	School of Science
Yukon University	**GEOL 206** **Sedimentology and Stratigraphy**
	Term: Fall 2024 **Number of Credits: 3**
	Course Outline

INSTRUCTOR: Dr. Chad Morgan
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OFFICE LOCATION: T1084   **OFFICE HOURS:** Drop-in and by appointment

CLASSROOM: Lectures in A2406 (Wednesdays 1:00 – 2:20 pm) & A2202 (Fridays 10:30 – 11:50 am); Labs in T1090 (Fridays 1:00 – 3:50 pm)
DATES: September 4, 2024, to December 9, 2024

COURSE DESCRIPTION

This course provides a comprehensive introduction to the fields of sedimentology and stratigraphy. Students examine the physical and chemical processes that govern sediment production, transport, and deposition in a variety of environments, and gain expertise in the identification and classification of sediments and sedimentary rocks using various classification schemes. The course also introduces different principles and methods for stratigraphic analysis and correlation. Students incorporate these methods with sedimentological data and observations to describe and interpret sedimentary facies, predict facies architecture, and resolve depositional histories. Students learn associations between tectonic settings and depositional facies, and the tectonic controls on the development of sedimentary basins are presented with a focus on basin development in Yukon and Western Canada.

COURSE REQUIREMENTS

Prerequisite(s): GEOL 105 (Physical Geology) and GEOL 106 (Historical Geology)
Corequisite(s): GEOL 200 (Mineralogy)
Prior completion of GEOL 107 (Geological Field Methods and Mapping I) is an asset.

EQUIVALENCY OR TRANSFERABILITY

Receiving institutions determine course transferability. Find further information at:
https://www.yukonu.ca/admissions/transfer-credit

LEARNING OUTCOMES

Upon successful completion of the course, students will be able to:

- analyze and characterize the physical processes responsible for sediment production, transport, deposition and lithification.

- properly classify, describe and interpret sedimentary rocks in outcrop, hand sample, and thin section; accurately measure and record stratigraphic sections in a field setting.
- identify and interpret physical and biogenic sedimentary structures.
- predict what types of sedimentary processes and depositional environments would characterize a particular tectonic setting, and what the resulting stratigraphic signature would be.
- interpret changes in a depositional environment through time (stratigraphic change) at a variety of spatial and temporal scales based on data from sedimentary rocks and successions.
- utilise different analytical methods and datasets (lithostratigraphy, chronostratigraphy, chemostratigraphy, magnetostratigraphy, etc.) to build and correlate stratigraphic sections.
- demonstrate understanding of the facies concept and be able to use facies associations and facies models to interpret depositional environments.

COURSE FORMAT

Weekly breakdown of instructional hours

This course consists of two 90-minute lectures and one three-hour lab period per week. The lecture schedule included in this course outline provides the major topics covered and roughly when those topics will be presented throughout the course. Please note that this schedule may be modified throughout the term, as some topics may not be finished within the predicted lecture time. It is expected that this course will require 3-4 hours/week of homework and additional reading. It is important to note that the time required will vary by individual.

Delivery format

Lectures for the Fall 2024 offering of this course will be delivered in-person. Lectures will be delivered in room A2406 and A2202, and the lab section will be held in room T1090 on the Ayamdigut (Whitehorse) campus. Lecture slides, laboratory instructions, and worksheets will be provided digitally on the Moodle course page.

EVALUATION

Weekly lab assignments (10)	30% (3% each)
Midterm Exam	20%
Final Exam	20%
Lecture Assignments (2)	5% (2.5% each)
Term Assignment Paper	10%
Term Assignment Peer Review	5%
Term Assignment Presentation	10%
Total	100%

Assignments

Weekly lab exercises will be due at the start of the subsequent lab section. In addition to laboratory exercises, students will participate in two in-class lecture assignments to help reinforce course concepts.

Students must complete these learning assignments and submit them at the start of the subsequent lecture.

One term assignment is included in this course and will be conducted over the duration of the semester. This assignment directs students to engage with and evaluate the geologic landscape of northwestern Canada by picking a stratigraphic unit to research and write an overview/literature review paper on. This assignment also includes students preparing and presenting a power point presentation of their findings to their peers during scheduled class/lab time, in addition to the formal written report submitted to the course instructor at the end of the term. Students will be required to submit working drafts of their term paper during the semester to allow the instructor to help guide them through the process of writing a scientific review paper. One of these drafts will be submitted for peer review by course colleagues. Students will be responsible for reading and providing suggestions and comments to a colleague on their paper draft and will receive peer feedback on their own paper as well. Peer review feedback provided by each student will be assessed and graded by the course instructor, but the rough drafts will not be graded.

Late assignments are graded based on the following scheme: a deduction of 10% per day up until a total deduction of 50% is reached, following that, assignments may be accepted by the course instructor up until the date graded assignments are returned (subject to instructor).

As this course involves research and production of scientific literature review papers (term project) it is important to note that the use of computer assisted text writers (*e.g.*, artificial intelligence software) will not be tolerated and will be considered a form of academic dishonesty. These programs often include scientifically inaccurate or imaginary material and sources (*e.g.*, A.I. hallucinations) in outputs and their use defeats the ultimate purpose of the assignment, which is to learn and apply new concepts and methods.

Examinations

This course includes two lecture examinations, a midterm and a final. The midterm exam is conducted during scheduled lecture time; the final exam is conducted within the final exam period scheduled by the Office of the Registrar. The midterm lecture exam is a 1.5-hour exam; the final exam will be conducted within a 3-hour time slot.

Missed exams will be assigned a grade of 0% unless re-scheduling for a valid reason is approved and determined in advance of the scheduled exam date. Any student who is absent from a test or exam for legitimate reasons will be eligible to write a deferred exam. Please note that excuses such as car trouble, vacation travel, oversleeping, and misreading the test schedule are not considered legitimate reasons and do not qualify the student for a deferred exam.

For missed exams, the student must contact the instructor within 48 hours of the missed exam by email. For missed final exams, students must contact the Chair of the School of Science. Any deferred exams will be scheduled by the Chair.

COURSE WITHDRAWAL INFORMATION

Refer to the YukonU website for important dates.

TEXTBOOKS & LEARNING MATERIALS

Required Textbook:

Prothero, D.R. and Schwab, F. 2014. *Sedimentary Geology: An Introduction to Sedimentary Rocks and Stratigraphy*. 3rd ed. New York, New York: MacMillan. 593 pp.

> The required textbook is available in either print or eBook format from online booksellers including MacMillan Press (https://store.macmillanlearning.com/ca/product/Sedimentary-Geology/p/1429231556), Amazon, and select online used book sellers.

Suggested Further Reading Materials (not required):

James, N.P. and Dalrymple, R.W. 2010. *Facies Models 4*. St. Johns, Newfoundland: Geological Association of Canada, 586 pp. [Physical copies are available from the Geological Association of Canada bookstore https://gac.ca/product/facies-models-4/ and a copy will be available in the Earth Science Lab-room]

Embry, A.F. 2009. *Practical Sequence Stratigraphy*. Canadian Society of Petroleum Geologists, 81 pp. [Freely available online: https://www.researchgate.net/publication/286179344_Practical_sequence_stratigraphy]

ACADEMIC INTEGRITY

Students are expected to contribute toward a positive and supportive environment and are required to conduct themselves in a responsible manner. Academic misconduct includes all forms of academic dishonesty such as cheating, plagiarism, fabrication, fraud, deceit, using the work of others without their permission, aiding other students in committing academic offences, misrepresenting academic assignments prepared by others as one's own, or any other forms of academic dishonesty including falsification of any information on any Yukon University document.

Please refer to Academic Regulations & Procedures for further details about academic standing and student rights and responsibilities.

ACCESSIBILITY AND ACADEMIC ACCOMMODATION

Yukon University is committed to providing a positive, supportive, and barrier-free academic environment for all its students. Students experiencing barriers to full participation due to a visible or hidden disability (including hearing, vision, mobility, learning disability, mental health, chronic or temporary medical condition), should contact Accessibility Services for resources or to arrange academic accommodations: access@yukonu.ca.

TOPIC OUTLINE

Week	Date	Lecture	Lecture Topics	Recommended Resources
1	Sept. 4	1	Course introduction	Ch. 1 – 2, Ch. 5 p. 81-91; Ch. 15 p. 311-315
	Sept. 6	2	Sediment production, classification, & analysis	
2	Sept. 11	3	Sedimentation: Weathering, erosion, & transport	Ch. 3
	Sept. 13	4	Sedimentary structures & trace fossils	Ch. 4
3	Sept. 18	5	Clastic sedimentary rocks	Ch. 5 – 7
	Sept. 20	6	Clastic sedimentary rocks II	
4	Sept. 22	7	Siliciclastic depositional environments	Ch. 8 – 10
	Sept. 27	8	Siliciclastic depositional environments	
5	Oct. 2	9	Carbonate sedimentary rocks	Ch. 11
	Oct. 4		*Learning Assignment #1: Palaeoflow Analysis*	
6	Oct. 9	10	Carbonate sedimentary rocks II	Ch. 11 – 12
	Oct. 11	11	Carbonate depositional environments	Ch. 12
7	Oct. 16	12	Organisation of the stratigraphic record: Lithostratigraphy, facies, & the Code	Ch. 15, Appendix A
	Oct. 18	13	Biostratigraphy & relative-age correlation	Ch. 16, Ch. 18
8	Oct. 23	14	Chronostratigraphy & Geochronology	
	Oct. 25		Midterm exam review	
9	Oct. 30		**Midterm exam** *(in class)*	
	Nov. 1	15	Chemo- & Magnetostratigraphy	Ch. 17
10	Nov. 6	16	Seismic & sequence Stratigraphy I	Ch. 17 p. 371-376, & Embry, 2009
	Nov. 8	17	Sequence stratigraphy II	
11	Nov. 13		*Reading Break (no classes or labs)*	
	Nov. 15			
12	Nov. 20	18	Tectonics & sedimentation	Ch. 19
	Nov. 22		*Learning Assignment #2: Isopach Mapping*	
13	Nov. 27	19	Basin analysis and characterisation	Ch. 19
	Nov. 29	20	Hydrocarbon resources & chemical sedimentary rocks	Ch. 13 – 14
14	Dec. 4	21	WCSB Lecture	
	Dec. 6		Final exam review (**Term assignments due**)	

*Lecture Schedule subject to change at Instructor's discretion

LABORATORY TOPIC OUTLINE

Week	Topic
2	Sediment grain size analysis
3	Sedimentary rock description and measurement: Richtofen formation, Whitehorse Trough [**field trip**]
4	Lab 3
5	Siliciclastic sedimentary rocks: Description and classification from hand samples
6	Carbonate sedimentary rocks: Description and classification from hand samples
7	Lithostratigraphic correlation and interpretation
8	Biostratigraphic correlation and interpretation: Index fossil identification and biozone definition/recognition and correlation
9	Introduction to Ichnology
10	Sequence stratigraphy: Correlation using chronostratigraphic and lithostratigraphic approaches and applying Walther's law
12	Report writing
13	Term Assignment Presentations

*Lab Schedule subject to change at Instructor's discretion