

GEOL 427/627: Igneous and Metamorphic Petrology (4 credits) Spring 2018

Lecture: MW 1-2:15 PM in WRI C237;

Lab: T 2:30-5:15 PM or F 8.30-11.15 AM in LFG 202

Instructor: Simon Jowitt

Office: LFG 204B **Phone:** (702) 895-2447 **e-mail:** simon.jowitt@unlv.edu

(email is the best way to contact me)

Office Hours: **Monday 9-10.30 am, Tuesday 9-10 am**, or by appointment.

Teaching Assistant: Kelsy Konkright

Office: TEC 110 **email:** konkrigh@unlv.nevada.edu

Office Hours: **Tuesday 12-2 pm**, or by appointment.

Textbook: *Principles of Igneous and Metamorphic Petrology (2nd Edition)* by John D. Winter (ISBN 13: 978-0-321-59257-6). Every student is expected to do the readings before the relevant lecture.

Prerequisites: 220 Mineralogy (C or above)

Course Description This upper-level course introduces both igneous and metamorphic petrologic processes, which can be constrained by identifying and classifying igneous and metamorphic rocks.

Learning Outcomes: At the end of this course, students should be able to:

- Identify, describe, and classify igneous and metamorphic minerals and rocks in hand samples and thin sections
- Interpret magmatic history of rocks using hand sample and microscopic study
- Understand and use various geochemical data and phase diagrams to constrain petrogenesis of igneous rocks and their tectonic context
- Identify and understand metamorphic mineral assemblages to constrain history and pressure-temperature (P-T) conditions
- Discuss the role of igneous and metamorphic processes in the origin and evolution of the Earth's crust

Grading policy: Final grades will be assigned according to the following schedule. The instructor may also elect to curve the **final** grades in the student favor.

<u>Grade</u>	<u>Semester Average</u>	<u>Grade</u>	<u>Semester Average</u>
A	Over 93	C	Between 73 and 77
A-	Between 90 and 93	C-	Between 70 and 73
B+	Between 87 and 90	D+	Between 67 and 70
B	Between 83 and 87	D	Between 63 and 67
B-	Between 80 and 83	D-	Between 60 and 63
C+	Between 77 and 80	F	Less than 60

Grades: Grades are based on a combination of in class exams, two covering igneous petrology and one (final) covering metamorphic petrology. The final exam will also include some igneous-related questions but will not be, strictly speaking, a comprehensive exam.

Exam I	15%
Exam II	20%
Exam III (final)	25%
Field trip report	5%
Lab Quizzes and exercises	30%
Participation	5%
(based on instructor & T.A. evaluation)	
Term project	10% (for graduate students only)

Expectations for Graduate students are higher than for undergraduates. Accordingly, a different grading system will be used for undergraduate and graduate students and a term project is required for graduate students.

Important notes:

1. You **MUST** pass both the lecture and the laboratory in order to pass the course. A grade of F in lab or a grade of less than 60 in lecture will earn an F for the entire course regardless of the numerical average of the two scores.
2. Required reading means that you are responsible for knowing the assigned material.
3. No extra credit will be given.

Attendance and Make ups: On time attendance to class lectures, laboratory, and field trip is required. We will make accommodations for reasonable absences (illness for example) but may require documentation. Please notify us as soon as possible that you will be missing a class and especially a lab or an exam. If you miss a lecture, you are responsible to find out what material was covered and if any schedule changes were announced. If you miss an exam, you must notify me before the event with an acceptable excuse with required documentation. Make-up exams must be taken within one week of the scheduled test.

Lab Policies: Lab assignments are due at the beginning of the following lab period. Labs turned in late will be given partial credit (75%) up to 24 hr late. 24-48 hr will be graded at 50% and no credit will be given for labs more than 2 days late without a valid excuse. Please let the T.A. know ahead of time if you are going to be missing a lab. If you skip lab or leave more than 15 min early you forfeit the opportunity to ask questions and/or seek help during office hours.

Official Extracurricular Activity: All students who represent UNLV at any official extracurricular activity have the opportunity to make up an assignment. However, you must provide official written notification to me at least 1 week prior to the missed class(es).

Non-enrolled guests: Students are not allowed to bring guests, including children to lecture, laboratory, or the field trip.

Changes to syllabus: The lecture schedule is **tentative**; adjustments to the schedule of topics and readings may be made in accordance with the rate of progress in the classroom. Students will be provided with an updated syllabus if significant changes are necessary.

Course Schedule

Date	Lecture	Readings Chapter # (2 nd Edition)	Lab
<i>Jan 15</i>	<i>No Class – MLK day</i>		MLK Holiday – No lab
Jan 17	Intro to Petrology, Mineralogy review	1	
Jan 22	Igneous structures and field relationships	4	NO LAB
Jan 24	Classification and textures of igneous rocks	2 + 3	
Jan 29	Chemical petrology – Major + Trace element geochemistry	8 + 9	<u>Lab #1:</u> Igneous minerals and microscope review
Jan 31	Isotopes and geochronology I	9.7.2	
Feb 5	Isotopes and geochronology II	9.7.2	<u>Lab #2:</u> Igneous rock classification
Feb 7	Thermodynamics + phase diagrams I	5	
Feb 12	Generation of basaltic magmas	10	<u>Lab #3:</u> Phase diagrams
Feb 14	Magma diversity - differentiation and contamination	11	
<i>Feb 19</i>	<i>No Class – President's Day Recess</i>		<u>Lab #4:</u> Chemical variation diagrams and norms
Feb 21	Magma diversity - differentiation and contamination – Review before exam	11	
Feb 26	<i>Exam I</i>		<u>Lab #5:</u> Intro minerals in thin section
Feb 28	Basaltic volcanism at mid-ocean ridges, ophiolites	13	
Mar 5	Petrogenesis of OIB	14	<u>Lab #6:</u> Ultramafic and Mafic rocks
Mar 7	Subduction I: Island arc volcanism	16	
Mar 12	Subduction II: Continental arc volcanism	17	<u>Lab #7:</u> Intermediate and Felsic Rocks
Mar 14	Continental magmatism I	15, 19	
Mar 19	Continental magmatism II	18, 20	<u>Lab #8:</u> Pyroclastic rocks

Mar 21	Introduction to metamorphic rocks	21	
Mar 26	<i>Spring Break – No Classes</i>		
Mar 28			
Apr 2	Phase diagrams and Metamorphic reactions	24	<u>Lab #9</u> : Introduction to metamorphic rocks in hand samples
Apr 4	<i>Exam II</i>		
Apr 9	Metamorphic zones and facies	25	<u>Lab #10</u> : Introduction to metamorphic rocks in thin sections
Apr 11	Metamorphic textures	23	
Apr 16	Metamorphism of mafic rocks	25	<u>Lab #11</u> : Metamorphic phase diagrams
Apr 18	Metamorphism of pelites	28	
Apr 23	Thermobarometry	27	<u>Lab #12</u> : Metapelitic rocks
Apr 25	Calc-silicate rocks and fluids	29	
Apr 30	Meteorites	X	<u>Lab #13</u> : Metabasic rocks
May 2	NO CLASS		
May 7th	<i>Final Exam, Monday May 7th 2018, 8.10-10.10 AM</i>		

FIELD TRIP: The course has a one day field trip, the date of which will be confirmed in class.

Learning environment: The classroom is intended to be a place of learning. As such, and as specified in the UNLV undergraduate Catalog, no pagers, cell phones, or other potentially disruptive devices are allowed in either lecture or lab. Student usage of laptop, recording equipment, or similar devices is only allowed with explicit permission of the instructor, and is restricted to taking notes for this course. Disruptive behavior including, but not limited to those described above, chatting, sleeping, watching video, playing games, or texting may result in an administrative withdrawal from the course.

Administrative Drops/Classroom conduct: You are required to be familiar with university policies and procedures in the current UNLV undergraduate Catalog. Importantly, we follow the policies on Administrative Drops/Classroom Conduct as stated in the most recent UNLV Undergraduate Catalog. Any student that does not comply with these requirements, and conduct themselves in a manner that is disruptive and interferes with the right of other students to learn, or of the instructor to teach will be administratively dropped from the course.

Academic Misconduct: Academic integrity is a legitimate concern for every member of the campus community; all share in upholding the fundamental values of honesty,

trust, respect, fairness, responsibility, and professionalism. By choosing to join the UNLV community, students accept the expectations of the Student Academic Misconduct Policy and are encouraged when faced with choices to always take the ethical path. Students enrolling at UNLV assume the obligation to conduct themselves in a manner compatible with UNLV's function as an educational institution.

An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another, from the Internet or any source, without proper citation of the sources. See the Student Academic Misconduct Policy (approved December 9, 2005) located at: <https://www.unlv.edu/studentconduct/student-conduct>.

Classroom Conduct: Students have a responsibility to conduct themselves in class and in the libraries in ways that do not interfere with the rights of other students to learn or of instructors to teach. Use of electronic devices such as pagers, cellular phones, or recording devices, or potentially disruptive devices or activities, are permitted only with the prior explicit consent of the instructor. The instructor may rescind permission at any time during the class. If a student does not comply with established requirements or obstructs the functioning of the class, the instructor may initiate an administrative drop.

Classroom Surveillance: Nevada Revised Statutes (State Law) 396.970 Surreptitious electronic surveillance on campus; exceptions. [Effective January 1, 2017.]

1. Except as otherwise provided in subsection 2, it is unlawful for a person to engage in any kind of surreptitious electronic surveillance on a campus of the System without the knowledge of the person being observed.

2. Subsection 1 does not apply to any electronic surveillance:

(a) Authorized by a court order issued to a public officer, based upon a showing of probable cause to believe that criminal activity is occurring on the property under surveillance;

(b) By a law enforcement agency pursuant to a criminal investigation;

(c) By a peace officer pursuant to NRS 289.830;

(d) By a uniformed peace officer of the Nevada Highway Patrol Division of the Department of Public Safety pursuant to NRS 480.365;

(e) Which is necessary as part of a system of security used to protect and ensure the safety of persons on the campus; or

(f) Of a class or laboratory when authorized by the teacher of the class or laboratory.

(Added to NRS by 1993, 2138; A 2015, 575, 3668, effective January 1, 2017)

Copyright: The University requires all members of the University Community to familiarize themselves **with** and to follow copyright and fair use requirements. **You are individually and solely responsible for violations of copyright and fair use laws. The university will neither protect nor defend you, nor assume any responsibility for employee or student violations of fair use laws.** Violations of copyright laws could subject you to federal and state civil penalties and criminal liability, as well as disciplinary action under University policies. Additional information can be found at: <http://www.unlv.edu/provost/copyright>.

Disability Resource Center (DRC): The UNLV Disability Resource Center (SSC-A 143, <http://drc.unlv.edu/>, 702-895-0866) provides resources for students with disabilities. If you feel that you have a disability, please make an appointment with a Disabilities Specialist at the DRC to discuss what options may be available to you. If you are registered with the UNLV Disability Resource Center, bring your Academic Accommodation Plan from the DRC to the instructor during office hours so that you may work together to develop strategies for implementing the accommodations to meet both your needs and the requirements of the course. Any information you provide is private and will be treated as such. To maintain the confidentiality of your request, please do not approach the instructor in front of others to discuss your accommodation needs.

Final Examinations: The University requires that final exams given at the end of a course occur at the time and on the day specified in the final exam schedule. See the schedule at: <http://www.unlv.edu/registrar/calendars>.

Incomplete Grades: The grade of I—Incomplete—can be granted when a student has satisfactorily completed three-fourths of course work for that semester/session but for reason(s) beyond the student's control, and acceptable to the instructor, cannot complete the last part of the course, and the instructor believes that the student can finish the course without repeating it. The incomplete work must be made up before the end of the following regular semester for undergraduate courses. Graduate students receiving "I" grades in 500-, 600-, or 700-level courses have up to one calendar year to complete the work, at the discretion of the instructor. If course requirements are not completed within the time indicated, a grade of F will be recorded and the GPA will be adjusted accordingly. Students who are fulfilling an Incomplete do not register for the course but make individual arrangements with the instructor who assigned the I grade.

Library Resources: Students may consult with a librarian on research needs. Subject librarians for various classes can be found here: https://www.library.unlv.edu/contact/librarians_by_subject. UNLV Libraries provides resources to support students' access to information. Discovery, access, and use of information are vital skills for academic work and for successful post-college life. Access library resources and ask questions at <https://www.library.unlv.edu/>.

Rebelmail: By policy, faculty and staff should e-mail students' Rebelmail accounts only. Rebelmail is UNLV's official e-mail system for students. It is one of the primary ways students receive official university communication such as information about deadlines, major campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the university. Students' e-mail prefixes are listed on class rosters. The suffix is always @unlv.nevada.edu. Emailing within WebCampus is acceptable.

Religious Holidays Policy: Any student missing class quizzes, examinations, or any other class or lab work because of observance of religious holidays shall be given an opportunity during that semester to make up missed work. The make-up will apply to

the religious holiday absence only. It shall be the responsibility of the student to notify the instructor within the first 14 calendar days of the course for fall and spring courses (excepting modular courses), or within the first 7 calendar days of the course for summer and modular courses, of his or her intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit: <http://catalog.unlv.edu/content.php?catoid=6&navoid=531>.

Transparency in Learning and Teaching: The University encourages students to use a transparency template to discuss with their instructors how assignments and course activities benefit student success:

https://www.unlv.edu/sites/default/files/page_files/27/TILT-Framework-Students.pdf.

Tutoring and Coaching: The Academic Success Center (ASC) provides tutoring, academic success coaching and other academic assistance for all UNLV undergraduate students. For information regarding tutoring subjects, tutoring times, and other ASC programs and services, visit <http://www.unlv.edu/asc> or call 702-895-3177. The ASC building is located across from the Student Services Complex (SSC). Academic success coaching is located on the second floor of SSC A (ASC Coaching Spot). Drop-in tutoring is located on the second floor of the Lied Library and College of Engineering TBE second floor.

UNLV Writing Center: One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, located in CDC-3-301. Although walk-in consultations are sometimes available, students with appointments will receive priority assistance. Appointments may be made in person or by calling 702-895-3908. The student's Rebel ID Card, a copy of the assignment (if possible), and two copies of any writing to be reviewed are requested for the consultation. More information can be found at: <http://writingcenter.unlv.edu/>.