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# GEO 443.01: Principles of Sedimentary Petrology

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**Geosciences 443 – Sedimentary Petrology  
Autumn, 2018**

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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>
Mon/Aug. 27	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
Wed/Aug. 29	Physical and biogenic sedimentary structures	Boggs, ed. 2, Ch2
Mon/Sept. 3	<b>NO CLASS – LABOR DAY</b>	
Wed/Sept. 5	Sed and biogenic structures, continued. intro to siliciclastic conglomerates and sandstones	
Mon/Sept. 10	Siliciclastic sandstones, continued	
Wed/Sept. 12	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. 17	Siliciclastic sandstone compositions Go over Lab #1.	
Wed/Sept. 19	Diagenesis of siliciclastic sandstones	

Mon/Sept. 24	Diagenesis of siliciclastic sandstones, continued Go over Lab #3.	
Wed/Sept. 26	Chemical sedimentary rocks <b>Lab #2 due at beginning of class</b> <b>Lab #3 assigned – chemical sedimentary rocks</b>	
Fri/Sept 28	5 pm – leave for Dillon, camp at Barrett's CG	
Sat/Sept 29	9-6pm – sedimentary geology of Dillon area	
Sun/Sept 30	5pm – return to Missoula	
Mon/Oct 1	Chemical sedimentary rocks	
Wed/Oct 3	Chemical sedimentary rocks, cont. <b>Lab #3 due</b> <b>Lab #4 assigned – Mudrocks</b>	
Mon/Oct 8	Mudrocks I go over lab #3	
Wed/Oct 10	Mudrocks II	
Mon/Oct 15	Mudrocks III work on lab #4	
Wed/Oct 17	Limestones I <b>Lab # 4 due</b> <b>Lab #5 assigned – Limestones</b>	
Mon/Oct 22	Limestones II Go over Lab #4	
Wed/Oct 24	<b>MIDTERM EXAM – through Chemical Sed Rocks</b>	
Mon/Oct 29	Go over Midterm exam Lab #5 assigned – mixed compositions	
Wed/Oct 31	Mixed compositions	
Mon/Nov 5	Mixed compositions	
Wed/Nov 7	Work on lab #5	
Mon/Nov 12	<b>NO CLASS – VETERANS DAY</b>	
Wed/Nov 14	Intro to SEM/EDS <b>Lab #5 due</b>	
Mon/Nov 19	Intro to XRD Go over lab #5.	
Wed/Nov 21	<b>NO CLASS – THANKSGIVING HOLIDAY</b>	
Mon/Nov 26	Review of course material	
Wed/Nov 28	Review of course material	
<b>Mon/ Dec 3</b>	<b>Final student presentations</b>	
<b>Wed/Dec 5</b>	<b>Final student presentations</b>	
<b>Thurs/Dec 13</b>	<b>FINAL EXAM; Thursday, Dec. 13, 8:00-10:00am</b>	

**Field Trip:** This course has one required weekend-long trip Sept. 28-30. We will leave Missoula at 5pm on Friday, September 28 and we will return to Missoula by 5pm on Sunday, September 30. 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 1-2:30PM 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)*