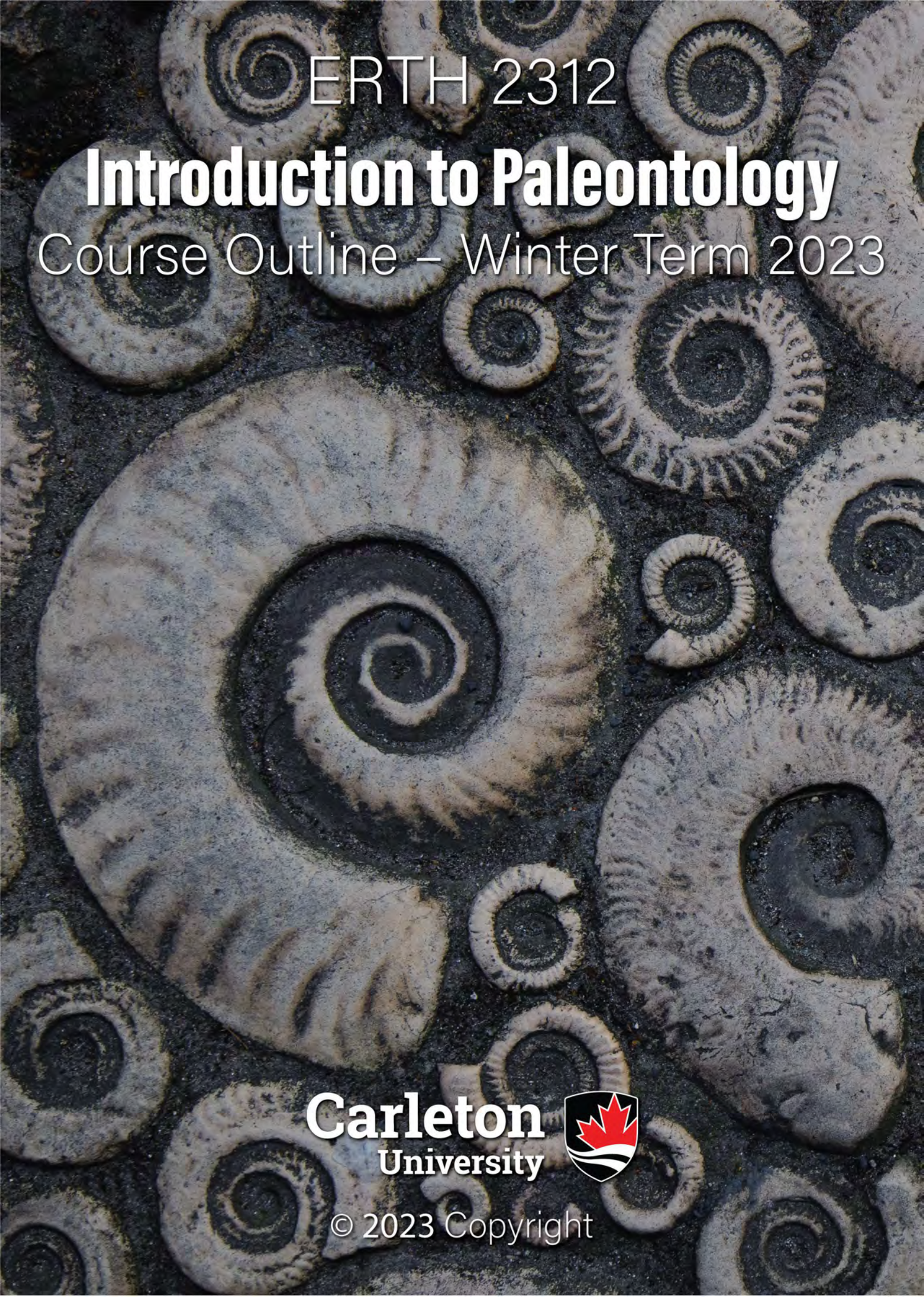


ERTH 2312

Introduction to Paleontology

Course Outline – Winter Term 2023

Carleton University

ERTH 2312: Introduction to Paleontology

Winter Term 2023

Credits	0.5	**Lecture**	Monday	4:35 – 6:25 pm	HP 3120
Modality	Fully in person	**Lab A1**	Thursday	8:35 – 11:25 am	HP 2130
Prerequisits	ERTH 1006 & ERTH 1009 or GEOG 2013	**Lab A2**	Friday	2:35 – 5:25 pm	HP 2130

About your Instructor

Dr. Nawaf A. Nasser received a B.Sc. degree in Geology from Kuwait University (minor: marine science), and M.Sc. and Ph.D. degrees in Earth Sciences from Carleton University (specilization: micropaleontology). Dr. Nasser specializes in environmental biomonitoring and reconstruction in lakes. His research is based on a framework that integrates tools and techniques from the fields of (micro)paleontology (mainly using lake testate amoebae), sedimentology, geochemistry, climate change, and geostatistics.

Office SC 240
E-mail Nawafnasser@cunet.carleton.ca (please insert "ERTH 2312" into the subject line)
Office Hours I do not keep a dedicated day and time for my office hours, but I welcome studnets to e-mail me in case they have any question(s) and/or need to schedule a meeting (in person or virtual through Zoom). Please insert "ERTH 2312 – Meeting" into the subject line of your e-mail.

About your Teaching Assistants

Conrad Wilson is a Ph.D. candidate working in Prof. Hillary Maddin's lab. His graduate research is focused on investigating Paleozoic fish ecology and evolution.

conradwilson@cmail.carleton.ca

Matthew Marshall is a Ph.D. candidate working in Prof. Tim Patterson's Lab. His graduate research is focused on reconstructing the response of northern lakes to natural and anthropogenic disturbances.

matthewmarshall3@cmail.carleton.ca

* Please insert "ERTH 2312" into the subject line of any e-mail you send to your TAs

About the Course

What comes to mind when you hear the word "Paleontology"? The word often conjures different mental images, like that of a person carefully unearthing a fossil in a distant field, an exquisite fossil collection displayed at a museum, or even someone studying microfossils under the microscope. Do you notice the common denominator in these images? It is fossils. For many people, paleontology is simply the study of fossils. While this is true in essence, paleontology is in fact much more. It is a dynamic branch of earth sciences that incorporates knowledge from multiple disciplines (e.g., geology, biology, ecology, anthropology, archeology, computer science, and statistics) to investigate the origin, evolution, and extinction of various organisms across the deep geological time. Paleontology, therefore, is nothing less than the scientific study of life on earth. In this course, students we will traverse a multitude of paleontological themes and topics (see the "Themes" section), gain competency in fundamental paleontological concepts and techniques, and develop an appreciation for the interdisciplinarity of the field of paleontology. It is my hope that by the end of this course, students will understand why paleontology is much more than just studying beautiful fossils.

Themes

In this course, we will discuss various themes and topics in paleontology, including (but not limited to):

- Paleontology and the scientifc method
- Applications of paleontology
- The vastness of the geological record
- The fossil record and its fedility
- The tree of life and the origin, evolution, diversification, and extinction of some of its branches
- Major paleontological events (diversification, trends, radiations, extinctions, mass extinctions)
- How past life, environments, ecologies, and climates are reconstructed in paleontology

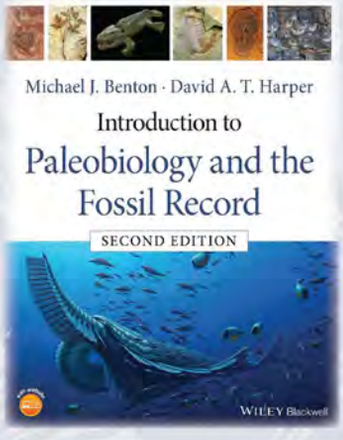
Learning Outcomes

By the end of this couse, studnets should be able to:

- **Identify:**
  - members of major macroinvertebrate groups and their fossils
  - memebrs of microfossil groups
  - (and label) diagnostic morphological features
- **Interpret:**
  - the function of key morphological features for fossil groups (macrofossils and microfossils)
  - the age of a rock and/or stratigraphic unit using fossils
  - the taphonomic history of a fossil or group of fossils
  - the depositional environment using fossils
  - the paleoecology of a given assemblage of fossils
  - several paleontological plots (biostratigraphic range charts, phylogentic charts, cladograms...etc.)
- **Understand and describe:**
  - how paleontology uses various lines of evidence to reconstruct the past
  - how analytical methods are used in paleontologists (e.g., quantative paleontology, paleontological models, morphospaces, geometric morphometrics, cladistics, taxonomy...etc.)
  - the major events across the vast geologic time (e.g., extinctions, diversifications, radiations)
- **Practice:**
  - scientific reading and writing by researching a specific paleontological topic of choice
  - Oral presentation

Textbook

Benton, M. J., & Harper, D. A. (2020). Introduction to paleobiology and the fossil record. John Wiley & Sons. (2nd edition)



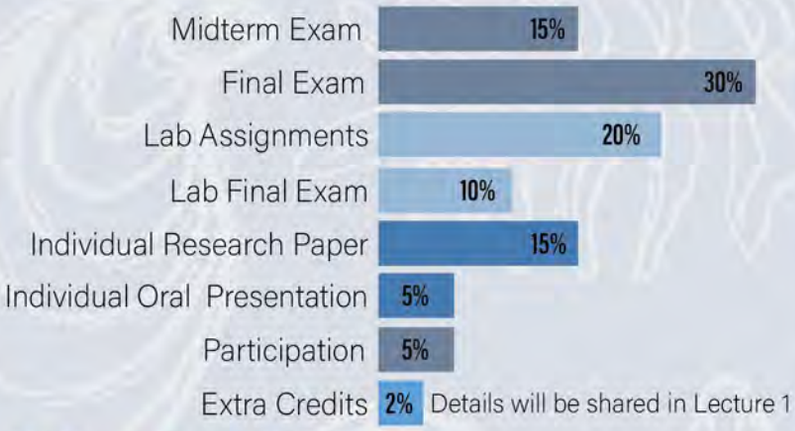
- Students can purchase the book from Amazon.ca (physical and digital formats are available). **Make sure to acquire the 2nd editon, not the 1st edition.** While the 1st edition may be available online, It is notably different in structure to the 2nd edition.
- The textbook is the primary resource for studying for the exams and completing the lab assignments.
- Other suggested readings (peer-reviewed journal articles) will be posted on Brightspace.

Lectures and Labs Schedule

The lectures (two hours/week) will include discussions of various paleontological topics and key fossil groups. Students will use the lab period (three hours/week) to work on a lab assignemnts, which are based on the concepts and/or the fossil group discussed in the lectures.

Date	Lecture Number	Lecture Topic (s)	Lab	Textbook Chapters
9 Jan 2023	1	**Welcom to the Past!** The Science of Paleontology Stratigraphy	**No Lab**	CH 1 CH 2
16 Jan 2023	2	**Detective Work** Taphonomy and The Fossil	**Taphonomy and Trace Fossils**	CH 5 CH 20
23 Jan 2023	3	**Tiny Beginings** Life's Origin, Protists, and Paleoclimate	**Micropaleontology**	CH 3 (P69 – 77) CH 9 CH 10
30 Jan 2023	No Lecture	**Midterm Exam** Covers the meterial discussed in the first three lectures	**Basics of Fossil Identification**	Midterm CH 1, 2 , 3 (P69 – 77), 5, 9, and 10
6 Feb 2023	4	**The Rise of Multicellularity** Metazoa, Sponges, and Corals	**Sponges and Corals**	CH 11 CH 12
13 Feb 2023	5	**Life Finds A Way** Evolution Speciation and Systematics	**Cladistics and Taxonomy**	CH 7
20 Feb 2023	No Lecture	**Winter Break**	**Winter Break**	
27 Feb 2023	6	**What is a Lophophore?** Bryozoa and Brachipoda Fossil Form and Function	**Bryozoa and Brachiopoda**	CH 6 CH 13
6 Mar 2023	7	**Living in a Shell** Molluska Paleogeography	**Bivalves, Gastropods, and Cephalopods**	CH 3 (P50 – 69) CH 14
13 Mar 2023	8	**Life in a suit of Armor** Arthropods Paleoecology	**Arthropods**	CH 4 CH 15
20 Mar 2023	9	**Where Spines Rule** Echinoderms Diversity and Extinction	**Echinoderms**	CH 8 CH 16
27 Mar 2023	10	**Individual Oral Presentation** Day 1	**Review Lab**	N/A
3 Apr 2023	11	**Individual Oral Presentation** Day 2	**No Lab**	N/A
10 Apr 2023	12	**Individual Oral Presentation** Day 3	**No Lab**	N/A

Course Evaluation



Midterm Exam (15%): One midterm exam (30 January 2023). Students will be tested on material from the first three lectures. Questions will include multiple choice, true/false, short answer, and an essay question (students will choose one of three questions). **Missed midterm**: Please send Dr. Nasser an e-mail as soon as possible if you miss the lecture midterm. Reschedules may be possible.

Final Exam (30%): The date, time, and place for writing the final exam will be announced at a later time. The exam is cumulative but is weighed more towards the latter part (after Lecture 3). Questions will include multiple choice, true/false, short answer, and an essay question (students will choose two of five questions). **Missed final exam**: The University's exam services handles all requests for deferred and missed final exams. Students must contact that office for any information about missing the formally scheduled final exam.

Lab Assignemnts (20%): Studnets will complete assignemnts pertaining to concepts and/or fossils groups discussed in the lectures. Assinments are to be completed indiviually and submitted at the end of the lab period.

Lab Final Exam (10%): The final lab exam will be announced at a later time. The exam is designed to test the students ability to utilize the information gained durring the course and their ability to identify fossils. Questions will be based soley on materails discussed in the labs (i.e., fossil specimens, cladistics, and taxonomy).

Participation (5%)

Quiz Cards approximately 10 – 15 minutes will be dedidacated to a quiz card activity. This activity is designed to test your understanding and attention to lecture material. Students will recieved 9 quize cards (see the examples below), one for each lecture. Durring the lecture, I will share a slide that contains a question (or two) pertaining to the lecture's contents. Studnets will be given five minutes to answer the question(s) and fill the card corresponding to the lecture. Once done, they can insert the card in a ballot box (I will bring the box with me) and a period of approximately 10 minutes of discussion will follow.

Individual Research Paper and Oral Presentation (20%)

Individual Research paper (15%): To practice scientific reading and writing, students will research a paleontological topic of interest and write a research paper on it. The topic is to be chosen in consultation with Dr. Nasser. A paper submitted without the the topic being approved will not be graded. Details pertaining to the submittion procesure and date, length, format, and structure of the paper will be posed on Brightspace at the begining of the term. A rubric detailing the expectations and grading scheme for the paper will also be available on Brightspace.

Oral presentation (5%): Students will deliver a short oral presentation (10 minutes; 8 minutes for the presentation and 2 minutes for questions) on the topic chosen for the individual research paper. Presentations will be delivered durring the last three lectures in the term. The day and time of the presentation will be assigned to each students early in the term. More details about the oral presentaion and the how it will be graded will be posed on Brightspace at the begining of the term.

Student Accomodation Process

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: http://carleton.ca/equity/wp-content/uploads/Student-Guide-to-Academic-Accommodation.pdf

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: http://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 https://carleton.ca/pmc/ or 613- 520-6608 or pmc@carleton.ca for a formal evaluation. 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-clas s scheduled test or exam requiring accommodation (if applicable). After requesting accommodation from PMC, contact and/or meet with your instructor directly as soon as possible to ensure accommodation arrangements are made.

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

Student Support

- Academic and Career Development Services: http://carleton.ca/sacds/
- Writing Services: http://www.carleton.ca/csas/writing-services/
- Peer Assisted Study Sessions (PASS): https://carleton.ca/csas/group-support/pass/
- Science Student Success Centre: https://sssc.carleton.ca/

Academic Integrity

Academic misconduct tarnish the values of trust, respect, honesty, and fairness that this course, and all other course at Carleton University, thrive to foster. Carleton University provides ample opportunities to support and preserve academic integrity by offering access to workshops. The workshops are designed to ensure that all students understand the norms and standards of academic integrity that we expect you to uphold. As an academic team (the TAs and myself), we are responsible to ensure that the Academic integrity code is honoured and followed.

Below are actions that do not adhere to Carleton's Academic Integrity Policy:

- Plagiarism
- Accessing unauthorized sites for assignments or tests
- Unauthorized collaboration on assignment and exams

Penalties for breaking the Carleton's Academic Integrity Policy: A student who has not adhered to Carleton's Academic Integrity Policy may be subject to one of several sanctions:

1. If the studnet takes full responsibility for their actions, and it is their first time violating the policy, they will receive zero on the assessment. If you are found to have violated the policy but do not take responsibility, an additional grade deduction will be applied (e.g. an A- will become a B+)

2. Subsequent violations of the policy may result in more severe penelties (e.g., failing the course, suspension from all studies, and/or expulsion).

Process of an Academic Misconduct Investigation: The proceess can be summarized in six steps:

Step 1: The instructor believes misconduct has occurred and submits documentation to the Dean of the Faculty of Science > **Step 2:** The Dean reviews documentation and can proceed with or dismiss the allegation > **Step 3:** If sufficient evidence, the student receives an allegation statement by email. Ombuds services is copied on the email > **Step 4:** The student provides a written response to the evidence provided > **Step 5:** Either party may request a meeting between student, dean, and the ombudsperson > **Step 6:** Dean informs the student of the decision > **Appeal:** Student has the right to appeal the decision.

Additional details about this process can be found on the Faculty of Science Academic Integrity website. **Students are expected to familiarize themselves with and follow the Carleton University Student Academic Integrity Policy (**http://carleton.ca/secretariat/wpcontent/uploads/Academic-Integrity-Policy.pdf**)**. The Policy is strictly enforced and is binding on all students.