

**Geosciences 443 – Sedimentary Petrology
Autumn, 2016**

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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:

Day/Date	Lecture/lab topic	Assigned Reading
Mon/Aug. 29	Pre-course assessment Sedimentary basin settings; Sedimentary textures – grain shape, sorting and size distribution <i>Lab #1 assigned – conglomerate fabrics</i>	Boggs, Ch. 1 Boggs, Ch. 2 Farrell et al., 2012
Wed/Aug. 31	Physical and biogenic sedimentary structures	Boggs, Ch. 3
Mon/Sept. 5	NO CLASS – LABOR DAY	
Wed/Sept. 7	Sed 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>	Boggs, Ch.6
Thurs/Sept. 8	Required class field trip 9am-5pm	
Mon/Sept. 12	Siliciclastic sandstones, continued Go over Lab #1.	
Wed/Sept. 14	Review of optical mineralogy <i>Lab #2 due at beginning of class.</i> <i>Lab #3 assigned - Siliciclastic sandstone compositions</i>	
Mon/Sept. 19	Siliciclastic sandstone compositions	

	Go over Lab #2.	
Thurs/Sept. 22	Required class field trip 9am-5pm	
Wed/Sept. 21	Diagenesis of siliciclastic sandstones Lab #3 due at beginning of class. Lab #4 assigned – Siliciclastic sandstone diagenesis	Boggs, Ch.4, 5, & 8
Mon/Sept. 26	Diagenesis of siliciclastic sandstones, continued Go over Lab #3.	
Wed/Sept. 28	Chemical sedimentary rocks Lab #4 due Lab #5 assigned – chemical sedimentary rocks	
Mon/Oct 3	Chemical sedimentary rocks Go over Lab #4.	Boggs, Ch.9Oct
Wed/Oct 5	Chemical sedimentary rocks, cont. Lab #5 due Lab #6 assigned – Mudrocks I	
Mon/Oct 10	Mudrocks I Go over Lab #5.	
Wed/Oct 12	Mudrocks II Lab #6 due Lab #7 assigned – Mudrocks II	
Mon/Oct 17	Mudrocks III Go over Lab #6.	
Wed/Oct 19	Limestones I Lab #7 due Lab #8 assigned – Dolomites	Boggs, Ch.13&14
Mon/Oct 24	Limestones II Go over Lab #7	
Wed/Oct 26	Dolomites Lab #8 due	
Mon/Oct 31	Mixed compositions I Go over Lab #8	
Wed/Nov 2	MIDTERM EXAM - through dolomites	Boggs, Ch.7&9
Mon/Nov 7	Go over Midterm exam Lab #9 assigned – Mixed compositions	
Wed/Nov 9	Guest lecture TBA	
Mon/Nov 14	Mixed compositions II	Boggs, Ch. 10
Wed/Nov 16	Mixed compositions III Lab #9 due – Mixed compositions	
Mon/Nov21	Mixed compositions IV Go over lab #9.	
Wed/Nov 23	NO CLASS – THANKSGIVING HOLIDAY	
Mon/Nov 28	Mixed compositions V	
Wed/Nov 30	Review of course material	Boggs, Ch.11
Mon/ Dec 5	Final student presentations	
Wed/Dec 7	Final student presentations	Boggs, Ch.12
Tues/Dec 20	FINAL EXAM; Tuesday, Dec. 20, 8:00-10:00am	

Field Trip:

We will undertake two one-day field trips from Missoula on Thursday, September 8 and Thursday, September 22. Both days we will leave at 9am and return to campus no later than 5pm. Both field trips are required.

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 nine 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) 9 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:

Most of the reading for this class will come from the book *Petrology of Sedimentary Rocks* by Sam Boggs, Jr. This is an excellent guide to the composition and diagenesis of sedimentary rocks. I recommend you keep it at the end of the semester and make it part of your permanent library. In addition, some supplemental reading will be assigned as reading and other reference material will be available via the course web site throughout the semester.

Course Web Site:

Please be aware that all of the course content will be posted on moodle. Generally, I will post materials for each lecture about 24 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