GEOL 4313 — Case Studies

COURSE OVERVIEW

This course uses case studies to teach concepts of geologic analysis on a regional scale. Published literature on the mapped lithologies, structure, petrology, geochemistry, geophysics, sedimentology, stratigraphy and/or geochronology of various regions will be used to unravel geologic history and evaluate tectonic models.
After an introductory module on plate tectonics, there will be four case studies. Each student will contribute to each case study by giving an assigned seminar presentation. A written abstract will also be required prior to each presentation.Another goal of this course is to provide instruction, practice, and guidance in making oral presentations on topics in geology. By the end of the course, you should be competent and confident in giving professional scientific presentations, a skill that will serve you well in future graduate school and employment.

The course includes **3 hours of lectures** every week.

Instructor: Dr Tobias Stephan
CB-4005
tstephan@lakeheadu.ca
Office hours: Tue 1–3 pm

Class Schedule: Lectures: Mon & Wed 5:30–7:00 pm (CB-3031)

Grading: Abstract 30 %
Seminar talk 60 %
In-Class Participation 10 %

Learning goals

- Understand fundamental concepts of plate tectonics, mantle dynamics, and intraplate tectonics
- Formulate hypotheses of plate tectonic processes
- Explain geologic history of our planet (focus on North American plate)

Skills you will develop

- Search for and cite primary sources
- Read and present research papers
- Write a scientific research abstract that summarizes the geologic history / model for a study area
- Generate testable questions with multiple working hypotheses
- Discuss arguments and hypotheses

RECOMMENDED TEXTBOOKS

Moores, E. M. and Twiss, R. J. (1995) *Tectonics*. Reissued (2014) by Waveland Press, Long Grove.

Kearey, P., Klepeis, K. A.. and Vine, F. J. (2009) *Global Tectonics*. 3nd Ed. Wiley-Blackwell.

TENTATIVE CLASS SCHEDULE

Week 1	Introduction to course
2	Overview and History of Plate Tectonics
3	Literature Research, Abstract Writing and Oral Presentations
4	*Case Study: TBA*
5	Internal Structure and Composition of Earth
6	*Case studies: Mantle Dynamics*
7	Plate motion, Geometry, and Plate margins
8	*Case studies: Active Orogens*
9	*Case studies: Pangea Assemblage*
10	*Case studies: Pangea Break-up*
11	*Case studies: Intraplate Tectonics*
12	*Case studies: Early Earth Tectonics*

CLASS PARTICIPATION

Class participation (and obviously attendance) is expected for all class and lab meetings. If you are too ill to attend class, please send me an email prior to class (if possible). Group work is common in class. Be prepared to work with different people—this is a life skill.

GRADING

You will be expected to attend all class meetings, participate in class discussions, and present well-illustrated seminars to the class as assigned. Your grade for the course will be based on your written abstract (max. 300 words) and oral presentations in class (15 min), including your ability to research, present and explain complex

material, defend your ideas with evidence, and respond to questions and counterarguments. Your contribution to class discussion of other presentations will also be considered in the final grade.

ACADEMIC INTEGRITY

Standard rules of academic integrity apply to all assignments. Namely, your work should be your own. If you solve problems with other students, please list their names and explain the nature of your collaboration. Please review the University's webpage about academic integrity incl. plagiarism.

Remember that ChatGPT and other generative AI tools will not improve your abstracts and presentations unless you are already skilled in writing and presenting. I will grade your abstracts after checking your understanding of the research during your presentations, so that a well-written but meaningless text will be graded even worse.

Last updated: December 17, 2025

Rubric for seminar talks

Presentation (12 pts)	0 pt	1 pt	2 pt	3 pt	4 pt
RESEARCH DEPTH	No evident research or understanding of the topic	Minimal research, showing little understanding of the topic. Important aspects are missing or incorrect. Few references, and some may not be relevant.	Basic research with some gaps in understanding. Covers only fundamental aspects of the topic, with limited supporting evidence or less relevant references.	Good research with a solid understanding of the topic. Covers key points but lacks some depth or detail. Most references are relevant and reasonably current.	Thorough and in-depth research. Demonstrates comprehensive understanding of the topic with a clear focus and strong supporting evidence. Includes recent and relevant references.
CONTEXT AND SYNTHESIS	No evidence of synthesis or contextual understanding.	Little to no synthesis or contextualization. Fails to connect ideas meaningfully.	Basic synthesis with limited connections or understanding of broader implications. Analysis is superficial.	Good contextualization and synthesis. Makes some connections and shows understanding but lacks originality or depth in analysis.	Excellent integration of research into a broader context. Draws insightful connections between ideas, showing critical thinking and originality. Effectively synthesizes findings.
ORAL PRESENTATION SKILL	Ineffective or incomplete oral delivery.	Presentation not practiced; student has read entire presentation. Little to no engagement.	Presentation somewhat practiced; student has read many parts of the presentation. Limited audience engagement.	Good presentation; student can communicate with very little reading of slides. Engages the audience reasonably well.	Excellent presentation skills; student can communicate without reading slides. Engaging and confident delivery.
VISUAL PRESENTATION QUALITY	No visual aids or ineffective use of visuals.	Poor visuals that detract from the presentation. Disorganized, with significant errors or distractions.	Basic visuals that communicate some ideas but lack polish or organization. May include unclear, overcrowded, or irrelevant content.	Good visuals that support the presentation. Mostly well-organized, with minor errors or areas for improvement in clarity or design.	Exceptional visuals that enhance understanding. Well-organized, professional design, with appropriate use of figures, graphs, and text. No errors or distractions.
DISCUSSION	Unable to respond meaningfully to questions or comments.	Struggles to respond effectively. Answers are unclear, off-topic, or lack accuracy and confidence.	Basic ability to answer questions but with noticeable gaps in clarity, accuracy, or confidence. Limited engagement with comments.	Good responses to most questions and comments. Shows understanding and provides mostly clear and accurate answers, though with minor gaps in depth or clarity.	Exceptional ability to respond to questions with confidence and depth. Provides clear, thoughtful, and accurate answers, demonstrating strong critical thinking. Engages with comments constructively.

The final grade for each seminar talk is $\frac{1}{6}(\text{Research depth} + \text{Context} + \text{Oral presentation} + \text{Visuals} + 2 \cdot \text{Discussion})$.