

Instructor: Dr. Alex Zagorevski (he/him/his)  
[alexandrezagorevski@CUNET.carleton.ca](mailto:alexandrezagorevski@CUNET.carleton.ca)

## ERTH 3806A: STRUCTURAL GEOLOGY – WINTER 2024

### Department of Earth Sciences

#### LAND ACKNOWLEDGMENT:

Carleton University acknowledges the location of its campus on the traditional, unceded territories of the Algonquin nation. In doing so, Carleton acknowledges it has a responsibility to the Algonquin people and a responsibility to adhere to Algonquin cultural protocols.

#### WELCOME:

Welcome to Structural Geology, the course that explores the structures of the Earth's lithosphere as well as the causes and mechanisms of their formation. My email is [alexandrezagorevski@CUNET.carleton.ca](mailto:alexandrezagorevski@CUNET.carleton.ca) - don't hesitate to email anytime with your questions. I will be available to meet with you after classes or labs, during scheduled office hours, and by appointment. This document and the Brightspace course website contain information about this course, instructor contact information and academic policies. These also contain links to a range of student-focused organizations & student support (e.g., Earth Sciences groups and activities, Health Care Resources, Ojigkwanong Indigenous Student Centre, Paul Menton Centre, Science Student Success Centre, etc.). I encourage you to take advantage of these resources. *I want you to succeed in this course and will do my best to keep you engaged and help you learn!*

**How to address me:** Alex Zagorevski (he/him/his)

**Teaching Assistant** (weekly office hours; appointments at other times are available upon request; emails will be answered):

Thereza Yogi (she/her/hers) ([TherezaYogi@cmail.carleton.ca](mailto:TherezaYogi@cmail.carleton.ca))

#### COURSE DESCRIPTION:

ERTH 3806A Structural Geology [0.5 credit]: Structures and deformational processes in a variety of crustal settings. Applications to geological engineering and mineral and petroleum exploration. Prerequisites: ERTH 2105 and ERTH 2406. Lecture two hours a week and laboratory three hours a week.

#### COURSE LEARNING OUTCOMES:

By the end of this course, you will be able to:

1. Identify and describe the physical and geometric characteristics of structures and systems of structures.
2. Carry out structural analysis and interpretation (i.e. surface and subsurface mapping; cross-section construction; orthographic projection; stereographic projection; strain analysis; kinematic analysis; determination of fault relationships with respect to

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principal stresses; and structural analysis of joints, faults, lineations & foliations, folds, and shear zones).

3. Relate forces and stresses to mechanical strength and behaviour of rocks.
4. Explain deformation mechanisms of structures and microstructures.
5. Interpret the origin and structural (or tectonic) significance of structural systems.
6. Apply structural analysis to Geoscience problems involving Earth systems, resources or hazards.
7. Distinguish observations from interpretation, apply critical thinking skills and communicate questions, ideas, data, interpretations, and conclusions pertinent to the field of structural geology.

#### **COURSE DELIVERY:**

You will need access to a computer with capability of printing figures, access to power point as well as other office programs, ability to scan or photograph hand-made drawings and a pdf file compiler. Please let me know ASAP if you don't have these capabilities or have difficulty with internet connection.

**Lecture: 14:35 - 16:25 (Tuesdays) HP 3120:** Lectures, including in-class exercises and discussions, will be held "in person", with full adherence to most current COVID or other safety protocols. Lecture slides will be available on Brightspace; however, lecture participation will not be available via videoconference, nor will lectures be recorded or posted. **Lectures start on Tuesday, January 8**

**Laboratory A1: 11:35 - 14:25 (Thursday) HP 2130:** Laboratories will be conducted "in person" in the laboratories within the Department of Earth Sciences with full adherence to COVID or other safety protocols. **Lab introductions will not be recorded or posted.**

**TA Office hours:** To be scheduled (in-person and/or by zoom)

#### **REQUIRED TEXTBOOK AND LABORATORY MANUAL (on reserve in the library):**

**Hatcher, Robert D, Jr. & Bailey, Christopher, M.** 2019. Structural Geology, 3<sup>rd</sup> edition, Oxford University Press. This is a required textbook with reading assignments worth a substantial part of your grade. Purchase book or e-book; books will be available at the Carleton bookstore or online.

**Rowland, S.M., Duebendorfer, E.M. and Gates, A.** 2021. Structural Analysis and Synthesis, A Laboratory Course in Structural Geology. Published by Wiley Blackwell. Fourth Edition (Do not acquire the 2007 3<sup>rd</sup> edition). This 2021 edition is required; readings and problems form the basis for labs throughout the term. Purchase from the bookstore, or on-line.

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### REQUIRED TOOLS:

Textbook and lab manual. Geometry set (i.e., with scales in metric and English, protractor, drawing compass); drafting and mapping tools (e.g., fine point pencils with hard 2H pencil leads, pencil sharpener, eraser, colored pencils); stereonet, graph paper, tracing paper, mineral and rock identification and classification resources, etc. You will need access to a computer with mic and video camera, capability of printing figures, access to power point as well as other office programs, ability to scan or photograph hand-made drawings and a pdf file maker.

### MARK DISTRIBUTION:

<b>Course participation</b> - reading assignment quizzes	<b>30%</b>
<b>In-class polls &amp; in-class assignments</b>	not graded
<b>Class &amp; Lab Midterm Quiz (Feb 16<sup>th</sup> in lab period)</b>	<b>15%</b>
<b>Class and Lab Final Quiz (Apr 6<sup>th</sup> in lab period)</b>	<b>15%</b>
<b>Laboratory assignments</b>	<b>40%</b>

**Note that completion of all components of the course is required to pass the course** (i.e. you must complete a majority of the reading assignment quizzes, a majority of the laboratories, the midterm quiz, and the final quiz). A total percentage of  $\geq 50\%$  for the course is required to pass the course.

**Assignments & Their Deadlines:** Check the Brightspace course page and Class Schedule for deadlines and on-line quiz instructions. Weekly **Reading Assignments** (i.e. online quizzes available on Brightspace) will be posted after lecture and available for 6 days (e.g., posted January 9 and due 11:00 pm January 15). The lowest Reading Assignment mark will be dropped and not counted towards your final mark. **Laboratory Assignments** will be due at 11:00 pm on Wednesday evenings (files are to be submitted to the Brightspace). The lowest Laboratory Assignment mark will be dropped and not counted towards your final grade.

**Late Lab Policy.** Late labs will be accepted without penalty in the instance of illness, emergencies, and in some cases, technical difficulties, etc. however, you are required to email A. Zagorevski by email prior to the assignment deadline or within 24 hours after the deadline (use a Self-Declaration Form (SDF)). Otherwise 10% per day will be deducted for each day late. Labs will not be accepted more than 6 days after their due date.

**Missed Assignments Policy:** The lowest Laboratory (one) and Reading (one) assignment marks will be dropped and not counted towards your final grade. If you miss an assignment, you will receive a 0 on that assignment, and it will be the dropped grade. SDFs for missed assessments will not be accepted because of this flexibility.

**Deferred midterm/final quiz:** SDFs for midterm/final quiz must be received prior to the quiz or within 24 hours after the quiz start time. Please note that only valid requests for deferrals will be accepted (<https://carleton.ca/secretariat/wp-content/uploads/Academic-Consideration-Policy-for->

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[Students.pdf](#)). Deferral evaluations will take place at 7:00 am HP2130 on Feb 27 (midterm quiz) and April 9 (final quiz).

In accordance with the Carleton University Undergraduate Calendar Regulations, the letter grades assigned in this course will have the following percentage equivalents:

A+ = 90-100	B+ = 77-79	C+ = 67-69	D+ = 57-59
A = 85-89	B = 73-76	C = 63-66	D = 53-56
A- = 80-84	B- = 70-72	C- = 60-62	D- = 50-52
F = <50			

WDN = Withdrawn from the course

ABS = Student absent from final exam

DEF = Deferred

FND = (Failed, no Deferred) = student could not pass even with 100% on final exam

#### **Conflicts with Course Requirements:**

If you have a conflict with course requirements, ***bring this to the attention of the instructor beforehand.***

#### **Missed Course Requirements Due to Illness:**

If a lab, assignment or exam is missed due to illness, contact A. Zagorevski no later than 24 hours after the deadline regarding a deferral. In the case of a serious illness, see the rules concerning deferral of an exam or assignment at <https://carleton.ca/registrar/specialrequests/deferral/>.

It is important to remember that COVID and other respiratory infections are still present in Ottawa. There are a number of actions you can take to lower your risk and the risk you pose to those around you including being vaccinated, wearing a mask, staying home when you're sick, washing your hands and maintaining proper respiratory and cough etiquette. Remaining COVID measure can be found at <https://students.carleton.ca/2023/05/update-on-the-remaining-covid-19-measures/>.

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**MY RESPONSIBILITIES AS A STUDENT ARE:**

- **Act with academic integrity**, which is a commitment, even in the face of adversity, to the values of honesty, trust, fairness, respect and responsibility.
- **Be equipped:** i.e., computer with camera and mic, textbook & lab manual, hand lens, scale, compass, protractor, calculator, graph and tracing paper, stereonet, fine point pencils with hard 2H pencil leads, pencil sharpener, eraser, colored pencils.
- **Email [alexandrezagorevski@cunet.carleton.ca](mailto:alexandrezagorevski@cunet.carleton.ca) or send a message right away or within 24 hrs** to advise of absences due to illness, emergencies or other difficulties.
- **Regularly check the Brightspace webpage, course outline and my Carleton emails for a synopsis of the weekly rollout including:**
  - structural themes of the week
  - office hours
  - reading assignments, laboratories and their deadlines
  - required resources and tools to have at hand for each class or lab
- **Students with accommodations via the Paul Menton Centre (PMC).** If you require accommodations, please register with the PMC and notify A. Zagorevski. Do not wait until half-way through the term or just before an exam.
- **Participate in the weekly lectures:** come to class with the resources; engage with in-class activities and the posted resources.
- **Participate in the weekly laboratories:** come to the labs with the required resources, pay attention during introduction, engage with the instructors and classmates, aim to finish the lab within the lab period
- **Complete and submit laboratory and reading assignment quizzes on time.**

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### STUDENT RESOURCES:

Science Student Success Centre (SSSC)	<a href="https://sssc.carleton.ca">https://sssc.carleton.ca</a>
Paul Menton Centre PMC)	<a href="https://carleton.ca/pmc/">https://carleton.ca/pmc/</a>
Ojigkwanong Indigenous Student Centre	<a href="https://carleton.ca/indigenous/cisce/students/ojigkwanong-indigenous-student-centre/">https://carleton.ca/indigenous/cisce/students/ojigkwanong-indigenous-student-centre/</a>
Ottawa-Carleton University SEG student chapter (Society of Economic Geology)	<a href="https://www.facebook.com/groups/1512324829077735">https://www.facebook.com/groups/1512324829077735</a>
Department of Earth Sciences Student Societies	<a href="https://earthsci.carleton.ca/current-students/student-societies">https://earthsci.carleton.ca/current-students/student-societies</a>

### 2024 WINTER TERM DATES (<https://calendar.carleton.ca/academicyear/>)

Jan 4	University reopens.
Jan 8	Winter term classes begin.
Jan 19	Last day for registration in winter term classes; last day to change courses.
Jan 31	Last day for withdrawal with full fee adjustment. Withdrawals after this date will result in a permanent notation of WDN on the official transcript.
Feb 19	Statutory holiday – University closed.
Feb 19-23	Winter break – no classes or labs.
Mar 15	Last day to submit accommodation requests to PMC for final exams.
Mar 15	Last day for academic withdrawal from winter term courses.
Apr 10	Winter term ends. Last day for term assignments. Last day of classes. Classes follow a Friday schedule.
April 13-25	Final exam period.

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## POLICIES, ACADEMIC INTEGRITY AND PLAGIARISM

**Sanctions are severe and are strictly enforced.**

**The instructor is required to report all incidents (or suspected incidents) directly to the Dean of Science.**

In the Faculty of Science, sanctions for misconduct under the Academic Integrity Policy of Carleton University will normally be applied as follows:

- A first offence will result in a grade of zero on the work(s) associated with the misconduct, and a deduction of up to three (3) grade points from the final course grade (e.g., a grade of B could be reduced to a C).
- Any subsequent offences will result in increasingly severe sanctions ranging from:
  - A final grade of F in the course.
  - Suspension from studies for up to three (3) semesters.
  - Expulsion of enrollment from the University.

Note: These sanctions are provided here as guidelines only; more severe sanctions may be applied as appropriate (e.g., in the case of cheating on an examination).

Academic Accommodations and Human Rights Concerns	<a href="https://students.carleton.ca/course-outline/">https://students.carleton.ca/course-outline/</a>
Academic Integrity and Accommodations policies	<a href="https://carleton.ca/senate/senate-policies/">https://carleton.ca/senate/senate-policies/</a>
Academic Integrity (Science)	<a href="https://science.carleton.ca/academic-integrity/">https://science.carleton.ca/academic-integrity/</a>

### **Academic misconduct**

The University has adopted a policy to deal with allegations of academic misconduct. Please review and familiarize yourselves with Carleton's Student Academic Integrity Policy:

<https://carleton.ca/senate/senate-policies/> as well as that of the Faculty of Science: <https://science.carleton.ca/academic-integrity/>. These policies are binding on all students.

### **Recording policies of video conference activities:**

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This class or portions of this class and laboratory introductions may be recorded by the instructor or TAs for educational purposes. These recordings will be shared only with students enrolled in the course via the course Brightspace page.

Unauthorized student recording is prohibited. Students requesting the use of assistive technology as an accommodation should direct such requests to the [Paul Menton Centre](#).

Unauthorized student recording of classroom or other academic activities (including advising sessions or office hours) is prohibited. Unauthorized recording is unethical and may also be a violation of University policy. Students requesting the use of assistive technology as an accommodation should contact the [Paul Menton Centre](#). Unauthorized use of classroom recordings – including distributing or posting them – is also prohibited. Under the University's [Copyright Policy](#), faculty own the copyright to instructional materials – including those resources created specifically for the purposes of instruction, such as lectures slides, lecture notes, and presentations. Students cannot copy, reproduce, display, or distribute these materials or otherwise circulate these materials without the instructor's written permission. Students who engage in unauthorized recording, unauthorized use of a recording, or unauthorized distribution of instructional materials will be referred to the appropriate University office for follow-up.

#### **Copyright of course materials**

Classroom teaching and learning activities, including lectures, discussions, presentations, etc., by both instructors and students, are copy protected and remain the intellectual property of their respective author(s). All course materials, including PowerPoint presentations, outlines, and other materials are protected by copyright and remain the intellectual property of their respective author(s).

Students registered in the course may take notes and make copies of course materials for their own educational use only. Students are not permitted to reproduce or distribute lecture notes and course materials publicly for commercial or non-commercial purposes without express written consent from the copyright holder.

#### **The Academic Integrity Policy:**

- describes those actions and behaviors which violate Carleton University's standards of academic integrity;
- defines the responsibilities of various offices and individuals in upholding the policy;
- specifies the procedures and processes to be followed when an allegation of violating these standards has been made against a student;
- specifies the sanctions that may be applied to a student who has been found to have violated these standards; and,
- describes the appeal and petition processes open to students who feel they have not been treated fairly under this policy.

All work handed in must be your own work. Plagiarism (i.e., presenting another's ideas, arguments, words or images as your own), violation of exam rules, misrepresentation of facts



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for any academic purpose, using unauthorized material, impersonation, fabricating or misrepresenting research data, disruption of academic activities, obstruction or interference of scholarly activities of another student, unauthorized co-operation or collaboration, or completing work for another student are viewed as being particularly serious, and the sanctions imposed are accordingly severe. Students who infringe the Policy may be subject to one of several penalties including: suspension from a program; withdrawal from courses; a grade of zero, a failure or a reduced grade for a piece of academic work; completion of a remediation process, etc. In particular:

- My answers to questions, exercises and assignments will be my own work.
- I will NOT share questions, answers or assignments with anyone else or post them anywhere on the internet, discussion boards, etc.
- I will NOT share course content (videos, lecture slides, or any other material) with anyone else or post them anywhere on the internet.
- I am aware of sanctions that may be used if I engage in any activity that will dishonestly improve my results in this course.

## ACADEMIC ACCOMMODATIONS

<https://students.carleton.ca/course-outline>

**Requests for Academic Accommodation:** You may need special arrangements to meet your academic obligations during the term. For an accommodation request, the processes are as follows:

### Pregnancy obligation

Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website: [carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf](https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf)

### Religious obligation

As soon as you receive your course syllabus, identify any potential conflicts between your religious obligations and course requirements. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, visit the Equity Services website: [carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf](https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf)

### Academic Accommodations for Students with Disabilities

If you have a documented disability requiring academic accommodations in this course, please contact the Paul Menton Centre for Students with Disabilities (PMC) at 613-520-6608. <https://carleton.ca/pmc/> or email [pmc@carleton.ca](mailto:pmc@carleton.ca) for a formal evaluation or contact your PMC coordinator to send your instructor your **Letter of Accommodation** at the beginning of the

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**term. Contact me (Alex Zagorevski) at least two weeks before any exams or assignments during the term to ensure that accommodation arrangements are made, and for final exams notify me and submit requests to PMC by March 15<sup>th</sup>.**

### **Survivors of Sexual Violence**

As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: [carleton.ca/sexual-violence-support](https://carleton.ca/sexual-violence-support)

### **Accommodation for Student Activities**

Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. <https://carleton.ca/senate/wp-content/uploads/Accommodation-for-Student-Activities-1.pdf>