

Earth Sciences 2260a, Stratigraphy and Sedimentology; From Beds to Basins

Lectures: 9:30-10:30, Tuesday and Thursday

Labs: 12:30-3:30 Monday or 11:30-2:30 Thursday.

Corequisite: ES 2200A/B

“Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.”

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Syllabus and Outline:

My aim in this course is to show how Historical Geology, based on stratigraphy, lies at the very core of Geology as a science. Remember that, without the element of **TIME**, Geology is nothing more than chemistry, physics and biology! It is essential to appreciate the enormity of geological time, and to understand the different methods that are available to determine both the *relative* ages of rocks, and also their *absolute* age.

The course has three distinct parts. First we will look briefly at the origins, composition, transport and deposition of sedimentary rocks because it is necessary to know what the building blocks look like before we start to build anything with them! The second part (and this will be only the briefest of reviews) will examine how and why sedimentary basins form in the first place. Sedimentary basins will be considered in terms of plate tectonic mechanisms and plate settings. The third part will involve a brief historical review of the evolution of the concept of Geological Time and the gradual rejection of the biblical timescale in the early 1800's. We will examine various ways of dividing up packages of sedimentary rocks into manageable pieces, and at methods that are available to correlate rock successions from local to intercontinental scales.

In the labs, we will look at some of the main types of sedimentary rock, both in hand specimen and thin section. **A field trip is planned for Sunday September 28th (with the 27th Sept. as a fallback option if weather looks poor) to see ‘real stratigraphy’.** All students in the course are strongly encouraged to attend. Later, we will look at various stratigraphic problems. Much of the emphasis will be on using ‘real world’ industry data (well logs, seismic) that any practicing petroleum geologist would use every day.

**ES 2260a/b Stratigraphy & Sedimentology: from Beds to Basins:
Lecture Schedule (poss. subject to minor change)**

Lecture	Main Topics	Lab Exercises
1	Introduction; origin of clastic grains, weathering.	West Alberta - Rock I.D.
2	Terminology used to describe clastic sediments; fabric, texture, composition	
3	Origin of carbonate sediment grains, bioclastic & inorganic.	West Alberta - Facies Concepts
4	Origin of Chemical Sediments, evaporites, ironstones, organic sediments	
5	Characteristics of fluids, Fluid flow, turbulence, flow structure, Reynolds number, Froude number.	West Alberta - Correlation Principles & Environmental Synthesis
6	Transport of loose granular sediment, Hjulstrom diagram, bedform phase diagram, bedforms produced by unidirectional currents	[Field Trip - Sunday September 28th]
7	Bedforms produced by oscillatory currents	Intro to Seismic Stratigraphy
8	Sediment gravity flows, slides, slumps, debris flows	
9	Sediment gravity flows, turbidity currents & associated structures.	North Sea Rift Basin Seismic Exercise
10	Review of Earth's plate structure & plate motion; basin types;	
11	Rift basins.	Greenland - Divergent Margin Basin Seismic Exercise
12	Divergent margin basins & ocean basins	
13	Convergent margin basins, back-arc & forearc basins, foreland basins	North Italy - Foreland Basin Seismic Exercise
	Mid Term Exam, 1 hour	
14	Strike slip basins, epeiric basins, intracratonic basins	Lab Exam # 1
15	Practical Stratigraphy - methods available to modern stratigraphers; outcrop, core, cuttings, wireline logs, FMI, 2-D and 3-D seismic.	
16	Historical Geology; Evolution of idea from Herodotus to Werner	Exploration Game - Intro to Principles of Well Log Correlation.
17	Evolution of ideas; Hutton to Lyell	
18	Evolution of ideas; Darwin to the Deep-Sea Drilling Project	Exploration Game - Intro to Isopach Mapping & Drilling Strategy
19	Stratigraphy; Lithostratigraphy and terminology	
20	Allostratigraphy & Sequence Stratigraphy	Exploration Game - Developing Predictive Exploration Models & Economic Considerations.
21	Biostratigraphy	
22	Biostratigraphy	Revision & Review of Lab Exercises
23	Magnetostratigraphy	

24	Chronostratigraphy	Lab Exam # 2
25	Cyclostratigraphy	

Course Materials:

Text: Gary Nichols: *Sedimentology and Stratigraphy*. Blackwell Science. (This text also useful for 3314b and 4460a)

Evaluation

- 20% MidTerm Test (Short answers)
- 30% based on 2 lab exams
- 50% Final Exam (Essay Style)

Academic Offences:

“Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site: <http://www.uwo.ca/univsec/handbook/appeals/scholoff.pdf> .”

Absence from Exams

If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to the Dean's office as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. In the event of a missed final exam, a "Recommendation of Special Examination" form must be obtained from the Dean's Office immediately. For further information please see: <http://www.uwo.ca/univsec/handbook/appeals/medical.pdf>

Accommodation due to Illness

A student requiring academic accommodation due to illness, should use the Student Medical Certificate when visiting an off-campus medical facility or request a Records Release Form (located in the Dean's Office) for visits to Student Health Services. The form can be found here: https://studentservices.uwo.ca/secure/medical_document.pdf