

Earth Sciences 2232G: Exploring the Planets

An Introduction to Planetary Science



Victoria Crater, Mars. Taken by the NASA rover "Opportunity"

******This course is taught in both a blended (i.e., both online and in person instruction) and fully online format and is cross-listed with Astronomy 2232G******

Section:	Lectures:		
Section 200	Monday	10:30–11:30	Nat Sci 7
Section 201	Wednesday	10:30–11:30	Nat Sci 1
Section 650	Not Applicable – Online Only		
Laboratories:	All online		
Instructor:	Dr. Gordon Osinski		
Office:	Room 1050, Biological & Geological Sciences Building		
Office hours:	Mondays 09:30–10.15, Wednesday 11.30–12.30 (or by appointment)		
Email:	gosinski@uwo.ca		
Phone:	(519)-661-4208 (ext. 84208 on campus)		
TAs:	Section 200: Christy Caudill (ccaudill@uwo.ca); Section 201: Matthew Svensson (mvenss@uwo.ca); Section 650: Derek King (dking63@uwo.ca)		
Prerequisites:	None		
Antirequisites:	ES 2001G, ASTRO 2232G		
Textbook:	There is no required textbook for this course. Material will be presented online in various formats. There are abundant online resources for this course, including <i>Exploring the Planets</i> by E. H. Christiansen & W. K. Hamblin, which is freely available online at http://explanet.info/		

Course Calendar Description:

This course provides an introduction to planetary science and the exciting frontier of space exploration. Emphasis is placed on exploring the processes that shape the planets and moons of the Solar System and how this informs us about the origin and evolution of Earth, the Solar System, and of life itself. Advances in planetary science are highlighted with particular attention to recent and current results from planetary exploration missions.

Should I take the blended or online section?

This is a good question! The major difference is that students who take the blended version are expected to actively contribute to the discussions that will take place in class every week. In terms of content, the blended and online sections are identical so you should emerge at the end of the course with the same level of understanding of the material regardless of the section you choose. The evaluations are also more or less the same, but with one major difference: there is no *Weekly News Assignment* for the online section. As mentioned already and as detailed below, this involves active participation and presenting in class so if this is not for you, sign up for the online section.

Detailed Course Description:

This course provides an introduction to the interdisciplinary field of planetary science, which can be defined as the scientific study of planets, moons, and planetary systems. This course explores the origin and development of the Solar System with an emphasis on what is presently known about the Solar System and its constituents, with particular emphasis on the terrestrial (or rocky) planets – Mercury, Venus, Earth, and Mars – and the Earth's moon. Students will be introduced to the major processes that shape the interior and surface of rocky planets and moons, as well as the processes that affect the atmospheres of the terrestrial planets and the giant planets of the outer Solar System. This course seeks to highlight the exciting nature of planetary science and the rapid pace of discoveries. The results of recent and ongoing space missions to various planets and moons will be integrated into the lecture material. Guest lectures from researchers participating in planetary missions will be incorporated. The goal of this course is to enhance students' understanding of how our Solar System formed, the processes that shape the planets and moons of the Solar System, and implications this has for the origin and evolution of Earth and of life itself. This course will focus on the following topics:

- Why do we explore Space? What is planetary science?
- The properties of planetary bodies in the solar system.
- The origin of the solar system.
- Planetary interiors.
- Planetary surface processes (e.g., volcanism, impact cratering, aqueous processes).
- Planetary atmospheres.
- Meteorites: rocks from Space.
- Astrobiology and the search for life.
- Exoplanets: Extending planetary science beyond our Solar System.

Learning Outcomes:

Upon completion of this course successful students will be able to:

- Define the properties of the various objects in the Solar System.
- Distinguish and explain processes that shape the various objects in the Solar System.
- Apply knowledge of the Solar System's dynamic processes to develop a targeted space exploration project.
- Integrate theoretical and observational information to describe the cause(s) of the variety of objects in our solar system.
- Evaluate and begin to synthesize concepts, theories, and observations related to course material.
- Develop writing skills and project development related to planetary science and space exploration.

Course Materials:

The majority of the materials for this course will be presented online through pre-recorded lectures, tutorials, and laboratories. The 1-hour per week in person classroom time will be used for various presentations, discussions, and activities and will vary from week to week. New material may be presented in class so it is imperative that you attend.

Course Evaluation (summary):

Note that the Course Evaluation for the blended sections (200 and 201) and online section (650) differ slightly. Make sure you read the correct description!

Sections 200 and 201 (Blended)

Pre- and Post-Course Surveys	2.5%
Scientific Engagement	10%
Weekly News Assignment	10%
Laboratory Exercises	30%
Quizzes	15%
Group Project Assignment	22.5%
Group Project Presentation	10%
	100%

Section 650 (Online)

Pre- and Post-Course Surveys	2.5%
Scientific Engagement	10%
Laboratory Exercises	35%
Quizzes	15%
Group Project Assignment	27.5%
Group Project Presentation	10%
	100%

Course Evaluation (details):

Important note: three of these activities will be carried out in groups. You **MUST** sign up for groups in OWL by **11.59 pm on Friday January 13th**. Failure to do so will result in 2% being deducted from your final mark.

Pre- and Post-Course Surveys – This takes the form of a short survey in the form of a quiz to gauge students’ perceptions and understanding of key concepts and facts in planetary science prior to, and following the completion of, the class. Full marks will be awarded to any student who completes both surveys. There are no right or wrong answers!

Scientific Engagement – One of the most exciting aspects of planetary science is how rapidly new discoveries are made. As part of this class, students will share relevant news items by “tweeting”. Some examples of space news websites and people to follow on Twitter will be provided on the OWL site. Students may use their own personal account or may choose to create a new Twitter account for the purposes of this class. To receive any marks for this assignment, please do the following:

- Submit your twitter handle via the Assignment tab in OWL;
- Follow me at @drcrater – I will share lots of news relevant to this class throughout the semester;
- All tweets **MUST** include the #ES2232 hashtag to be counted;
- Ensure that your tweets are public.

A guide for how tweets will be graded is as follows: 0 tweets = 0 marks; 1–5 tweets = 1 mark; 5–9 tweets = 2 marks; 10–14 tweets = 3 marks; 15–19 tweets = 4 marks; 20–24 tweets = 5 marks; 25–29 tweets = 6 marks; 30–34 tweets = 7 marks; 35–39 tweets = 8 marks; 40–44 tweets = 9 marks; 45 or more tweets = 10 marks. However, the TA's and myself will be closely monitoring these feeds and grading them according to your depth of insight rather than merely the number of Tweets. For example, simply “retweeting” other peoples tweets throughout the semester will not earn you 10 out of 10 marks even if you post 45 times.

A tutorial on the use of Twitter will be given in class for those not familiar with this media. For students not comfortable using Twitter, an alternative is to post items to the Forum page in OWL; however, the learning experience will be less that if you use Twitter and the same rubric will apply. Students are, therefore, strongly encouraged to use Twitter.

Weekly News Assignment (sections 200 and 201 only) – The first 10–15 minutes of each class will feature a group presentation and in-depth discussion of one or a maximum of two news items from the previous week. Each group will present once during the semester with 1 or 2 groups presenting each week (schedule posted on OWL). Whereas the goal of the *Scientific Engagement* assignment above is on exposing students to a huge breadth of planetary science news, the goal of the *Weekly News Assignment* is to focus on a deeper and more in depth understanding of on one topic – or two related topics. Thus, students are expected to conduct research in to the news item(s) that they choose to focus on. The presenting group should prepare a 5–10 minute PowerPoint presentation (max. 5 slides), which **MUST** be uploaded to OWL by 11.59 pm the night before the class in which they present. The group is then expected to take questions and lead a discussion with the entire class. For ideas on the topic, content posted via Twitter by anybody can be used in this assignment. Students will receive a mark out of 5 for the group performance (quality of slides, presentation, and discussion) and each student will receive a mark out of 5 for their individual performance and contribution to the presentation and discussion – for a total of 10 marks.

Laboratory Exercises – Six online laboratory exercises will cover a variety of topics, including mapping of planetary surfaces, investigation of major rock types common to many planetary surfaces, exoplanets, etc. Full details for each lab are provided in the Online Laboratories tab in OWL and they are submitted through the Assignments tab. Due dates for each lab are posted on OWL. Each lab is worth 5% of the final mark.

Quizzes – you are required to take series of quizzes throughout the course. Due dates for each quiz are posted on OWL.

Group Project Assignment – Mission to Mars – In this assignment, you are required to work together in groups to produce a report for a mission concept “*Mission to Mars*”. Facilitated by an interactive web application, you get to decide what the goal of the mission is, what scientific instruments you need, and where you will land. You will need to draw on the information presented during the course, together with a literature review, to develop a successful mission concept. Detailed requirements for this group project will be provided in class and through the relevant OWL link.

Group Project Presentation – The finale for this class will be a presentation by each group in the final two weeks of the semester. Each group will produce a poster and a 3-minute presentation. Posters should be 36” high by 48” wide and a template for compiling the poster in PowerPoint will be provided. Posters and presentations will be evaluated by a Mission Review Panel. For Sections 200 and 201, the presentation will be in person during the final lecture slot of the semester. For the online section 650, students are to record this presentation (guidance to be provided) and upload it to OWL.

Course Polices and Friendly Reminders:

Assignments: All assignments must be submitted via OWL on the assigned due date and will not be accepted late, except under medical or other compassionate circumstances (see below); after the due date a penalty of minus 5 marks per day will be applied. No assignment without appropriate documentation will result in a zero (0) grade. Students must write their assignments in their own words. Whenever students take an idea, or a passage from another author, they must acknowledge this both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. Plagiarism is a major academic offence (see below).

Accessibility: Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

Absences/Missed Exams/Assignments: If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to the Dean's office as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. In the event of a missed final exam, a "Recommendation of Special Examination" form must be obtained from the Dean's Office immediately. For further information please see:

<http://www.uwo.ca/univsec/handbook/appeals/medical.pdf>

A student requiring academic accommodation due to illness should use the Student Medical Certificate when visiting an off-campus medical facility or request a Records Release Form (located in the Dean's Office) for visits to Student Health Services. The form can be found here:

https://studentservices.uwo.ca/secure/medical_document.pdf

Academic misconduct: Academic 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

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>). Computer-marked tests and may be subject to submission for similarity review by software that will check for unusual coincidences in answer patterns that may indicate cheating.

Classroom Behaviour: Disruptive behavior will not be tolerated in class or on the course website. Please respect the rights of your classmates to benefit from the lecture by limiting your conversations to those essential to the class. Students who persist in loud, rude or otherwise disruptive behavior will be asked to leave. Cellular phones, pagers, and text-messaging devices are not to be used in class and must be placed in silent mode. Laptops for the purpose of typing lecture notes are permitted in class, but please be respectful to your fellow students and turn the sound off. Audio and/or videotaping of lectures is not permitted unless approval has been sought from the instructor in advance.

Grades: Course marks may, in some cases, be adjusted in order to conform to the meaning of course marks described in the Western Academic Calendar, <http://www.westerncalendar.uwo.ca/2014/pg104.html>, and in order to conform to Department policy

Support Services: Students who are in emotional/mental distress should refer to Mental Health@Western <http://www.uwo.ca/uwocom/mentalhealth/> for a complete list of options about how to obtain help. Other support is available from Registrarial Services (<http://www.registrar.uwo.ca>) and Student Support Services (<http://westernusc.ca/services/>).