

GEOL 311 – SEDIMENTATION & STRATIGRAPHY

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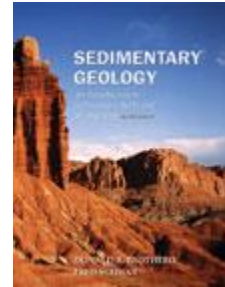
Lecture Meetings: 9:00-9:50 AM, MWF, Jepson 409

Lab Meetings: Jepson 101, 405, 409. Please note that many labs will involve outside activity. Please come prepared to get wet and/or muddy and bring a water bottle, rock hammer, hand lens, and most importantly a ☺.

Webpage: <http://users.umw.edu/~ntibert/seds/>

Course Summary: Sedimentary rocks record an intricate history of changing earth systems. This course will provide an overview of the fundamental concepts associated with sedimentary rocks deposited on the surface of the earth. Lecture topics will include theoretical sedimentology, process oriented facies analysis, and applied stratigraphy. Laboratory exercises will be field based and whenever possible, we will collect samples to analyze in the lab. The quantitative focus will be on physical sediment and sedimentary rock characterization.

Textbook: Prothero, D.R., and Schwab, F., 2004, Sedimentary Geology: An Introduction to Sedimentary Rocks and Stratigraphy, 2nd Ed.: W.H. Freeman and Company, New York, 575 p.



Readings: The textbook should be considered a standard reference for the lecture topics. Weekly readings may include current scientific articles relevant to lab and/or lecture material.

Exams: There will be 3 practical midterms during class time that will comprise the majority of the lecture grade.

Grading:	Practical Exam I	15%
	Practical Exam II	15%
	Practical Exam III	15%
	Lab Projects	50%
	Attendance/Participation	05%

Projects: Lectures and labs will comprise both theoretical discussion and hands on sedimentary analysis. Lab exercises will concentrate on the following 4 lab projects:

- Textural comparison between Rappahannock River & Potomac Beach Sediments
- Facies & Architectural Analysis of Quaternary Alluvium
- Paleoenvironmental History of Chesapeake Bay
- Petrographic Analysis of Sedimentary Rocks

Short formal reports (3-5 pages) will be required for most projects. Peer review will be incorporated into the evaluations.

GEOL 311 – SEDIMENTATION & STRATIGRAPHY LECTURE OUTLINE

UNIT A – FUNDAMENTAL CONCEPTS	READINGS	RELATED ASSIGNMENTS
<ul style="list-style-type: none"> • Introduction to Sedimentary Geology & Stratigraphy • Weathering & Soils 	<p>Chapter 1</p> <p>Chapter 2</p>	
UNIT B – SEDIMENTOLOGICAL PROCESSES & PRODUCTS		
<p>Basic Concepts</p> <ul style="list-style-type: none"> • Intro to sedimentary textures 	<p>Chaps. 3 & 5 p. 81-91</p>	<p>²Project A Textural Analysis of Potomac Beaches & Rappahannock River</p>
<p>Gravity Flows</p> <ul style="list-style-type: none"> • Bingham Plastic Flow • Alluvial fanglomerates • Slope & Rise (Turbidites) 	<p>Chaps. 4, 5, 8, 10</p>	
<p>Unidirectional Flow</p> <ul style="list-style-type: none"> • Laminar & Turbulent Flow • Bedforms & Sedimentary Structures • Fluvial, Aeolian 	<p>Chaps. 4, 5, & 8</p>	<p>¹Project B Goodloes Gravel Pit -- Paleoflow and Architectural Analyses</p>
<p>Multidirectional Flow</p> <ul style="list-style-type: none"> • Chesapeake Bay Environments • Beaches, marshes, estuaries 	<p>Chaps. 4, 5, 9</p>	
<p>Deposition From Suspension (Laminated)</p> <ul style="list-style-type: none"> • Lacustrine • Deep Sea 	<p>Chaps. 8, 10</p>	
UNIT C – STRATIGRAPHY		
<p>Lithostratigraphy</p> <ul style="list-style-type: none"> • Review of Sedimentary Facies Analysis • Mechanisms- Tectonics, Eustasy, Climate, Autogenesis 	<p>Chapter 15</p> <p>Scan Appendices</p>	<p>¹Description of sedimentary rocks in Fredricksburg</p> <p>²Project C Paleoenvironmental History Chesapeake Bay</p>
<p>Biostratigraphy & Chronostratigraphy</p>	<p>Chaps. 16, 18</p>	
<p>Stratigraphic Correlatory Techniques</p> <ul style="list-style-type: none"> • Seismic Stratigraphy • Chemostratigraphy • Cyclostratigraphy 	<p>Chapter 17</p>	
UNIT D – SEDIMENTARY PETROLOGY		
<p>Conglomerates & Sandstones</p> <ul style="list-style-type: none"> • Classification, Texture, Composition, Origin & Occurrence 	<p>Chapter 5</p>	
<p>Mudrocks</p> <ul style="list-style-type: none"> • Classification, Texture, Composition • Clay minerals 	<p>Chapter 6</p>	<p>²Project D Petrographic Analysis Sedimentary Rocks</p>
<p>Siliciclastic Diagenesis</p>	<p>Chapter 6</p>	
UNIT E – BIOCHEMICAL & CHEMICAL SEDIMENTARY ROCKS		
<p>Carbonates</p> <ul style="list-style-type: none"> • Classification, Texture, Composition • Carbonate petrography & diagenesis 	<p>Chaps. 7, 11</p>	
<p>Organic Sediments</p> <ul style="list-style-type: none"> • Peat & Coal • Petroleum 	<p>Chapter 12</p>	

GEOL 311 – SEDIMENTOLOGY AND STRATIGRAPHY LAB SCHEDULE

Date	Location	Analysis	Assign.
Aug 26	No Lab		
Sept 2	Rappahannock River Fredericksburg VA	Fluvial sediments = unidirectional flow	¹ Project A
Sept 9	Jepson 101	Grain size & Shape analysis	
Sept 16	Popes Creek Westmoreland VA	Tidal Sediments = bidirectional flow	
Sept 23	Jepson 409 & 407	Shape analysis of sediments using <i>ImageJ</i>	
Sept 30	Goodloes Gravel Pit King George VA	Facies & Architectural Analysis	² Project B
OCT 7	Cretaceous Rocks of Fredericksburg VA	Stratigraphic Field Methods	² Weekly
Oct 14	Jepson 409	Paleoflow Analysis	
Oct 21	Tappahannock VA	Marsh Coring	¹ Project C
Oct 28 –Boo!	Jepson 409	Core processing & Loss On Ignition C. Bay	
Nov 4	Jepson 409	Magnetic Susceptibility & Core Log Drafting	
Nov 11	Jepson 405	Sedimentary Petrology	¹ Project D
Nov 18	Jepson 405	Siliciclastic Rocks Point Counting Siliciclastic Rocks	
Nov 25	Thanksgiving	No Lab	
Dec 2	Jepson 409	Movie & Pizza	

¹Project will entail preparation of a formal written report (3-5 pages in length).

²Worksheet associated with lab exercise.