

**Geosciences 443 – Sedimentary Petrology
Autumn, 2017**

**Prof. Marc S. Hendrix
SC359; Phone: 544-0780 (cell); 243-5278 (office);
email: marc.hendrix@mso.umt.edu**

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:

Day/Date	Lecture/lab topic	Assigned Reading
Mon/Sept. 4	NO CLASS – Labor Day Holiday	
Wed/Sept. 6	Pre-course assessment Sedimentary basin settings; Sedimentary textures – grain shape, sorting and size distribution <i>Lab #1 assigned – conglomerate fabrics</i>	Farrell et al., 2012
Mon/Sept. 11	Physical and biogenic sedimentary structures	
Wed/Sept. 13	NO CLASS – LABOR DAY	
Mon/Sept. 18	Sedimentary and biogenic structures, continued. Intro to siliciclastic conglomerates and sandstones <i>Lab #1 due at beginning of class</i> <i>Lab #2 assigned – sedimentary textures</i>	
Wed/Sept. 20	Siliciclastic sandstones, continued	
Mon/Sept. 25	Review of optical mineralogy Go over Lab #1 <i>Lab #2 due at beginning of class</i> <i>Lab #3 assigned - Siliciclastic sandstone compositions</i>	
Wed/Sept. 27	Hendrix at WTGS meeting; guest speaker Nate LaFontaine	

	Siliciclastic sandstone compositions Work on Lab #3	
Mon/Oct. 2	Composition and diagenesis of siliciclastic sandstones Go over Lab #2. Work on Lab #3.	
Wed/Oct. 4	Diagenesis of siliciclastic sandstones, continued Lab #3 due at beginning of class. Lab #4 assigned – Siliciclastic sandstone diagenesis	
Fri/Oct 6	Leave for field trip to Dillon 4pm, camp near Dillon	
Sat/Oct 7	Field trip in Dillon area, camp near Dillon	
Sun/Oct 8	Return from field trip, arrive Missoula by 6pm	
Mon/Oct 9	Chemical sedimentary rocks - cherts	
Wed/Oct 11	Chemical sedimentary rocks - phosphorites	
Fri/Oct 13	Lab #4 due at 5pm.	
Mon/Oct 16	Hendrix in West Texas – field trip, guest instructor TBD Limestones I Lab #5 assigned - Limestones and dolomites	
Wed/Oct 18	Hendrix in West Texas – field trip, guest instructor TBD Limestones II – work on Lab #5	
Mon/Oct 23	Limestones III Work on Lab #5. Go over Lab #4.	
Wed/Oct 25	Dolomites I Work on Lab #5.	
Fri/Oct 27	Lab #5 due at 5pm.	
Mon/Oct 30	Go over Lab #5. Midterm review	
Wed/Nov 1	MIDTERM EXAM - through dolomites	
Mon/Nov 6	Go over Midterm exam Mudrocks I Lab #6 assigned - Mudrocks	
Wed/Nov 8	Hendrix out of town, guest lecturer Work on lab #6.	
Mon/Nov 13	Mudrocks II	
Wed/Nov 15	Mudrocks III	
Mon/Nov 20	Mudrocks IV	
Tues/Nov 21	Lab #6 due at 5pm.	
Wed/Nov 22	NO CLASS – THANKSGIVING HOLIDAY	
Mon/Nov 27	Mixed compositions I Go over Lab #6. Lab #7 assigned.	
Wed/Nov 29	Mixed compositions II Student Research Project Presentations 1-2	
Mon/Dec 4	Student Research Project Presentations 3-6	
Wed/Dec 6	Student Research Project Presentations 7-10 Lab #7 due at beginning of class.	
Mon/Dec 11	Student Research Project Presentations 11 Go over Lab #7. Final exam review	
Wed/ Dec 13	Study/Reading Day	
Fri/Dec 15	FINAL EXAM; Friday, December 15 from 8:00-10:00am	

Field Trip:

This course has one required weekend-long trip the first weekend in October. We will leave Missoula at 4pm on Friday October 6, and we will return to Missoula by 6pm on Sunday. The field trip will be to the Dillon area and will involve interacting with a graduate class in Sedimentary Basin Analysis led by Prof. Dave Bowen at MSU.

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