

Earth Sciences 4460a. Clastic and Carbonate Facies & Environments

Instructor: Dr. A. G. Plint. Rm 1072, BGS, gplint@uwo.ca, 519-661-3179.

Lectures: Two lecture hours per week; Tuesday, Thursday, 9:30-10:30, Room: TBA

Labs: 3 laboratory hours per week; Tuesday, 2:30-5:30 BGS 1065.

Prerequisites: ES 2260a/b, ES3314a/b, or permission of the Department.

“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.”

Syllabus. The emphasis of this course will be on *sedimentary environments*, the *processes* that characterize them, and the *sedimentary rocks* that result from those processes. As with most other fields of geology, "*the present is the key to the past*", and with this in mind, I will attempt, as far as possible, to discuss ancient sedimentary environments (represented by rocks) in terms of **modern** settings and processes.

Labs. Some stratigraphic problems will be set during lab time. These will be based on subsurface information (logs, cores), and will provide an introduction to log and core interpretation, and some of the principles of Sequence Stratigraphy. At the end of the course, you will complete an exercise that further develops the principles of sequence stratigraphy and the construction of a chronostratigraphic chart. The distribution of facies and environments with respect to relative sea level changes will be discussed. Much of the scheduled lab time will be ‘free’, - allocated to preparation of a field report and two term papers.

Field Trip If at all possible (funds permitting) I will organize a field trip (probably to the Kingston area) to enable us to get some ‘hands on’ experience describing and interpreting sedimentary rocks. A brief report on this trip will be required and will constitute 20% of the course mark.

Term Papers. Two papers will be prepared during the course. These will be limited to **eight** text pages each, plus relevant illustrations, captions and references, and will involve a literature review of a variety of topics. A few key references will be given as the basis for each paper. Two of the lab slots will be used as seminar sessions, when each student will present her/his essay to the group, and be prepared to discuss and elaborate ideas. Each paper will be worth 20% of the total course mark. Papers should include a brief (200 word) but informative Abstract; and a brief list of Conclusions. References and Figures must be keyed to the text. The second paper will also involve review by your peers before submission for grading. Your efforts, both as a reviewer and as an author will be taken into account in the grading scheme. Additional details will be provided separately. Papers must be supplied as hard copy and also in pdf format for possible checking with *Turnitin* software (see ‘Academic Offenses’ below).

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Mid-Term Test. There is *no* formal mid-term test in this course.

Final Exam. The final exam will be of two hours, and will involve essay-type answers to questions spanning the entire range of topics covered in the course. Needless to say, relatively brief, clearly-discussed answers, (with due attention to spelling and grammar) are more likely to result in good marks than a random regurgitation of disconnected facts! The final exam will constitute 40% of the course mark.

Course Materials

Main Text: *Facies Models: Response to Sea Level Changes* (4th. Edition, 2010) Edited by R.W. Dalrymple and N.P. James. Geological Association of Canada. A very readable introduction to sedimentary environments and facies models. Essential reading for this course.

Recommended reading (not purchase) *Sedimentary Environments: Processes, Facies & Stratigraphy* (3rd. Edition, 1996) Edited by H.G. Reading. Blackwell Scientific Publications. ISBN 0-632-03627-3. (A very comprehensive review of all major sedimentary environments).

Evaluation

Two Term Papers (40%);
Field Trip report (20%)
Final Exam, 40%

Learning Outcomes:

Upon successful completion of this course, students should be able to:

1. Identify physical sedimentary structures in order to describe and interpret successions of clastic sedimentary rocks in terms of their depositional environment.
2. Apply prior knowledge of the biogenic components of carbonate sediments, in conjunction with knowledge of physical sedimentary structures, to analyse, describe and interpret successions of carbonate sedimentary rocks in order to deduce depositional environments.
3. Conduct practical description, illustration, analysis and interpretation of sedimentary rock successions observed in the field.
4. Review and analyse selected research papers in order to synthesize and integrate current ideas on selected topics in sedimentary geology; present the review in the style of a formal scientific paper, and also in a conference-style oral presentation.

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> .”

“All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted for such checking will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently

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between The University of Western Ontario and Turnitin.com (<http://www.turnitin.com>).”

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:

www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_illness.pdf

(which includes a link to the [Student Medical Certificate](#))

Emotional/Mental Health Distress

Students who are in emotional/mental distress should refer to Mental Health@Western

<http://www.uwo.ca/uwocom/mentalhealth/> for a complete list of options about how to obtain help.

Accessibility

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific question regarding an accommodation.

www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_disabilities.pdf

Support Services

Students who are in emotional or mental distress should refer to mental Health@Western

<http://www.uwo.ca/uwocom/mentalhealth/> for a complete list of options about how to obtain help.

Registrarial Services are available at : <http://www.registrar.uwo.ca/>, and Student Support Services are listed at <http://westernusc.ca/services/>

Religious Holidays

Please see this link for University policy on accommodation for Religious Holidays.

www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_religious.pdf

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Approximate Schedule of Classes

Week	Date	Topic	Lab Topic
1	Sept 5	No Class – Instructor leading 4450y trip	
2	10 Sept	No Class – Instructor leading 4450y trip	
	12 Sept	Introduction to course, Facies principles	
3	17 Sept	Intro to carbonate environments	Lab: Facies and time lines
	19 Sept	Peritidal carbonate environments	
4	24 Sept	Carbonate shelves and reefs	Lab: Paper # 1prep time
	26 Sept	Platform margins, slopes and deep water environments	
	Fri 27- Sun 29 Sept	Planned weekend field trip: details TBA	
5	1 Oct	Fluvial systems – braided rivers	Lab: Field Rept prep time
	3 Oct	Fluvial systems – meandering rivers	
6	8 Oct	Fluvial systems - floodplains	Field report due, 5 pm.
	10 Oct	Fluvial systems – anastomosed rivers	
7	15 Oct	Deltas: River dominated	Presentation of paper #1, 10 minute talk by each student; paper due in lab.
	17 Oct	Deltas: Wave-dominated	
8	Oct 22	Deltas: Tide-dominated	Lab: Paper #2, prep time
	Oct 24	Eolian systems	
9	Oct 29	Wave-dominated clastic shelves-coasts	Lab: Paper #2, prep time
	Oct 31	Wave-dominated clastic shelves-offshore transport	.
10	Nov 5	Fall Break	Fall Break
	Nov 7	Fall Break	
11	Nov 12	Tide-dominated coasts and shelves	# 2 Paper preparation
	Nov 14	Deep water systems - processes	
12	Nov 19	Deep-water systems – submarine fan models	Paper #2 due to reviewer.
	Nov 21	Principles of Sequence stratigraphy	
13	Nov 26	Sequence stratigraphy – Systems tracts	Presentation of paper #2; paper due in lab.
	Nov 28	Trace Fossils – Burrowing behavior (Ethology)	

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14	Dec 3	Trace Fossils – Ichnofacies concepts	
	Dec 5	Open class, course review, as necessary.	