and the assessment for which consideration is being sought is worth 30% or less of the student's final grade. Students are expected to contact their instructors within 24 hours of the end of the period of the self-reported absence, unless noted on the syllabus. Students are not able to use the self-reporting option in the following circumstances:

- for exams scheduled by the Office of the Registrar (e.g., December and April exams)
- absence of a duration greater than 48 hours,
- assessments worth more than 30% of the student's final grade,
- if a student has already used the self-reporting portal twice during the academic year

If the conditions for a Self-Reported Absence are *not* met, students will need to provide a Student Medical Certificate if the absence is medical, or provide appropriate documentation if there are compassionate grounds for the absence in question. Students are encouraged to contact their Faculty academic counselling office to obtain more information about the relevant documentation.

Students should also note that individual instructors are not permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons. **All documentation required for absences that are not covered by the Self-Reported Absence Policy must be submitted to the Academic Counselling office of a student's Home Faculty.**

For policy on Academic Consideration for Student Absences - Undergraduate Students in First Entry Programs, see:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Consideration_for_absences.pdf

and for the Student Medical Certificate (SMC), see:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf

Religious Accommodation

Students should consult the University's list of recognized religious holidays, and should give reasonable notice in writing, prior to the holiday, to the Instructor and an Academic Counsellor if their course requirements will be affected by a religious observance. Additional information is given in the Western Multicultural Calendar:

<https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>

You may also be eligible to write the Special Exam if you are in a “Multiple Exam Situation” (see http://www.registrar.uwo.ca/examinations/exam_schedule.html).

7. Academic Policies

The website for Registrarial Services is <http://www.registrar.uwo.ca>.

In accordance with policy, <http://www.uwo.ca/its/identity/activatenonstudent.html>, the centrally administered e-mail account provided to students will be considered the individual’s official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner.

Contingency plan for an in-person class pivoting to 100% online learning

In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, all remaining course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will **not** change. Any remaining assessments will also be conducted online as determined by the course instructor.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

8. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on add/drop courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: <https://www.uwo.ca/sci/counselling/>

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Student Accessibility Services (SAS) at (519) 661-2147 if you have any questions regarding accommodations.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: <https://www.uwo.ca/se/digital/>.

Students who are in emotional/mental distress should refer to Mental Health@Western (http://www.health.uwo.ca/mental_health) for a complete list of options about how to obtain help.

Additional student-run support services are offered by the USC, <http://westernusc.ca/services>.