

**Geosciences 443 – Sedimentary Petrology  
Autumn, 2019**

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**Introduction:** The primary objective of the course is to develop skills in the characterization and analysis of sedimentary rock compositions, textures, and fabrics and the interpretation of physical, chemical, and biological influences on the sedimentary rock record. We will undertake analysis of sediment and sedimentary rock in outcrop, hand specimen and thin-section, and we will be introduced to various laboratory techniques for analyzing sedimentary rock compositions, textures and fabrics.

The chief outcome of this class is the development of skills related to describing the compositions, textures, and fabrics of sedimentary rocks and interpreting these attributes in the context of depositional and environmental processes, provenance, and tectonic setting. Specific course outcomes include: 1) recognition and interpretation of sediment textures in clastic and non-clastic sediments and sedimentary rocks; 2) identification and interpretation of grain compositions in siliciclastic sedimentary rocks using standard petrography; 3) identification and interpretation of allochemical and orthochemical constituents of non-clastic sedimentary rocks; 4) recognition of basic fossil types and their interpretation from thin-section analysis; 5) understanding the basic application of XRD, SEM, and SEM-EDS techniques in sedimentary petrology.

This class is designed to provide a platform for developing skills pertinent to the applied description and analysis of sedimentary rocks. You will have access to hundreds of rock and thin-section samples. Simply put, the more time you spend studying the rock materials presented in this class, the stronger your petrological skill set will become. Presently, there is a high demand for sedimentary petrologists, particularly in the energy industry. This class will provide you with the basic skills needed to work in this capacity.

The *tentative* course schedule and assigned readings are below:

<b>Day/Date</b>	<b>Lecture/lab topic</b>	<b>Assigned Reading</b>
Tues/Aug. 26	Pre-course assessment Sedimentary basin settings; Sedimentary textures – grain shape, sorting and size distribution <b><i>Lab #1 assigned – conglomerate fabrics</i></b>	Boggs, ed.2, Ch. 1 and Ch. 5
Thurs/Aug. 28	Physical and biogenic sedimentary structures	Boggs, ed. 2, Ch. 2
Tues/Sept. 2	<b>NO CLASS – LABOR DAY</b>	
Wed/Sept. 4	Sed and biogenic structures, continued. intro to siliciclastic conglomerates and sandstones	Boggs, ed. 2, Ch. 3
Mon/Sept. 9	Siliciclastic sandstones, continued	
Wed/Sept. 11	Review of optical mineralogy <b><i>Lab #1 due at beginning of class.</i></b> <b><i>Lab #2 assigned - Siliciclastic sandstone compositions and diag</i></b>	
Mon/Sept. 16	Siliciclastic sandstone compositions Go over Lab #1.	Boggs, ed. 2, Ch. 7
Wed/Sept. 18	Diagenesis of siliciclastic sandstones	Boggs, ed. 2, Ch. 8

Fri/Sept 20	5 pm – leave for Dillon, camp at Barrett's CG	
Sat/Sept 21	9-6pm – sedimentary geology of Dillon area	
Sun/Sept 22	5pm – return to Missoula	
Mon/Sept. 23	Diagenesis of siliciclastic sandstones, continued Go over Lab #3.	
Wed/Sept. 25	Chemical sedimentary rocks <b>Lab #2 due at beginning of class</b> <b>Lab #3 assigned – chemical sedimentary rocks</b>	Boggs, ed. 2, Ch. 12
Mon/Sept 30	Chemical sedimentary rocks	
Wed/Oct 2	Chemical sedimentary rocks, cont. <b>Lab #3 due</b> <b>Lab #4 assigned – Mudrocks</b>	
Mon/Oct 7	Mudrocks I – Intro to XRD go over lab #3	Boggs, ed. 2, Ch. 6
Wed/Oct 9	Mudrocks II – Intro to SEM/EDS	
Mon/Oct 14	Carbonaceous sedimentary rocks work on lab #4	Boggs, ed. 2, Ch. 13
Wed/Oct 16	Carbonates I <b>Lab # 4 due</b> <b>Lab #5 assigned – Limestones</b>	Boggs, ed. 2, Ch. 9 and 10
Mon/Oct 21	Carbonates II Go over Lab #4	Boggs, ed. 2, Ch. 11
Wed/Oct 23	<b>MIDTERM EXAM – through Chemical Sed Rocks</b>	
Mon/Oct 28	Go over Midterm exam	
Wed/Oct 30	<b>Lab #5 due;</b> Mixed compositions	
Mon/Nov 4	Go over Lab #5; Mixed compositions	TBA
Wed/Nov 6	Mixed compositions; <b>Lab #6 assigned – MT stratigraphy</b>	
Mon/Nov 11	<b>NO CLASS – VETERANS DAY</b>	
Wed/Nov 13	Montana stratigraphy and sedimentary compositions	TBA
Mon/Nov 18	Montana stratigraphy and sedimentary compositions; <b>Lab #6 due</b>	
Wed/Nov 20	Montana stratigraphy and sedimentary compositions; Go over Lab #6	
Mon/Nov 25	<b>NO CLASS – THANKSGIVING TRAVEL DAY</b>	
Wed/Nov 27	<b>NO CLASS – THANKSGIVING HOLIDAY</b>	
<b>Mon/ Dec 2</b>	<b>Final student presentations</b>	
<b>Wed/Dec 4</b>	<b>Final student presentations</b>	
<b>Wed/Dec 11</b>	<b>FINAL EXAM; Wed, Dec. 11, 10:10am-12:10pm</b>	

**Field Trip:** This course has one required weekend-long trip Sept. 20-22. We will leave Missoula at 5pm on Friday, September 20 and we will return to Missoula by 5pm on Sunday, September 22. The field trip will be to the Dillon area.

### **Class Projects:**

In addition to nine regular labs, a midterm, and a final exam, this class will involve one independent research project. From the GEO443 sample collection, each student must select one sample study suite. A list of the sample study suites will be provided separately. Over the course of the semester, you will be asked to undertake a formal petrographic description of your sample suite and develop an industry-style written report and accompanying powerpoint presentation that describes your results and interpretations. You will be asked to give a 15 minute oral presentation at the end of the semester summarizing these results, using your powerpoint file as the platform for presentation.

### **Grading System:**

This class includes seven individual assigned labs that constitute the heart of the course material. Most weeks of the semester, a new lab will be assigned and the previous lab will be reviewed.

Final grades for this course will be based on the following: 1) 7 individual laboratory assignments (~50% of final grade); a midterm exam (~15% of final grade); your term research project (assigned sand and rock samples; ~20% of final grade); and a comprehensive final lab exam (~15% of final grade)

### **Penalty for late work:**

Late assignments drag down the entire class and make it difficult to move forward with the material at a constant pace. Therefore, late assignments will not be accepted. Unexcused late assignments turned in after the due date at class time will not be graded and will automatically receive a zero.

### **Office Hours:**

Commonly in a class of this nature, questions arise that require the input of the instructor in the laboratory. To this end, we may use some class time answer questions pertaining to ongoing laboratory assignments. Hendrix will keep formal office hours from 1-2:00 PM on Mondays and Wednesdays, and is also available via appointment.

### **Reading:**

Reading for this class will be assigned on a week-by-week basis and usually will consist of a published paper or book chapter pertaining to that week's material.

### **Course Web Site:**

Please be aware that all of the course content will be posted on moodle. Generally, materials for each lecture will be posted 24-48 hours ahead of the class meeting. Please feel free to download and/or print out the slides for each lecture and bring them to class as a starting point for taking notes.

### **An important note about academic misconduct:**

*All students must practice academic honesty. Academic misconduct is subject to an academic penalty by the course instructor and/or a disciplinary sanction by the University. All students need to be familiar with the Student Conduct Code. The Code is available for review online at [http://www.umt.edu/vpsa/policies/student\\_conduct.php](http://www.umt.edu/vpsa/policies/student_conduct.php)*