

Lithology 51-206 Lecture and Lab, Spring 2023 Section: A09C and A01L

Instructor: Dr. Ben Hallett

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Office Hours (in Harrington 216): Mon 2:00pm–3:00pm and
Thurs 11:15am–12:15pm (or by appointment)

Description: Genesis and classification of igneous, sedimentary and metamorphic rocks; principles of magmatic differentiation and sedimentary and metamorphic facies. Laboratory work with hand specimens of rocks and minerals. Field trips may be taken to selected areas to illustrate principles taught in the course.

Prerequisite: Geology 205 (Mineralogy)

Schedule: Lectures MWF 10:20-11:20am, Harrington 217

Lab: F 12:40–4:00pm, Harrington 216

Textbook: Winter, J.D., 2010, Principles of Igneous and Metamorphic Petrology (2nd Ed.), plus **selected readings** (on Canvas: see schedule).

Important dates: 1/30/23 classes begin; 2/3/23 last day to add without instructor's signature; 2/24/23 last day to add with instructor's signature; 3/6/23 early alert due; 3/15/23 last day to drop; 3/20/23–3/34/23 Spring Break; 4/29–4/30/23 Class Field Trip; 5/12/23 Classes end.

Attendance: Attendance is required. Make up work will not be given without a valid excuse and/or prior approval. Any failure to attend class will negatively impact your grade.

Grades: Your course grade will be based on three lecture exams (50%), homework/in-class assignments/quizzes and lab assignments/projects including field trip (30%), specimen quizzes (10%), rock/mineral ID final (5%), and pre-lecture reading quizzes (5%)

Homework will be assigned periodically throughout the semester with a focus on tackling problems with applications to rock forming processes. Collaboration is permitted. I strongly recommend beginning homework early and contacting your instructor with questions.

Late Assignments: At the start of the semester you begin with 1 extension, and a chance to earn a second extension (**2 extensions total**) for any late assignments for the course, beyond which late assignments will not be accepted. Ways to earn the second extension will be announced in class. Extensions are not permitted for assignments from unexcused missed labs. The maximum allowable extension is **48 hours**. An extension granted for an assignment due at the start of a Friday lecture will be due at the start of the next Monday's lecture. No extensions are granted for any in-class assignments, quizzes, or exams.

Specimen ID Quizzes and Exam: There will be 12 total hand specimen quizzes given at the start of lab each week, beginning with Feb 10. These quizzes are cumulative – you are responsible for both new specimens and those previously covered. A list will be maintained on Canvas. Examples of rock/mineral specimens are provided in the drawers in the lab for you to study/practice ID. There will be a larger specimen ID exam at the end of the course. Your top 10 specimen quiz scores will count 10% toward your grade.

Canvas Reading Quizzes: Short open-book reading quizzes are assigned and are to be completed independently on Canvas prior to the start of Monday lectures (by 10:20am). These quizzes are based on the assigned reading for the topic each week. The quizzes may be retaken prior to the deadline as many times as you like, and your highest quiz score will count toward your grade. Missed quizzes will result in no points. There are **no time extensions for these quizzes**.

Lecture Exams: Each exam is worth 16.67% toward your grade: Exam 1 (igneous rocks/processes), Exam 2 (metamorphic rocks/processes), and Exam 3 (sedimentary rocks/processes plus key concepts from prior material) = 50% of your final grade.

Grade scale: 93% and up = A; 90–92 = A-; 87–89 = B+; 83–86 = B; 80–82 = B-; 77–79 = C+; 73–76 = C; 70–72 = C-; 67–69 = D+; 63–66 = D; 60–62 = D-; <60% = F

Academic Integrity: The Wisconsin Administrative Code states: “Students are responsible for the honest completion and representation of their work, for the appropriate citation of sources, and for respect of others academic endeavors.” (§ UWS 14.01) **Plagiarism and other forms of academic misconduct** are serious offenses with penalties listed in the student discipline code: <http://www.uwosh.edu/deanofstudents/university-polices-procedures/academic-misconduct>. If you do not understand this statement, please see me as soon as possible.

Laboratories:

Lab assignments for this course, including one multi-lab project, are designed to give you hands-on experience classifying and describing rocks and features/textures and manipulating/plotting/interpreting petrologic data. Lab activities are designed for students to collaborate but all submitted lab assignments must be your own original work. Lab assignments will be due on paper at Friday lecture. This means time management is critical to stay on top of lab and assignment deadlines. Missed labs without prior notification of a valid excuse will not be granted deadline extensions of any kind.

Course Goals and Rigor:

The primary goals of this course are to train you in how to identify and interpret igneous, sedimentary, and metamorphic rocks. This course traditionally will help you build the skill needed to appropriately describe rock samples, evaluate petrologic data, interpret the significance of the occurrences of different types of rocks in tectonic context, and write a professional-style report based on your interpretations. In combination, the skills you obtain in this course are intended to prepare you to work for a geological survey, mineral exploration company, consulting firm, university, or as an independent consultant.

This course will be challenging and require a concerted effort on your part to be successful. Coursework will be held to a high standard, and feedback (particularly on labs and homework) is intended to help students master the material. Any student who has met the prerequisites and fully engages with the material in and out of class can succeed. While the material and work will challenge you and require dedicated effort and time, you already have a firm foundation from your prior courses and you have access to resources, including your instructor, that will help you succeed in this course. If you are unclear what is expected of you after reading this syllabus, please see me immediately so that I can clarify.

Field Trip:

Over the weekend of April 29–30 2023, our field trip will include one night of camping in spring weather. We will visit a number of sites, practicing field rock descriptions/interpretations, and discussing the geology of Wisconsin. If you know you aren't able to attend the field trip (contact me ASAP) there will be a challenging alternative writing assignment required.

Specific Learning Outcomes:

- Identify and classify common igneous, metamorphic, and sedimentary rocks.
- Predict the occurrence of igneous, metamorphic, and sedimentary rocks based on global, regional, and local tectonic associations and crustal evolution.
- Describe the physical and chemical processes that lead to the production and diversification of magma and igneous rocks.
- Describe and quantify the P-T-t evolution of igneous and metamorphic rocks.
- Relate the mineral/textural associations within a rock to a specific physical/chemical evolution.
- Evaluate the thermodynamic stability of different minerals for a simple geochemical system at a common metamorphic facies and a fixed bulk rock composition.
- Describe the tectonic environment and processes of sediment production/transport/deposition that ultimately lead to the formation of common sedimentary rocks.
- Describe and Interpret implications and approaches to study of sedimentary provenance

Classroom Considerations for Spring 2023:

- All students are required to follow Campus health regulations and adhere to any additional expectations communicated by the instructor or posted in the classroom. These apply during class/lab meetings as well as all other times in the laboratory.
- Disinfecting Workspaces in Classroom and Lab: Students may disinfect their workspace prior to the start of each class using the wipes provided. Due to the sharing of lab materials and samples students are encouraged to regularly sanitize hands and disinfect workspaces.
- ***Eating is prohibited in classrooms and labs during class and lab periods—please eat outside of class time in the student lounge or elsewhere.***

Regarding Diversity, Equity & Inclusion: Diversity drives innovation, creativity, and progress. At the University of Wisconsin Oshkosh, the culture, identities, life experiences, unique abilities, and talents of every individual contribute to the foundation of our success. Creating and maintaining an inclusive and equitable environment is of paramount importance to us. This pursuit prepares all of us to be global citizens who will contribute to the betterment of the world. We are committed to a university culture that provides everyone with the opportunity to thrive.

Disclosure Statement: Students are advised to see the following URL for disclosures about essential consumer protection items required by the Students Right to Know Act of 1990: <https://uwosh.edu/financialaid/consumer-information/>

Lithology 2023 Tentative Schedule of Topics (*Subject to Change*)

Week of	Topic	Reading	Notes
Jan 30	Earth's Crust and Mantle, Tectonics	W§1, 4	
Lab 1	Mineral Review / Igneous textures I	Spear§4 (Canvas)	Practice Quiz
Feb 6	Classifying Igneous Rocks and textures, Phases and Equilibrium	W§2, 5	HW1 Due 2/8
Lab 2	Plutonic Rocks and textures	W§3, Hudak Atlas	Rock/Min Quiz 1
Feb 13	Phase Diagrams, Melting/ Crystallization, Igneous Geochem	W§6, 7.3-7.5.1 8.1-8.5	HW2 Due 2/15
Lab 3	Volcanic Rocks and textures		Rock/Min Quiz 2
Feb 20	Isotopes/Geochronology, Magma Generation/Diversification	W§9.7, 10, 11	Igneous Quiz Wed Feb 22
Lab 4	M & M Magma Chamber		Rock/Min Quiz 3
Feb 27	Layered Mafic Intrusions, Oceanic Volcanism, Flood Basalts	W§12.1-12.3.1, 13.1-13.4,14.1-14.3	
Lab 5	Begin Igneous Project		Rock/Min Quiz 4
Mar 6	Arc Magmatism, Granitoids, Other Igneous Rocks, EXAM 1: 3/10	W§16.1-16.5,17.1-17.4, 18	
Lab 6	Ig. Proj. Continued (draft due 3/15)		Rock/Min Quiz 5
Mar 13	Classifying Metamorphic Rocks	W§21	
Lab 7	Metamorphic Rock Classification		Rock/Min Quiz 6
Mar 20	SPRING BREAK 3/20–3/24 (no lab or lecture)		Igneous Proj due 3/29
Mar 27	Metamorphic Textures & Structures	W§22, 23	
Lab 8	Microstructures and Reactions		Rock/Min Quiz 7
Apr 3	Metamorphic Assemblages, Reactions, and Facies	W§24, 25.1-25.2	
Lab 9	Analytical Geochem. and Imaging		Rock/Min Quiz 8
Apr 10	Metamorphism in different Tectonic Regimes, EXAM 2 4/15	W§25.3-25.5; 28.1–28.2.4, 28.2.6–28.2.8, 28.5	
Lab 10	Metamorphic Facies and Tectonics		Rock/Min Quiz 9
Apr 17	Occurrence of Sedimentary Rocks, Weathering, Clastic Rocks	BTO§11, 13 Boggs§1	
Lab 11	Clastic Sedimentary Rocks		Rock/Min Quiz 10
Apr 24	Sandstones, Conglomerates, Mudrocks	BTO§13, 14	COSCA 2023: 4/27
Lab 12	Sedimentary Provenance Lab		Rock/Min Quiz 11
<i>Required Weekend Course Field Trip 4/29–4/30</i>			
May 1	Carbonates, Evaporites	BTO§15, 16	
Lab 13	Carbonates and other Sed Rocks		Rock/Min Quiz 12
May 8	Other Sed. Rocks, EXAM 3: May 12 in lab (semi-comprehensive)	BTO§16	Exam 3 in Lab May 12 Rock/Min ID final 5/10

W= Winter Textbook (Required)

BTO= Blatt, Tracy, and Owens Textbook (**on Canvas** with Boggs material)