Spring 2-1-2022

GEO 309.01: Sedimentation and Stratigraphy

Marc S. Hendrix
University of Montana, Missoula, marc.hendrix@umontana.edu

Syllabus – GEO 309 – Sedimentation and Stratigraphy – Spring Semester 2022 – 4 credits

Lecture: Tuesday and Thursday 10:00 to 11:50 AM; ISB 110

Professor: Marc S. Hendrix: Office hours are from 1:00 to 2:00 PM on Wednesdays; other times by appointment. CHCB # 363; cell phone is 406-544-0780; marc.hendrix@umontana.edu

Text: Sedimentology and Stratigraphy, 2nd edition, Gary Nichols, Wiley-Blackwell press. Available in e-book configuration (kindle) via Amazon.

I chose this text because it provides a well-written, easy-to-read introduction to the topics covered in this class. The lectures will involve my amplifications and illustrations of many of the concepts described in the book. Please do your best to read each chapter ahead of the corresponding class lecture date. Additional course reading will be assigned on an ad hoc basis.

Course Outcomes: This course will provide you with a basic working knowledge of sedimentary rocks and the physical and chemical processes responsible for their deposition and subsequent diagenesis. The course also will provide a working knowledge of stratigraphic principles, correlation methods, and paleo-environmental reconstruction, in addition to an introduction into sedimentary basin analysis. These outcomes are achieved through class room lectures, a series of laboratory exercises and/or problem sets, and a field exercise.

Class Format: Many ideas and materials will be presented in lectures that are not covered in the course text. You are accountable for all ideas and materials covered in the text as well as those presented in lecture.

Moodle Course Supplement: Class announcements, lecture slides, labs, exams, etc., will be posted on Moodle.

Course Schedule:

Week 1:			
	Tuesday, Jan. 18	Introduction	Nichols, Chapter 1
	Thursday, Jan. 20	Terrigenous clastics	Nichols, Chapter 2
		Lab 1 assigned – sedimentary rock types	
Week 2:			
	Tuesday, Jan. 25	Biogenic, chemical, and volcaniclastic sediments	Nichols, Chapter 3
	Thursday, Jan. 27	continued	
Week 3:			
	Tuesday, Feb. 1	Sediment transport	Nichols, Chapter 4
		Lab 1 due at class time	
	Thursday, Feb. 3	Field Sedimentology	Nichols, Chapter 5
		Lab 2 assigned – paleocurrent analysis	
Week 4:			
	Tuesday, Feb. 8	*Review Lab 1*	
		Continental Erosion	Nichols, Chapter 6
	Thursday, Feb. 10	Glacial Environments	Nichols, Chapter 7
Week 5:			
	Tuesday, Feb. 15	(A)eolian Environments	Nichols, Chapter 8
		Lab 2 due at class time	

Thursday, Feb. 17	Alluvial fans and Rivers	Nichols, Chapter 9
	Lab 3 assigned – Renova core exercise	

Midterm 1 - all content from beginning of class through Continental Erosion (Feb. 8 lecture)

Exam will be released Thursday, Feb 17 at noon and will be due at 11:59pm Monday, Feb. 21.

Week 6:		
Tuesday, Feb. 22	*Review Lab 2*	
	Review Midterm 1	
	Lakes	Nichols, Chapter 10
Thursday, Feb. 24	The Marine Realm	Nichols, Chapter 11
Week 7:		
Tuesday, Mar. 1	Deltas	Nichols, Chapter 12
	Lab 3A due at class time	
Thursday, Mar. 3	Clastic Coasts and Estuaries	Nichols, Chapter 13
Week 8:		
Tuesday, Mar. 8	*Review Lab 3*	
	Carbonates and Evaporites	Nichols, Chapter 14
Thursday, Mar. 10	Carbonates and Evaporites, cont.	
Week 9:		
Tuesday, Mar. 15	Deep Marine sedimentation	*Nichols, Chapter 15*
	Lab 4A assigned – lower Eagle core exercise	
Thursday, Mar. 17	Volcanic dynamics and deposits	Nichols, Chapter 16
Week 10:		
Tuesday, Mar. 22	***Spring Break - NO CLASS***	
Thursday, Mar. 24	**Spring Break - *NO CLASS***	
Week 11:		
Tuesday, Mar. 29	Sedimentary Diagenesis	Nichols, Chapter 17
	Lab 4A due	
	Lab 4B assigned – upper Eagle core exercise	
Thursday, Mar. 31	Sedimentary Diagenesis, cont.	

Midterm 2 - all content from beginning of class through volcanic dynamics and deposits (Mar. 17 lecture); emphasis on content from Weeks 4-9 (sedimentary environments).

Exam will be released Thursday, March 31 at noon and will be due at 11:59pm Monday, April 4.

Week 12:		
Tuesday, Apr. 5	Lithostratigraphy	Nichols, Chapter 18
Thursday, Apr. 7	Biostratigraphy	Nichols, Chapter 19
	Lab 4B due at class time	
Week 13:		
Tuesday, Apr. 12		
	Review Lab 4	
Thursday, Apr. 14	Dating and Correlation, cont.	Nichols, Chapter 20
	Lab 5 – Eagle field exercise assigned	

Friday, April 15	leave for Billings	
Saturday, April 16	Billings area field work	
Sunday, April 17	return to Missoula	
Week 14:		
Tuesday, Apr. 19	Subsurface Stratigraphy	Nichols, Chapter 21
Thursday, Apr. 21	Sequence Stratigraphy **Lab 5 due**	Nichols, Chapter 22
Week 15		
Tuesday, Apr. 26	*Review Lab 5* Sequence Stratigraphy, cont.	
Thursday, Apr. 28	Sedimentary Basins	Nichols, Chapter 23
Week 16		
Tuesday, May 3	Sedimentary Basins, cont.	
Thursday, May 5	Review for final exam	
Final Exam	**Moodle: Opens Monday May 9 at 8am and closes Friday, May 13 at noon**	

Grading: There will be ***two midterm exams*** (16% each). Each of the midterms will address all course material covered to that point in the class. The ***final exam*** (30%) will be comprehensive. Exam format will be variable and may include term definitions and/matching, short answer/essay, computational questions, hand specimen identification, and analysis of photos. Failure to take any of the exams at the scheduled time will result in a grade of zero (0), unless prior arrangements are made with the professor or a signed medical excuse from the attending physician is presented to the professor.

There are four (4) on-campus ***laboratory exercises*** that will involve the analysis of rock core, thin-sections, and other materials. The labs will be reviewed/graded and count as part of your final grade (20% of total grade). All exercises must be completed in a timely manner to receive credit.

There also is a fifth lab that is an off-campus ***field exercise*** as part of a ***weekend long field trip*** to Billings, Montana. The field exercise is scheduled to start at *12 Noon* on *Friday, April 9th*. We will travel to the Billings area and will return on the evening of April 11th. Lab 5 (the field trip exercise) is due on Friday, April 23th by 5:00 PM.

If you cannot participate in the *field exercise*/*field trip* for an acceptable reason (e.g., medical issue, National Guard duty) you must discuss this with Hendrix. In lieu of your participation, a *research term paper* is required to successfully complete this course using the following guidelines: The text of the paper (not including the abstract, figures, and references) should be 10 to 12 pages in length (one and one-half spaces for text) and follow is the *Geological Society of America Bulletin* format. *Schedule an appointment with Hendrix to discuss your paper topic before January 22st*. The make-up term paper is due on the last day of classes, Friday, April 23th, by 5:00 PM.

Individual letter grades and final letter grades will be based on the following percentages: 100-90% A, 89-80% B, 79-70% C, 69-60% D, 59% and below F. Plus and minus scores will be assigned to letter grades following university guidelines.

Exam Dates: Each of the two midterm exams, and the final exam, will be given electronically via the Moodle page for GEO309. Each of the two midterms will open at 5pm Thursday and will close the

following Sunday at 11:59pm. That is, each exam will be open for over 72 hours, but you must take the exam within that period and once started you must finish the exam within 120 minutes. The final exam also will be electronic and will be open for 48 hours, from 8AM Tuesday, April 27 until Thursday, April 29 at 11:59pm.

STUDENT CONDUCT CODE: Please be familiar with the UM Student Conduct Code. The Student Conduct Code can be found here: 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 and this class

This course is being offered face-to-face with a completely on-line option for anyone who cannot or does not wish to attend the lectures and field trip in person. All sche**du**l**ed** lectures and labs will be recorded vi**a** zoom and posted on the course moodle page along with any other content (e.g., powerpoint decks). The option for those unable to attend the field trips is described above.

The field trip to Billings in mid-April will follow the protocols posted here:

UM_Covid19_Guidance_Field_Research_Projects.pdf

Here are the Covid-19 protocols for all on-campus activities associated with this class:

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.