

GEOL 477/677 – Ore Deposit Geology Spring 2021

- Faculty:** Dr. Simon Jowitt
LFG 114
702-895-2447
Email: simon.jowitt@unlv.edu (best form of contact)
- Office Hours:** 10-11 am Tuesday, 10-11.30 am Thursday, or by appointment
- Course Format:** **Lectures twice a week Tuesday, Thursday, 1-2.15 pm in WRI C212**
Labs will be held on Friday at 8.30-11.15 am in WRI C212
- Suggested Textbook:** Reading material will be provided on Webcampus as required but Introduction to Ore Forming Processes by Robb or Robb and Ducree is recommended (but is not compulsory).
- Prerequisites:** No university prerequisites

Learning Outcomes: After successfully completing this course, students will: 1) Understand the processes that generate mineral deposits and the factors that make ore deposits economic using an Earth Systems approach; 2) Describe the tectonic settings of ore deposits within the plate tectonic paradigm and key global metallogenic events; 3) Understand how the minerals industry operates, including mining and exploration practices.

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

Final Grades will be computed as follows:

GEOL 477	Exam 1 (Tuesday October 11 th , 2022, in class)	20%
	Exam 2 (Tuesday November 1 st , 2022, in class)	20%
	Exam 3 (Tuesday December 13, 1-3 pm; subject to change)	20%
	Mineral Exploration Presentation	15%
	Mineral Exploration Assignment	25%
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		100%
GEOL 677	Exam 1 (Tuesday October 11 th , 2022, in class)	20%
	Exam 2 (Tuesday November 1 st , 2022, in class)	20%
	Exam 3 (Tuesday December 13, 1-3 pm; subject to change)	20%
	Mineral Exploration Presentation	10%
	Mineral Exploration Assignment	20%
	Term project (Graduate students only)	10%
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		100%

The majority of the lab assignments form intrinsic parts of the Mineral Exploration exercise; successful completion of these exercises and use of feedback will be assessed as part of the final grades of your presentation and assignment.

Note the different weightings for GEOL477 and GEOL677. This reflects the fact that expectations for Graduate students are higher than for undergraduates. Accordingly, a different grading system is used for GEOL677 relative to the GEOL477 course and an **extra term project** worth 10% of the mark and focused on a given theoretical topic associated with mineralizing systems (e.g. gold complexation in hydrothermal fluids, precipitation mechanisms in differing mineralizing systems) is required for graduate students. Graduate students should choose their own topic in consultation with the faculty member running the course.

The Mineral Exploration Presentation and Assignment consists of a simulated exploration exercise where small groups of students are assigned to evaluate the current thinking on ore deposit genesis for a commodity in which the company is developing a Nevada-wide targeting strategy. Individual groups should select a particular deposit style to focus on and

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need to provide an overview of the current model(s) for the genesis of that deposit style, and how that relates to Nevada, including areas of known mineralization and areas for future exploration. This will culminate in a **group** presentation and the submission of **group** assignments summarizing these ideas and targets. More details are given in the assignment handout available on Webcampus/Canvas.

Due dates:

Intermediate Mineral Exploration Presentations:	In class, Thursday October 6th, 2022
Mineral Exploration Presentations:	In class, December 6th and 8th, 2022
Mineral Exploration Assignment:	Friday December 9th, 2022
Term Project (Graduate students only)	Friday December 9th, 2022

Notes on grading:

1. Required reading means that you are responsible for knowing the assigned material. Your instructor may test you on that material even if it has not been covered in lecture.
2. No extra credit will be given.
3. No make-up exams, make-up quizzes, or make-up exercises will be given except as specified in the University Catalog for illness, religious holidays and university-sponsored extracurricular activities.
4. Assignments that are submitted late without a valid excuse or special consideration will lose 10% of the total mark per 24 hours or part thereof. Work will not be accepted more than seven (7) calendar days late. Deductions apply for weekends as well as weekdays.

Notes on Lab sessions:

Lab sessions will be held in WRI C212 with materials provided on Webcampus and as hardcopies in the lab. Each session has material that should be completed either individually or as a group (see instructions online for each lab) by the **Friday** of the following week. Some labs will develop general economic geology skills and knowledge, others will focus on key steps for your Mineral Exploration group assignment, and others will be assigned as free time to develop the group assignment and to do key research. **The marks for these assignments are incorporated into your mineral exploration exercise as they form key steps in the development of an exploration program; feedback from the successful completion of these exercises should be incorporated into your exploration program.** Students should also make use of email and office hours or schedule appointments with the faculty member running the course to discuss assignments as necessary. If possible, please bring along a laptop or similar to lab sessions as this will make finding information for some of the labs easier.

Several of the labs will focus on a mineral exploration simulation exercise using a platform called Foreur. More details on this will be provided later on in the course.

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Week	Dates	Topic	Lecture	Friday Lab Session
Week 1	Tuesday, August 30, 2022	NO LECTURE		NO LAB SESSION
	Thursday, September 1, 2022	Introduction to ore deposits, deposit classification, mineral economics	Introduction to ore deposits, deposit classification, mineral economics	
Week 2	Tuesday, September 6, 2022			Igneous ore-forming processes, genesis of magmatic mineral deposits
	Thursday, September 8, 2022	PGE-(Cu-Ni) Reef- and contact-type deposits		
Week 3	Tuesday, September 13, 2022	Igneous ore-forming processes, genesis of magmatic mineral deposits	Ti-V-Fe, and carbonatite deposits	Lab 2
	Thursday, September 15, 2022		Diamond and pegmatite deposits	
Week 4	Tuesday, September 20, 2022	Magmato-hydrothermal ore deposits	Magmato-hydrothermal processes; an overview	Lab 3
	Thursday, September 22, 2022		Porphyry copper deposits	
Week 5	Tuesday, September 27, 2022	Magmato-hydrothermal ore deposits	Epithermal and Skarn deposits	Lab 4
	Thursday, September 29, 2022		IOCG deposits	
Week 6	Tuesday, October 4, 2022	INTERMEDIATE PRESENTATIONS		Lab 5
	Thursday, October 6, 2022	EXAM 1		
Week 7	Tuesday, October 11, 2022	Hydrothermal deposits	VMS deposits	Lab 6
	Thursday, October 13, 2022		Sedex and MVT deposits	
Week 8	Tuesday, October 18, 2022	Hydrothermal deposits	Orogenic Au	Lab 7
	Thursday, October 20, 2022		Sediment-hosted Cu-Co deposits	
Week 9	Tuesday, October 25, 2022	Sedimentary and residual ore deposits	BIF, Placer, Laterite and Bauxite deposits	NEVADA DAY HOLIDAY – NO LAB
	Thursday, October 27, 2022		EXAM 2	
Week 10	Tuesday, November 1, 2022	Exploration Techniques	Exploration Techniques 1	Lab 8
	Thursday, November 3, 2022		Exploration Techniques 2	
Week 11	Tuesday, November 8, 2022	Global tectonics and metallogeny	Global tectonics and metallogeny 1	Lab 9
	Thursday, November 10, 2022		Global tectonics and metallogeny 2	
Week 12	Tuesday, November 15, 2022	Global tectonics and metallogeny	Global tectonics and metallogeny 2	Lab 10

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	Thursday, November 17, 2022	Nevadan metallogeny	Nevada Metallogeny - Carlin	THANKSGIVING – NO LAB
Week 13	Tuesday, November 22, 2022		Nevadan Metallogeny – the rest of Nevada	
	Thursday, November 24, 2022	THANKSGIVING – NO LECTURE		
Week 14	Tuesday, November 29, 2022	Mining and modern life	Critical Metals; what are they, why are they important?	Lab 11 – project discussion session
	Thursday, December 1, 2022		The role of mining in climate change mitigation	
Week 15	Tuesday, December 6, 2022	GROUP PRESENTATIONS AND PROJECT DISCUSSION SESSIONS		No Lab
	Thursday, December 8, 2022			
Final Exam, Tuesday December 13, 1-3 pm (subject to change; check UNLV Final Exam Website)				

Changes to Syllabus: The above lecture and lab schedule is tentative; adjustments to the schedule of topics and reading assignments may be made in accordance with the rate of progress in the classroom. The instructor also reserves the right to change a lecture topic to reflect world events. Students will be provided with an updated syllabus if significant changes are necessary.

UNLV Academic Policies

Public Health Directives

Face coverings are currently optional for all faculty and students in the classroom. Students must follow all active UNLV public health directives while enrolled in this class. UNLV public health directives are found at Health Requirements for Returning to Campus, <https://www.unlv.edu/coronavirus/health-requirements>. Students who do not comply with these directives may be asked to leave the classroom. Refusal to follow the guidelines may result in further disciplinary action according to the UNLV Student Conduct Code, https://www.unlv.edu/sites/default/files/page_files/27/StudentConduct-Code.pdf, including being administratively withdrawn from the course.

Academic Misconduct

Academic integrity is a legitimate concern for every member of the University community. We 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 to always take the ethical path whenever faced with choices. Students enrolling at UNLV assume the obligation to conduct themselves in a manner compatible with UNLV's educational mission. An example of academic misconduct is plagiarism. Plagiarism is using the words or ideas of another person, from the Internet or any other source without proper citation of the source(s). See the Student Conduct Code, <https://www.unlv.edu/studentconduct/student-conduct>.

Auditing a Course

Auditing a course allows a student to continue attending the lectures and/or laboratories and discussion sessions associated with the course, but the student will not earn a grade for any component of the course. Students who audit a course receive the same educational experience as students taking the course for a grade, but will be excused from exams, assessments, and other evaluative measures that serve the primary purpose of assigning a grade.

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 devices such as cellular phones and pagers, or other potentially disruptive activities are only permitted with the prior explicit consent of the instructor.

Students are specifically prohibited to record classes without instructor authorization, including online/remote classes (either audio only, or video and audio). 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 withdrawal of the student from the course.

Since the COVID-19 pandemic forced some instruction to be delivered remotely starting in Spring 2020, numerous students have asked instructors to record their synchronous classes, so that they can access them at their convenience. Instructors who agree to record their classes (audio only, or video and audio) should inform students

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in advance. Recorded lectures may not be broadly released to anyone, but made available exclusively to those students enrolled in the class during the particular academic term. Recorded lectures must be stored securely, and are subject to the Nevada System of Higher Education's Records Retention Policy, meaning that the recordings can only be deleted 120 days after the end of class (i.e., after grades are posted). Once this requirement is met, the recordings should be deleted. Class recordings are protected from disclosure, as they are deemed part of an educational record under the Family Educational Rights and Privacy Act (FERPA).

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 student or employee 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 copyright policy information is available at <https://www.unlv.edu/provost/copyright>.

Disability Resource Center (DRC)

The UNLV Disability Resource Center (Campus Resource Center (CRC) 1st floor, <https://www.unlv.edu/drc>, telephone 702-895-0866) provides resources for students with disabilities. Students who believe that they may need academic accommodations due to a permanent disability, temporary or permanent medical need, or academic support due to pregnancy are encouraged to contact the DRC as early as possible in the academic term. A Disabilities Specialist will discuss what options may be available to you. Students who are already registered with the DRC should request their accommodations online each semester, and make an appointment to discuss their accommodations with their instructors.

Final Examinations

The University requires that final exams given at the end of a course occur on the date and at the time specified in the Final Exam schedule. The Final Exam schedule is typically available at the start of the semester, and the classroom locations are available approximately one month before the end of the semester. See the Final Exam Schedule, <https://www.unlv.edu/registrar/calendars>.

Identity Verification and Online Course Requirements

All UNLV students must use their Campus-issued ACE ID and password to log in to WebCampus-Canvas. UNLV students enrolled in online or hybrid courses are expected to read and adhere to the Student Academic Misconduct Policy, <https://www.unlv.edu/studentconduct/misconduct/policy>, which states that "acting or attempting to act as a substitute for another, or using or attempting to use a substitute, in any academic evaluation or assignment" is a form of academic misconduct. Intentionally sharing ACE login credentials with another person may be considered an attempt to use a substitute, and could result in investigation and sanctions, as outlined in the Student Academic Misconduct Policy. UNLV students enrolled in online courses are also expected to read and adhere to the Acceptable Use of Computing and Information Technology Resources Policy, <https://www.it.unlv.edu/policies/acceptable-use-computing-and-information-technology-resources-policy>, which prohibits sharing university accounts with other persons without authorization. To the greatest extent possible, all graded assignments and assessments in UNLV online courses should be hosted in WebCampus-Canvas or another UNLV-managed platform that requires ACE login credentials for access.

Incomplete Grades

The grade of "I" (Incomplete) may be granted when a student has satisfactorily completed three-fourths of course work for that semester/session, but cannot complete the last part of the course for reason(s) beyond the student's control and acceptable to the instructor, and the instructor believes that the student can finish the course without repeating it. For undergraduate courses, the incomplete work must be made up before the end of the following regular semester. 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 period indicated, a grade of "F" will be recorded, and the student's GPA will be adjusted accordingly. Students who are fulfilling an Incomplete grade do not register for the course, but make individual arrangements with the instructor who assigned the "I" grade.

Library Resources

Librarians are available to consult with students on research needs, including developing research topics, finding information, and evaluating sources. To make an appointment with a subject expert for this class, please visit the Libraries' Research Consultation website, <https://guides.library.unlv.edu/appointments/librarian>. You can also ask the library staff questions via chat and text message at <https://ask.library.unlv.edu/>.

Missed Classwork

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Any student missing class, quizzes, examinations, or any other class or laboratory work because of observance of religious holidays will be given an opportunity during that semester to make up the missed work. The make-up opportunity will apply to the religious holiday absence only. It is the responsibility of the student to notify the instructor within the first 14 calendar days of the course for Fall and Spring courses (except for modular courses), or within the first 7 calendar days of the course for Summer and modular courses, of their intention to participate in religious holidays which do not fall on state holidays or periods of class recess. For additional information, please visit the Missed Classwork policy, under Registration Policies, on the Academic Policies webpage, <https://catalog.unlv.edu/content.php?catoid=39&navoid=10666>.

In accordance with the policy approved by the Faculty Senate regarding missed class time and assignments, students who represent UNLV in any official extracurricular activity will also have the opportunity to make up assignments, provided that the student submits official written notification to the instructor no less than one week prior to the missed class(es).

The spirit and intent of the policy for missed classwork is to offer fair and equitable assessment opportunities to all students, including those representing the University in extracurricular activities. Instructors should consider, for example, that in courses which offer a "Drop one" option for the lowest assignment, quiz, or exam, assigning the student a grade of zero for an excused absence for extracurricular activity is both contrary to the intent of the Faculty Senate's policy, and an infringement on the student's right to complete all work for the course.

This policy will not apply in the event that completing the assignment or administering the examination at an alternate time would impose an undue hardship on the instructor or the University that could be reasonably avoided. There should be a good faith effort by both the instructor and the student to agree to a reasonable resolution. When disagreements regarding this policy arise, decisions can be appealed to the Department Chair/School Director, College/School Dean, and/or the Faculty Senate Academic Standards Committee.

For purposes of definition, extracurricular activities may include, but are not limited to academic recruitment activities, competitive intercollegiate athletics, fine arts activities, liberal arts competitions, science and engineering competitions, and any other event or activity sanctioned by a College/School Dean, and/or by the Executive Vice President and Provost.

Rebelmail

Rebelmail is UNLV's official email system for students and by University policy, instructors and staff should only send emails to students' Rebelmail accounts. Rebelmail is one of the primary ways in which students receive official University communications, information about deadlines, major Campus events, and announcements. All UNLV students receive a Rebelmail account after they have been admitted to the University. Sending emails within WebCampus-Canvas is also acceptable.

Title IX

UNLV is committed to providing an environment free of all forms of unlawful discrimination including sexual and gender-based discrimination, harassment, and violence like sexual assault, intimate partner violence, and stalking. If you, or someone you know, has experienced or is experiencing these types of behaviors, know that you are not alone.

Resources and support are available. To learn more or to report an incident, please visit the Office of Equal Employment and Title IX website at <https://www.unlv.edu/compliance>. Please be aware that as an instructor, I am not a confidential resource, and I will need to report incidents of sexual misconduct to UNLV's Title IX Coordinator. You can also report concerns directly using the online reporting form, at

https://cm.maxient.com/reportingform.php?UnivofNevadaLasVegas&layout_id=18, or via email at titleixcoordinator@unlv.edu or 702-895-4055. For confidential support in matters of sexual violence, relationship/family violence, or stalking, contact the Care Center at <https://www.unlv.edu/carecenter> or 702-895- 0602.

Tutoring and Coaching

The Academic Success Center (ASC), at the Claude I. Howard Building, 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, please visit the ASC website, <https://www.unlv.edu/asc>, or call 702-895-3177. The ASC is located across from the Student Services Complex (SSC). Academic success coaching is located on the second floor of SSC A, Room 254. Drop-in tutoring is located on the second floor of the Lied Library, and on the second floor of the College of Engineering building (TBE A 207).

UNLV Writing Center

One-on-one or small group assistance with writing is available free of charge to UNLV students at the Writing Center, <https://writingcenter.unlv.edu/>, located in the Central Desert Complex, Building 3, Room 301 (CDC 3–301). Walk-in consultations are sometimes available, but students with appointments receive priority assistance. Students may make appointments in person or by calling the Center, telephone 702-895-3908. Students are requested to

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bring to their appointments their Rebel ID Card, a copy of the instructions for their assignment, and two copies of any writing they have completed on their assignment.

988 FREE 24/7 SUICIDE & CRISIS LIFELINE

In addition to campus resources such as the Counseling and Psychological Services (CAPS) website at <https://www.unlv.edu/caps>, visiting the YOU@UNLV website at <https://you.unlv.edu/>, and Early Alert (for graduate students, at <https://www.unlv.edu/graduatecollege/academy/early-alert>), you may now call or text 988 or chat at 988lifeline.org if you or someone you know is in crisis and in need of support.

Diversity Statement

As an institution of higher learning, UNLV represents a rich diversity of human beings among its faculty, staff, and students, and is committed to aspiring to maintain a Campus environment that values that diversity. Accordingly, the University supports understanding and appreciation of all members of its community, regardless of race, sex, age, color, national origin, ethnicity, creed, religion, disability, sexual orientation, gender, gender identity, marital status, pregnancy, genetic information, veteran status, or political affiliation. Please see University Statements and Compliance, <https://www.unlv.edu/about/statements-compliance>.

A successful learning experience requires mutual respect and trust between the students and the instructor. Accordingly, the instructor asks that students be willing to listen to one another's points of view, acknowledging that there may be disagreements, keep discussion and comments on topic, and use first person, positive language when expressing their perspectives.

UNLV Land Acknowledgement

UNLV is situated on the traditional homelands of Indigenous groups, including the Nuwu or Nuwuvi, Southern Paiute People, descendants of the Tudu, or Desert People. We honor and offer gratitude for those who have stewarded the land; for the land itself; and for the opportunity to cultivate a thriving, diverse, inclusive, and just scholarly community here today that works for a better tomorrow for all.

GEOL 477/677 Policies

1. Participation - If you are confused about any of the material presented, please ask questions in class for clarification and further explanation. You will not be alone in your confusion. There are many ways to present this material, and I will attempt to find one that works for you. If you do not feel comfortable asking questions in class, please contact me independently via email or in person.

2. Attendance - It is important that you attend class because we cover a lot of material, and I will regularly provide guidance regarding reading assignments and exams. You are responsible for all material covered in lecture no matter what causes your absence. If you miss a lecture, try to get the notes from a classmate. Topics covered may vary from the schedule somewhat, but the exam dates will remain fixed.

3. Missed work - Exams and assignments missed due to absence will receive a grade of zero or will be subject to the late penalties outlined above unless you provide notification of an exception for an illness, a religious holiday or a university-sponsored extracurricular activity as specified in the University Catalog and as outlined above. In the case of an excused absence, the nature and format of the make-up exam will be at the instructors' discretion.

4. 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 conducts 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.

5. Academic Misconduct - This course operates under a "zero tolerance" policy. If any student who commits cheating or plagiarism will receive a grade of F for the class.