Fall 9-1-2020

GEO 443.01: Principles of Sedimentary Petrology

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Geosciences 443 – Sedimentary Petrology
Autumn, 2020
CHCB 348

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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 intepretation of allochemical and orthochemical constituents of non-clastic sedimentary rocks using standard petrography; 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.

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

Day/Date	Lecture/lab topic	Assigned Reading
Wed/Aug. 19	Course introduction Sediment types and origins – overview Sedimentary basins - overview ***Lab #1 assigned – review of basic sedimentary rocks types***	Boggs, ed.2, Ch. 1 and Ch. 5
Mon/Aug. 24	Sediment textures	Boggs, ed. 2, Ch. 2
Wed/Aug 26	Physical and biogenic sedimentary structures	
Mon/Aug 31	Intro to conglomerates	Boggs, ed. 2, Ch. 3
Wed/Sept. 2	Basics of petrographic microscopy (review) Intro to siliciclastic sandstones ***Lab #1 due at beginning of class*** ***Lab #2 assigned - Siliciclastic sandstones1***	
Mon/Sept 7	**NO CLASS – Labor Day Holiday**	
Wed/Sept 9	Go over Lab #1. Siliciclastic sandstone compositions*, cont.*	Boggs, ed. 2, Ch. 7
Fri/Sept 11	Drive to Dillon for field trip	
Sat/Sept 12	Dillon field work	
Sun/Sept 13	Dillon field work; return to Missoula by 5pm	
Mon/Sept. 14	Diagenesis of siliciclastic sandstones	Boggs, ed. 2, Ch. 8
Wed/Sept 16	***Lab #2 due at beginning of class*** ***Lab #3 assigned – Siliciclastic sandstones 2***	
Mon/Sept 21	Diagenesis of sandstones, cont.	
Wed/Sept 23	Go over Lab #2. Chemical sedimentary rocks	

Mon/Sept 28	Chemical sedimentary rocks, cont.	
Wed/Sept 30	***Lab #3 due at beginning of class*** ***Lab #4 assigned – Chemical sedimentary rocks***	
Mon/Oct 5	Chemical sedimentary rock	
Wed/Oct 7	Chemical sedimentary rocks, cont.	
Mon/Oct 12	Intro to X-Ray Diffraction Go over lab #3	Boggs, ed. 2, Ch. 6
Wed/Oct 14	***Lab #4 due at beginning of class*** ***Lab #5 assigned – Introduction to XRD*** Carbonaceous sedimentary rocks	
Mon/Oct 19	Go over lab #4. Intro to SEM-EDS	Boggs, ed. 2, Ch. 13
Wed/Oct 21	***MIDTERM EXAM – through Chemical Sed Rocks***	Boggs, ed. 2, Ch. 9 and 10
Mon/Oct 26	***Lab #5 due at beginning of class*** ***Lab #6 assigned – Carbonates*** Go over Midterm exam. Intro to carbonates SEM-EDS sessions with individual students all week	Boggs, ed. 2, Ch. 11
Wed/Oct 28	Go over Lab #5; Carbonate diagenesis SEM-EDS sessions with individual students all week	
Mon/Nov 2	**Remote Class;** Intro to Mudstones	
Wed/Nov 4	**Remote Class;** Mudstones, cont.	
Mon/Nov 9	**Lab #6 due at beginning of class** Mixed compositions – Montana stratigraphy	TBA
Wed/Nov 11	**NO CLASS – Veterans Day Holiday**	
Mon/Nov 16	Go over lab #6; Student research project presentations	
Wed/Nov 18	Student research project presentations	TBA
Tues/Nov 24	Final exam – 1:10-3:10pm	

Field Trip: This course has one required weekend-long trip Sept. 11-13. We will leave Missoula at 5pm on Friday, September 11 and we will return to Missoula by 5pm on Sunday, September 13. The field trip will be to the Dillon area.

Class Projects:

In addition to six 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:

Final grades for this course will be based on the following: 1) 6 individual laboratory assignments (~55% of final grade); a midterm exam (~15% of final grade); your term research project (~15% 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:
Most of the reading for this class will be from Sam Boggs 'Petrology of Sedimentary Rocks' second edition which is posted on the moodle class web site. Other readings may be assigned throughout the semester in addition to Boggs.

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.

STUDENT CONDUCT CODE: Please be familiar with the UM Student Conduct Code. The Student Conduct Code can be found on the Vice President for Student Affairs website: https://www.umt.edu/student-affairs/community-standards/default.php

Course Accommodations (DSS): Students with disabilities will receive reasonable accommodations in this course. To request course modifications, please contact me as soon as possible. I will work with Disability Services in the accommodation process. For more information, visit the Disability Services website (https://www.umt.edu/dss/) or call 406.243.2243 (Voice/Text).

Covid-19 mitigation during class activities:

1) Mask use is required within the classroom. View UM's face covering policy.

2) Each student is provided with a Healthy Griz kit. We expect students to clean their personal work space when they arrive for class, and before they leave the classroom.

3) Refill stations for cleaning supplies/hand sanitizer will be set up around campus - please learn where they are and use them.

4) Classrooms may have one-way entrances / exits to minimize crowding.

5) Students are discouraged from congregating outside the classroom before and after class.

6) Instructors should assign seating to ensure social distancing and take attendance to support contact tracing efforts.

7) Instructors should not allow more students in their classrooms at any time, for any reason, than the maximum approved capacity.

8) Additional seating should not be added to classrooms.

9) Drinking liquids and eating food (which requires mask removal) is strongly discouraged within the classroom.

10) Stay home and contact the Curry Health Center at (406) 243-4330 if you feel sick and/or if exhibiting COVID-19 symptoms.

11) If you are diagnosed with COVID-19, follow instructions for quarantine and contact your advisor so they can help you stay on track academically.

12) Students, please remain vigilant outside the classroom and help mitigate the spread of COVID-19.