

## **ERTH 2314 - Sedimentation and Stratigraphy**

Classes for this course will be in-person for both lectures and labs. Safety measures are explained under **In-class Teaching Lab COVID-19 Guidelines** in this document. There is a good video guide on the Earth Sciences webpage to access the lecture rooms and teaching labs for this fall ( <https://earthsci.carleton.ca/return-to-campus-2021>).

This course examines the origins, transport, and deposition of sedimentary grains, and how sediment layering reflects larger scale processes (tectonics, eustasy, and sediment supply) related to development of the Earth's surface through time. The second topic forms the basis of stratigraphy, the foundation of our understanding of geologic time, and the tool used at all scales (nano-scale to hemispheric) to predict micro- to hemispheric earth patterns (igneous, metamorphic, sedimentary).

### **Course Description:**

Origin of sediments and their transport, distribution, and primary structures; processes of sediment-to-rock transformation; spatial patterns; controls of stratigraphy; methods of correlation.

Includes: Experiential Learning Activity

Precludes additional credit for [ERTH 2318](#).

Prerequisite(s): [ERTH 1006](#) and ([ERTH 1009](#) or [GEOG 2013](#)).

Lectures three hours a week and a laboratory three hours a week.

### **Topics To be Covered (Schedule TBA):**

- Sedimentology
- Standard methods
- Sedimentary database
- Deconstructing a sedimentary section
- Siliciclastic rock classification and significance
- Carbonate/evaporite classifications and significance
- Other rocks and facies concepts - environmental criteria
- Siliciclastic facies models
- Interpretation of siliciclastic facies patterns
- Carbonate/evaporite facies models
- Dolostones a case of hydrology
- Interpreting carbonate facies patterns
- Sequence Stratigraphy developing the model and facies patterns

### **Learning Outcomes:**

**COURSE LEARNING OBJECTIVES** are intended to achieve the following

- develop **memory** of sedimentary geological concepts and attributes
- **understand** concepts
- **apply** concepts through practical demonstration
- learning to **evaluate** datasets

By the end of the semester, each successful student will acquire the following skills and knowledge sets in the lecture and laboratory sessions:

- Illustrating both understanding and capacity to examine, describe, and identify common sedimentary rocks, grain-size distributions, and sedimentary bedforms.
- Illustrating both understanding and capacity to explain, the origin of sediment, sedimentary bedforms, and stratification as products of environmental controls.
- Learning to infer temporal and lateral changes in environment through spatial juxtaposition and superposition of sedimentary facies.
- Learning to infer sea-level change as a product of tectonics, eustasy, and sediment supply from sedimentary patterns in stratigraphic successions.
- Connecting sedimentary geology to resources potential, and impact for society
- Learning and demonstrating how to communicate the above understanding and capacity in written and verbal form to peers and instructors.

### **The Instructor's expectations:**

that you will complete all necessary pre-lecture and/or pre-lab readings, assignments, tutorials that you will bring your understanding of basic geological concepts (plate tectonics, general rock type definitions, evolution, hydrology) from EARTH 1000-level courses into use to help understand 2000-level instruction that you will undertake active learning in both lecture and lab environments

### **Times and Location:**

*Lectures:* to be held in-person in Room 208 TB and delivered in-person 8:30-10:00 Tuesdays and Thursdays.

*Laboratories:* 11:30-14:30 Monday. To be held in-person in rooms 2120 HP and 2130 HP. I will ask that you stay in your registered laboratory session.

*Class Schedule:* TBA and posted on BrightSpace

**People:**

- *Instructor:* Chris Rogers
  - Office hours: TBA or by appointment
  - Email: chris.rogers@carleton.ca
  - For privacy reasons I only respond to emails sent through the Carleton University email system. *No Gmail, Hotmail etc*
- *Teaching assistants:* TBA
  - Office hours: via Zoom time TBA

**Textbooks:**

- *Mandatory Reading:* Miall, A.D. (2015) *Stratigraphy*. Springer (Switzerland)
- *Recommended Reading (Labs):* *Sedimentary Rocks in the Field: Dorrik A.V. Stow (2005) A Color Guide Paperback Gulf Professional Publishing*

**Course Resources:**

This document is available on BrightSpace as are many others relevant to the course. Frequently, visit the homepage of this course for updates with respect to the course plan. The course plan contains information on lecture and laboratory topics, reading assignments, homework, and pre-lecture as well as pre-lab preparations. Note that this course plan may alter during the term. The course website contains most of the laboratory assignments and homework, and you will have to print and read them carefully before the respective labs and lectures. Lectures and lecture notes will be made available after each lecture.

**Required Readings:**

**1. Selected readings**

The best textbook does not have an online version. Thus, readings are assigned as pre-lecture or pre-lab assignments, meaning that you need to read them before the lecture, listen to the lecture, go back over the readings to pick up on ideas / concepts that you may have missed.

**2. Laboratory Reference Manual** (from the BrightSpace website; there is no need to print this out – it may remain as online version, but you can print it out if you need to; it is 40-50 pages in length so taking it to Staples would be economical)

**Lecture/Lab resources:**

**1. Website (BrightSpace)**

The website provides access to lecture/lab schedule, lab assignments, lab reference manual. Lecture readings are defined for each week. Lecture slides are posted. All lab assignments are accessed through the website; will need to be downloaded and printed.

Review an upcoming week's lecture and lab requirements well before the lecture/lab periods so that you complete pre-lecture or pre-lab readings.

Many lab assignments are handed in at the end of a lab period (there will be timed acceptance).

## **2. Sedimentary toolkit**

Despite remote learning, you should assemble the following for the lab:

- hand lens\*
- grain-size comparator card\*
- coloured pencils,
- normal pencil, and
- a scale (in mm/cm)

*\* available from Science Stores (Steacie Building)*

### **Course requirements:**

All lectures and laboratories will be in person. You are expected to attend all lectures and laboratories, in-person. In the event of a switch to online learning lectures and labs will be held via zoom. All laboratory exercises are due at the end of the lab period and there is no opportunity to make up missed labs due to current COVID restrictions.

Please make every effort to attend the lab. Additional safety measures are explained under **In-class Teaching Lab COVID-19 Guidelines**. There is a good video guide on the Earth Sciences webpage to access the lecture rooms and teaching labs for this fall (<https://earthsci.carleton.ca/return-to-campus-2021>).

In the event we have to switch to online learning; if attending class synchronously:

- You will be required to use the Zoom platform to access lectures. Either through the web interface or the desktop app.
- Because not everyone will be able to attend lectures they will be recorded and will be posted as soon as the server processes them (up to 24hr)
- In the recording of the lecture:
- You can have your video on if you wish, that way I can see if people look confused. If bandwidth or a reliable connection is a problem, you can turn off your video during the lecture.

- Please wear headphones with a mic if possible. It cuts down on background noise when talking.
- When I start lecturing, I will mute all of your microphones to avoid background noises.
- If you want to ask a question, please type your question in the public chat box. If I need clarification, I will ask you to unmute yourself.
- Public chats can be downloaded to your computer before the end of class.
- If you don't want to ask a question in the public chat, please send me a private chat.
- There is also an option to raise your hand if you have a comment or complex question
- I may assign one random person per lecture to help moderate. That person may point out to me if people want to ask questions.

### **Missed Examinations and Assignments:**

Students with conflicts for any examination must have a note from an employer or a sports coach in order to write the exam at another date. Unless caused by illness, all conflicts MUST be reported to the instructor PRIOR to the exam date. If a lab is missed, a student may make it up the following week outside normal lab time. Because of COVID restrictions it is not possible to extend the deferral past a week. In this event alternative arrangements to make up the grade must be made. In the case of a less serious illness (cold, flu), I require that you inform me by e-mail immediately, and we will schedule a deferred exam as soon as possible. In the case of a serious illness, see <http://carleton.ca/registrar/special-requests/deferral/> for the rules concerning deferral of an exam or assignment, and contact me as soon as possible.

### **Grading:**

*Academic assessments are shown as a % of your final mark:*

#### Tests (lecture-based)

Test #1	10 %	
Test #2	15 %	
Test #3	20 %	December formal exam period

#### Tests (lab-based)

Lab exam #1	10 %	
Lab exam #2	15 %	
Laboratory assignments	15 %	due weekly
Written assignments	10 %	as defined on BrightSpace
Class participation	5%	Daily lecture attendance question*

\*In the event we switch to online learning; camera on during lectures and students must ask at least 1 question in at least one lecture

\*\*\*The lab component of the course must be passed in order to pass the course. Late labs will cannot be accepted because of current COVID restrictions.\*\*\*

**Written Assignments: (=10 % of final mark)**

Four assignments are offered to help you begin the process of learning to express your observations in writing. The first asks you to summarize why are you in the EARTH program. On the basis of different laboratory assignments, the next three help you to learn how to summarize depositional histories of stratigraphic successions based on rock types and sedimentary structures. Details of subject material for assignments #2-4 are provided in the lab one or two weeks prior to the assignment's due date.

Each assignment represents a minor component of the final grade but may be instrumental in pushing your final mark across a grade boundary.

*Purpose*

There are two roles for these assignments: the first is to get you into practice of linking observations, then drawing interpretations based on concepts learned in the lab / lecture; the second is to get you into the practice of organizing your thoughts into coherent written expression.

Format and a rubric are found on the website under Written Assignments

*Late assignments are not accepted unless medical/personal exceptions are documented according to University regulations*

**In-class Teaching Lab COVID-19 Guidelines: Department of Earth Sciences, July 22, 2021**

General Safety Measures

All members of the Carleton community are required to follow general COVID-19 prevention measures and all mandatory public health requirements, including wearing a well-fitted mask that covers the nose, mouth and chin at all times, physical distancing, hand hygiene, respiratory and cough etiquette, mandatory self-screening prior to coming to campus daily, and using the QR codes when entering/exiting a lab.

The Department will impress on all students, Teaching Assistants, and Instructors, the importance of vaccination for COVID-19. We cannot require that all Carleton Earth Sciences members are vaccinated, but we will emphasize the importance of vaccination in the protection of those at Carleton as well as family and friends off-campus.

### Crush Space Congestion

Only one lab or workshop session will be scheduled in the Department at any one time, so staggering of lab start times is not necessary. Two of our three laboratory rooms include sinks with handwashing stations, while the third laboratory room is opposite our Seryery which has a sink and handwashing station. The department will set up marked queuing stations in the hallways outside of each lab room.

Students will be instructed to arrive promptly at the beginning of lab or workshop times in order to minimize queuing outside of the lab.

### Attendance and Tracking Data

Instructors and TA's will ensure that all users (students, TA's, instructors) of teaching lab rooms will use the QR code system to register their attendance in those rooms. If the QR code system is not functioning, then the instructor/TA will take attendance.

### Lab Start and End Times

Start and End times of labs and workshops will be adjusted by five minutes to give students time to wash hands, take their seats, clean their work areas and leave the lab. For example, labs that start at 8:35AM will actually begin at 8:40AM, and labs that end at 11:25AM will actually end at 11:20AM.

### Teaching Lab Occupancy and Circulation

Occupancy limits in our teaching labs have been set in consultation with Sal Ugarte. Those occupancy maxima will be posted on lab doors.

Students will be directed from the entrance door to the handwashing stations at the back of HP 2120 and HP 2130 through floor signage. After hand washing, students will circulate clockwise to the marked sitting stations in the lab. All sitting stations will be a minimum of 2m apart. Each sitting station will have a chair designated for that station. All excess chairs will be removed from the rooms. At the end of the lab period, students will exit from their stations to their right, one row at a time from front to back, and exit through the front door on the right.

Students will maintain distancing of 2m while exiting and entering, and will always be 2m apart during the lab or workshop. If lab materials are located at the front of the lab, then the floors will be marked to indicate 2-metre distancing while students are lined up for those materials. Alternatively, lab materials will be moved to students in the room by the teaching staff.

In the case of HP 2110, students will use the Served sink and handwashing station before entering the lab.

### Inform Students About Procedures

Course syllabi will include laboratory procedures if in-person labs or workshops are part of that course. The Department will post videos on our website and on Brightspace courses demonstrating the safety protocols in all teaching laboratories.

At the beginning of every lab or workshop, the students will receive verbal instructions on how to enter and leave the lab room.

All lab or workshop materials will be set up in advance of the arrival of the students.

All shared equipment, primarily polarizing microscopes, will be cleaned by the students prior to use and after use. Each student will be using one microscope and one microscope camera during a lab or workshop session. The use of an ocular camera means students do not set their eyes on the microscope and only will touch the stage and focus knobs. The correct cleaning materials will be provided to each student. In rare cases, a student may be using a Department laptop computer that will be carefully disinfected after use.

Lab and workshop room procedures will be prominently posted in each lab room.

### High-Touch Surfaces / Shared Equipment / Shared Data

Students will be instructed on the cleaning of their lab sitting station prior to starting and after finishing their lab/workshop. Cleaning materials will be provided. We will provide videos of the correct cleaning techniques on Brightspace and in the lab sessions. Instructors will clean computer keyboards, the table, and any other touched surfaces at the front of each teaching lab.

Instructors and TA's will ensure that the teaching labs are indeed properly cleaned after each student group leaves. This includes door handles, sink faucet handles, storage cabinet handles, etc.

Cleaning procedures, especially for high-touch surfaces such as microscope focus dials, will be prominently posted in each teaching lab room.

Brightspace will be used to provide teaching materials for labs or workshops as much as possible, including all lab safety and cleaning protocols.



## Contamination Control

Students will bring all of their gear (backpack, coats, etc.) to their sitting station, but will be asked to bring a minimum of gear with them.

Cleaning supplies will be provided in each lab room, and TA's will organize their distribution to students. The supplies will be re-stocked by B. Halfkenny on a daily basis.

## Obtaining Assistance

All participants in in-person labs or workshops will be instructed on how to get assistance while in the room. A hand must be raised to signify the need for help. Students will be asked not to leave their sitting station except for using a washroom. While providing assistance, TA's and instructors will keep a maximum distance necessary from students and, if necessary, wear gloves. Some cleaning of equipment (e.g., microscope focus knobs) may be necessary after the assistance is rendered.

## Personal Protective Equipment

Earth Sciences labs or workshops do not require lab coats, safety goggles, gloves, or other PPE.

## Training

The Department will provide video training for students on COVID-19 protocols (distancing, hand washing, masks, face-touching, sneeze and cough etiquette, importance of vaccination). We will especially emphasize that students and instructors should not come to campus if they feel unwell. University COVID-19 posters will be prominently displayed, along with Department posters concerning room procedures.

Reminders of protocols, and communication of any changes to those protocols, will be conveyed by e-mail from the Department Chair as well as by instructors at the beginning of lab/workshop sessions.

## Non-Compliance

A student who does not comply with posted university or teaching lab protocols will first be addressed by the instructor and, if the behaviour continues, with Campus Safety officers.

If the behaviour repeats, then the Department Chair and Student Affairs will be informed.

## Student Illness

A student who falls ill during a lab or workshop will be asked to go home immediately and self-isolate, and to complete the Carleton COVID-19 symptom reporting web tool. If a TA, instructor, or other staff member becomes ill, then their supervisor/manger must be informed.

If the student is incapacitated, then Campus Safety (ext. 4444) must be contacted. The student should be kept at least 2m from other people in the room until help arrives.

## **Academic Integrity at Carleton**

Carleton University demands academic integrity from all its members. It is your responsibility to review Carleton's policy on Academic Integrity. The Academic Integrity Policy (<http://carleton.ca/secretariat/wp-content/uploads/Academic-Integrity-Policy.pdf>) governs the academic behaviour of students. Academic Integrity is defined as:

“A commitment even in the face of adversity to five fundamental values: honesty, trust, fairness, respect, and responsibility.” – Centre for Academic Integrity (1999)

Academic dishonesty, in whatever form, is destructive to the values of the university, and risks harming the university's reputation as place of learning and innovation. Furthermore, it is unfair and discouraging to those students who pursue their studies honestly.

Process

The Academic Integrity Policy is implemented at the faculty level across the university. Appeals of the Academic Integrity Policy are administered by the Director, Student Affairs.

Step 1: Instructor believes misconduct has occurred

Step 2: Faculty Dean reviews documentation

Step 3: Student is contacted by email and letter

Step 4: Meeting with student, Dean and Advisor

Step 5: Dean informs student of decision

Appeal: Student has the right to appeal the decision

## **Examples of Violations**

The following list includes, but is not limited to, examples of violations under the Academic Integrity policy. Please refer to the full Academic Integrity Policy (PDF) for more information.

**Plagiarism:**

The instructor is required to report all incidents (or suspected incidents) of plagiarism to the Dean. All work handed in must be your own work. The Policy is strictly enforced and is binding on all students.

Examples include:

- Submitting work written in whole or in part by someone else
- Failing to acknowledge sources through the use of proper citations when using another's work
- Test and Exam Rules:
- Attempting to read another student's exam paper
- Speaking to another student (even if subject matter is irrelevant to text)
- Using material not authorized by the examiner

**Other Violations:**

- Improper access to confidential information such as exams or test questions
- Disruption of classroom activities or periods of instruction
- Misrepresentation of facts for any academic purpose

**Examples of Sanctions**

The following list includes, but is not limited to, a few examples of sanctions that may be used independently or in combination, depending on the details of the academic integrity violation. Repeat or multiple violations will increase the sanction. Refer to the Academic Integrity Policy (PDF) for more information.

- A grade of zero, a failure or a reduced grade for the piece of academic work
- Reduction of final grade in the course
- Completion of a remediation process
- Resubmission of academic work
- Withdrawal from course(s)
- Suspension from a program of study
- A letter of reprimand

**Academic Accommodations**

Carleton University is committed to providing access to the educational experience in order to promote academic accessibility for all individuals.

Academic accommodation refers to educational practices, systems and support mechanisms designed to accommodate diversity and difference. The purpose of accommodation is to enable students to perform the essential requirements of their academic programs. At no time does academic accommodation undermine or compromise the learning objectives that are established by the academic authorities of the University.

## **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:

### **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 or [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 term. You must also contact the PMC no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, meet with your instructor as soon as possible to ensure accommodation arrangements are made. [carleton.ca/pmc](http://carleton.ca/pmc)

### **Religious 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](http://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf)  
For more information on academic accommodation, please contact the departmental administrator or visit: [students.carleton.ca/course-outline](http://students.carleton.ca/course-outline)

### **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](http://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf)  
For more information on academic accommodation, please contact the departmental administrator or visit: [students.carleton.ca/course-outline](http://students.carleton.ca/course-outline)

### **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 is 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](http://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> For more information on academic accommodation, please contact the departmental administrator or visit: [students.carleton.ca/course-outline](http://students.carleton.ca/course-outline)