

## Geology 9523B Course Outline

**This Outline is informational as the final time schedule will be determined in agreement with all students taking the course to avoid clashes with other GL & GP courses.**

**Course Information:** Physical Volcanology, Winter 2020

**Lectures:** Wed. & Thu. 11:30 – 13:00, Room TBD

**List of Prerequisites:**

---

**Instructor:** Dr. Cindy Mora-Stock; WSC G23

**Email:** cmorasto [ at ] uwo.ca

**Contact Policies:** Emails should go through the OWL platform. Include the “PhysVolc” keyword at the beginning of the subject line in your email. Allow a 48hrs response delay; these 48hrs don’t include weekends.

**Office Hours:** Fri. 12:00-13:00 hrs, or make appointment via OWL email.

---

**Aim of the Course:** At the end of this course, it is expected for the student to have an overview of the different processes that control the formation, emplacement, and eruption of volcanoes. The course will cover the history of volcanology, global distribution of volcanoes, magma generation and migration, magma storage, volatiles and explosivity, eruption styles and volcanic products, geophysics applied to volcanoes, volcano monitoring, volcanic hazards and hazard mitigation, among others.

### Tentative Schedule and Course Contents:

Date		Topic
Jan. 7 & 8	Intro to Volcanology	Introduction. History of Volcanology. Volcanoes: what, where and why.
	Volcano Global Distribution	Plate tectonics and Volcanism; distribution and types of volcanoes. Volcano-magma system. Magma formation.
Jan. 14 & 15	Magma: origin, types, ascend, stagnation, volatiles	Magma composition. Types of Magma & Igneous rocks.
Jan. 21 & 22		Physical Properties of Magma. Detachment. Magma Ascent.
Jan. 28 & 29		Stagnation. Differentiation. Magma Reservoirs. Imaging Volcanic Structures. Volatiles. Bubbles. Explosivity. Explosive vs Effusive eruption.
		Magma Reservoirs. Imaging Volcanic structures. Volatiles. Bubbles. Explosivity. Explosive vs Effusive eruption.
Feb. 4 & 5	Types of Volcanoes and Volcanic Structures:	Volcanic edifices and volcanic deposits: hotspots and mantle plumes, volcanic islands, stratovolcanoes, cones, calderas, rift zones, volcanic arcs, etc
		Volcano relics and edifice structure.
Feb. 11 & 12		<b>In-Class: Presentation</b>

Feb. 18 & 19	Reading Week	Reading Week
Feb. 25 & 26	Volcanic Products and Eruption Types	Explosive and effusive volcanism, VEI, magma-water interaction, volcanic plumes, etc.
Mar. 3 & 4		Products: lavaflores, pyroclastic fall deposit, tephra dispersal, PDC,
Mar. 10 & 11	Volcanoes and Society: Hazards, Monitoring, and Resources	Volcanic Hazards: fallout, PDC, lava flows, lahar, gas emissions, tsunamis, lightning, etc
Mar. 17 & 18		Volcano Monitoring: seismicity, infrasound, ground deformation, gas plume and thermal monitoring. Long term vs short term.
Mar. 24 & 25		Volcanic Hazard Maps. Probabilistic Volcanic Hazard and Risk Assessment, Air risk, Climate risk
Mar. 31 & Apr. 1		Economic Volcanology: Geothermal, soils, ore deposits, material, tourism.
	Planetary Volcanism	Planetary Volcanism
Apr. 7 & 8		<b>In-Class: Presentation</b>
		<b>In-Class: Presentation + FeedBack (Apr. 8.)</b>

### Methods of Evaluation

The grading of this course will depend highly on the student's participation as well as in its own work.

The overall course grade will be calculated as listed below:

- **25% Term Paper (Due Date: March 31<sup>st</sup>) + 15% Final Presentation (Apr. 7<sup>th</sup> - 8<sup>th</sup>)**

Paper will consist in an essay/research on a topic in volcanology that you find interesting. If no topic is known to you, a list of topics will be provided. Ideally you should find academic and research resources in the websites provided at the end of this outline. Before you write, please check with instructor to steer in right direction of suggested references and themes.

(Letter format, Arial font, 12 points, 1.5 spacing. Between 10 to 15 pages. More details regarding figures, and references in OWL)

Each student will give a conference style presentation (15min) about their selected topic for essay at the end of the term.

- **Reading and discussion - Reverse Classroom**

You will be given a reading assignment the weeks before the activity. You will read the publication, and you will answer questions in-class about the reading. To provide answers, ideally you should comment and discuss with your peers to find the best answer. Depending on the size of the class this activity might be done in pairs or groups.

**(15%) Jan. 22<sup>th</sup> to Jan. 29<sup>th</sup> - Check final date in OWL-: Magma**

**(15%) March 10<sup>th</sup> – 11<sup>th</sup> - Check final date in OWL-: Volcanic Products and their Hazards**

**(15%) March 24<sup>th</sup> – 25<sup>th</sup> - Check final date in OWL-: Volcano monitoring, Volcanic Hazard Maps, Hazard Assessment**

- **10% Presentation: Relics (Tentative date: Feb. 12<sup>th</sup> - Check final date in OWL-)**

You will give a presentation 10-15min (Depending on the size of the class, this activity might be done in pairs or groups) about a geological relic from a volcanic structure.

- **5% Attendance**

Means attendance to class. If you are unable to come to class or need to leave early, please contact the instructor at least one day in advance. For emergencies, please follow the policy on academic consideration for student absences

➤ **5% Extra credit for Direct Participation**

This extra credit is given to students that show excellent on-time delivery of assignments, participation in OWL course page forum, participation in class and presentations, debates, and ungraded quizzes, etc.

**Course Materials**

This course is a compendium of different book chapters and publications. All materials, complementary readings, and resources will be mentioned and posted in OWL. Students should check OWL (<http://owl.uwo.ca>) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class. Students are responsible for checking OWL on a regular basis.

Some activities (ungraded and graded) and feedback will be done using Personal Response Systems (“Clickers”) or electronic devices to access virtual clickers (like Kahoot). The devices will be used in service of the educational objectives of the course, students’ privacy will be protected with respect to data gathered from the responses, and this data will not be used for research purposes without the express written permission of the student. See Guidelines for Students on the Use of Personal Response Systems at the end of this outline.

**Main Books used for the course:**

*Encyclopedia of Volcanoes*, Elsevier 2<sup>nd</sup> Ed., edited by Sigurdsson.

*Fundamentals of Physical Volcanology*, Blackwell Publishing 2011, edited by Parfitt and Wilson.

*Volcanoes: Global Perspectives*, Wiley-Blackwell 2015, edited by Lockwood and Hazlett.

*Modeling volcanic processes*, Cambridge University Press 2013, edited by Fagents, Gregg and Lopes.

**Other books consulted for specific topics:**

*Volcanoes*, Freeman and Company 1981, edited by Decker and Decker.

*Volcanism*, Springer 2004, edited by Schmincke.

*Updates in Volcanology - A Comprehensive Approach to Volcanological Problems*, in Tech 2012, edited by Stoppa.

*Observing the Volcano World*, Springer Open 2018, edited by Fearnley, Bird, Haynes, McGuire and Jolly

*Monitoring and Mitigation of Volcano Hazards*, Springer 1996, edited by Scarpa and Tilling

*Hazards and Disasters Series: Volcanic hazards, risks and disasters*, Elsevier 2015, edited by Shroder and Papale.

**Classroom Etiquette**

Students are referred to read

[https://www.uwo.ca/international/iesc/student\\_life/academic\\_life/inside\\_the\\_classroom.html](https://www.uwo.ca/international/iesc/student_life/academic_life/inside_the_classroom.html)

**While you can have drinks in closed lid containers, please refrain from eating smelly food during the class.**

**Accommodation and Accessibility**

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.

If you are a student that requires accommodation through Accessible Education, you must connect with them as soon as possible. Accessible Education is located on the 4th floor of the Western Student Services Building (WSSB). WSSB is on the west side of campus between the University Community Centre (UCC) and the Weldon Library.

**Illness and serious circumstances**

If you are unable to meet a course requirement due to illness or other serious circumstances, you must seek

approval for the absence as soon as possible. Approval can be granted either through a self-reporting of absence or via the Dean's Office/Academic Counselling unit of your Home Faculty. If you are a Science student, the Academic Counselling Office of the Faculty of Science is located at NCB 280, and can be contacted at [scibmsac@uwo.ca](mailto:scibmsac@uwo.ca).

For further information, please consult the university's policy on academic consideration for student absences: [https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/Academic\\_Consideration\\_for\\_absences.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Consideration_for_absences.pdf) and [https://www.uwo.ca/sci/counselling/procedures/academic\\_consideration\\_for\\_absences/index.html](https://www.uwo.ca/sci/counselling/procedures/academic_consideration_for_absences/index.html)

### **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.

**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](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>).

### **Support Services**

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 661-2147 if you have any questions regarding accommodations.

The policy on Accommodation for Students with Disabilities can be found here:

[https://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/Academic%20Accommodation\\_disabilities.pdf](https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic%20Accommodation_disabilities.pdf)

The policy on Accommodation for Religious Holidays can be found here:

[http://www.uwo.ca/univsec/pdf/academic\\_policies/appeals/accommodation\\_religious.pdf](http://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf)

Learning-skills counsellors at the Student Development Centre (<http://www.sdc.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Students who are in emotional/mental distress should refer to Mental Health@Western

([http://www.health.uwo.ca/mental\\_health](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>.

### **GUIDELINES FOR STUDENTS ON THE USE OF PERSONAL RESPONSE SYSTEMS ("CLICKERS")**

Personal Response Systems ("clickers") may be used in some classes. If clickers are to be used in a class, it is the responsibility of the student to ensure that the device is activated and functional. Students must see their

instructor if they have any concerns about whether the clicker is malfunctioning.

Students must use only their own clicker. If clicker records are used to compute a portion of the course grade:

- the use of somebody else's clicker in class constitutes a scholastic offence,
- the possession of a clicker belonging to another student will be interpreted as an attempt to commit a scholastic offence.