DALHOUSIE UNIVERSITY

Faculty of Science Course Syllabus
Department of Earth and Environmental Sciences

ERTH 2110: Field Methods and Geological Maps
Fall, 2025

Instructor: *Mike Young* *mike.young@dal.ca* *Office: Room 2055A LSC*

Lectures: *MWF 9:35-10:25* *Room LSC 2055*

Laboratories: *M 11:35-2:25* *Room LSC 2055*

Teaching Assistant: *Emily Theben* *emily.theben@dal.ca*

Dalhousie University is located in Mi'kma'ki, the ancestral and unceded territory of the Mi'kmaq. We are all Treaty people.

We acknowledge the histories, contributions, and legacies of the African Nova Scotian people and communities who have been here for over 400 years.

Course Description

This is intended as an introduction to field techniques and geological mapping useful to the practicing geologist, particularly those concepts essential for the accurate field description of rocks applied to the use and construction of geological maps. Digital field data collection and compilation techniques and elementary structural geology are also considered.

Course Objectives/Learning Outcomes

- Map lithologic, intrusive and fault contacts in the field,
- Measure and plot structural features (e.g. bedding, cleavage, intersection lineation) on a map from first person observations,
- Map and analyse folds in the field using cleavage-bedding relationships,
- Identify true geometry of geological bodies in the field and from map pattern,
- Use structure contours and stereonets as aids to field mapping and desktop map analysis,
- Draw a geological cross section (unbalanced) using direct field observations and from published geological maps,
- Make a geological map and cross section from field data collected during the course,
- Using the field skills and knowledge acquired through the course, write and present a report describing and analysing a geological map.

Course Materials

Required Text:

1. Field Sheets course pack for ERTH 2010/2110. Available at the bookstore at the front counter.

Optional Texts (all available as downloadable pdf's):

1. Structural Analysis & Synthesis, by Rowland, Duebendorfer, and Schiefelbein (3rd or 4th edition)
2. Bennison, George M. 2011. **An Introduction to Geological Structures & Maps (8th Edition).** Rutledge
3. Coe, Angela L. 2010. **Geological Field Techniques.** Wiley-Blackwell, 336 p.

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Supplies Required:
Compass with inclinometer, field notebook, geologic protractor, grain size scale card, clipboard, geologic hammer (all sold at the front counter or online at the university bookstore – https://bookstore.dal.ca/Catalogue/shop/school-supplies/field-equipment). See below the course schedule for a detailed description of required and optional equipment.

A computer with Google Earth Pro is recommended but not required. We will primarily use the Google Earth Web and ArcGIS Online apps which are both best on Chrome and the new Microsoft Edge browser. Safari does not support WebGL so Mac users should install and use Chrome. Computer labs are readily accessible across campus including in the department down the hall from our lab room.

Course Assessment

This is a project-based course. Many of the projects will be done with partners, or in groups, but each person will hand in their own final piece of work for most of the projects. Most projects will be graded using a rubric and will take into account not only accuracy and thoroughness of field data, but also neatness, completeness, and presentation (i.e., PROFESSIONALISM). Final grades will be calculated on the following basis:

Component	Weight (% of final grade)	Date
Weekly Labs	*30%*	***See schedule below***
York Redoubt Mapping Project	*10%*	***Thurs Oct 30th***
Midterm	*15%*	***Fri Nov 7th***
Halifax Pen. Mapping Project	*20%*	***Fri Dec 5th***
Final exam (3 hours)	*25%*	*(Scheduled by Registrar)*

Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

A+ (90-100)	B+ (77-79)	C+ (65-69)	D	(50-54)
A (85-89)	B (73-76)	C (60-64)	F	(<50)
A- (80-84)	B- (70-72)	C- (55-59)		

DEADLINES AND MISSED COURSE TIME
We work hard to make the grading in this course fair. In the professional world, "there are no finished products, there are only deadlines." So, we require everyone to turn in their reports at the imposed time.

Students are paired for most of their projects. It is expected that each student will contribute equally to the field work and maps/reports due for each project. It is very difficult to make up a missed day in the field. Obviously, if you have a serious medical problem, a contagious illness, or another emergency, do not come, but realize that you will most likely not be able to complete the project.

Labs and weekly field trip reports will generally be due on Thursday afternoons following the lab period or field trip. Late submissions of labs, reports or projects will lose 10% of their value each day they are late and will not be accepted after submissions are graded and returned.

IN THE FIELD
Arrive on time for field trips. Gather on the lawn outside the Earth Sciences entrance to the LSC. Sturdy water-resistant field boots are a must; don't rely on sneakers. Dress for the weather. Layers are best, which will allow you to adapt to

changing conditions. Don't forget a hat and gloves. Keep a rain jacket or poncho in your day pack. Carry a bottle of water and a lunch to see you through. Sun protection is a good idea, and insect repellent can be helpful.

Course Content

Please note: This course is often weather dependent! We will not be deterred by light rain or cold temperatures. However, we may have to rearrange the schedule due to heavy rain or snow-covered rocks. We will hope for sunny, warm Thursdays, but will deal with whatever comes!

Week	***Topic***	***Lab/Field Trip***
Sept 22	Syllabus, Rock & Mineral Review, Compass & Notebook Review	
Sept 29	Base maps and introduction to geological field techniques, geological timescale	Lab 1: Introduction to maps – scale, legend, topographic profiles **Field Trip #1 – Sun Oct 5**: Rainbow Haven – intro to measuring geological structures
Oct 6	Introduction to geological maps, cross sections, Intro to folds & bedding-cleavage-lineation relationships	Lab2: Geological map and cross section introduction **Field Trip #2 – Sat Oct 11**: Intro to Halifax Peninsula Mapping Project.
Oct 13	Structure contours & 3-point problems	No Lab: Thanksgiving **Field Trip #3 – Sat Oct 18**: York Redoubt mapping project
Oct 20	Fair copy maps Stereonets	Lab 3: Structure Contours & 3-point problems
Oct 27	Folds – terminology and map patterns	Lab 4: Stereonets
Nov 3	Fold con't	Lab 5: Folds on maps #1
Nov 10	Reading Week	
Nov 17	Fault Systems; extension, compression, wrench	Lab 6: Folds on maps #2
Nov 24	Unconformities & Stratified Sequences	Lab 7: Map Analysis 1: Bree Creek x-section
Dec 1	Igneous & Metamorphic	Lab 8: Map Analysis 2: Faults
Dec 8	Map Analysis	Mon: Map Analysis 3: crystalline rocks Wed Dec 10: compass quiz

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Course Fees:

To conduct our field work, we will be chartering a bus for most field trips.

Field equipment costs are additional. The same equipment will be used as in ERTH 3002: Introductory Field School. The required equipment includes a reference book (Field Sheets), notebook, compass, geologic protractor, grain size scale card, and a photo scale card with geologic timescale. A geologic hammer and hand lens are optional. These items are available for purchase at the bookstore.

https://bookstore.dal.ca/supplies/course-supplies/field-equipment

These are the main references and equipment we will use in the class. Hence, the textbooks are optional. And this reference material will be used in all other field-based courses.

Please ensure you have acquired all the mandatory equipment by the beginning of classes.

Geological Equipment

You can also order these items online from a variety of retailers: Amazon (amazon.ca), Deakin Equipment (deakin.com), Chaltrek (chaltrek.com), and BAP Equipment (bapequipment.com).

Field Equipment sold by the bookstore. https://bookstore.dal.ca/supplies/course-supplies/field-equipment

Required field equipment (sold at Bookstore):

1. **Compass clinometer (Suunto MC-2)**
2. **Field Notebook (red hardcover)**
3. **Pencil for writing in notebook.** *0.5mm mechanical pencils are best. But 0.7 and 0.9 are good supplements for shading when field sketching.*
4. **Field Sheets Reference Manual**
5. **Grain size card**
6. **Geologic Protractor**
7. **Vinyl Envelope**
8. **Technical pens – ultra fine tipped (0.25mm)** *eg., Pigma Micron 01(sold at Bookstore)*
9. **Clipboard (regular 8.5" x 11" size)**
10. **Pencil Crayons**

Optional field equipment:

11. **Hand Lens (Belomo)** *(will be required for ERTH 3002: Field School)*
12. **Rock Hammer** *(will be required for ERTH 3002: Field School)*
13. **Safety Glasses**
14. **Scriber with magnet**
15. **Small first aid kit**
16. **Acid bottle/dropper**

University Policies and Statements

This course is governed by the academic rules and regulations set forth in the University Calendar and by Senate

Academic Integrity

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to

demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity.
Information: https://www.dal.ca/dept/university_secretariat/academic-integrity.html

Accessibility

The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (Canada and Nova Scotia).
Information: https://www.dal.ca/campus_life/academic-support/accessibility.html

Student Code of Conduct

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution.
Code: https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

Diversity and Inclusion – Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness
Statement: http://www.dal.ca/cultureofrespect.html

Recognition of Mi'kmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit or e-mail the Indigenous Student Centre (1321 Edward St) (elders@dal.ca).
Information: https://www.dal.ca/campus_life/communities/indigenous.html

Important Dates in the Academic Year (including add/drop dates)
https://academiccalendar.dal.ca/Catalog/ViewCatalog.aspx?pageid=viewcatalog&catalogid=117&chapterid=-1&topicgroupid=31821&loaduseredits=False

University Grading Practices

https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html

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Student Resources and Support

University Policies and Programs

Important Dates in the Academic Year (including add/drop dates): http://www.dal.ca/academics/important_dates.html

Classroom Recording Protocol: https://www.dal.ca/dept/university_secretariat/policies/academic/classroom-recording-protocol.html

Dalhousie Grading Practices Policies: https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html

Grade Appeal Process: https://www.dal.ca/campus_life/academic-support/grades-and-student-records/appealing-a-grade.html

Sexualized Violence Policy: https://www.dal.ca/dept/university_secretariat/policies/health-and-safety/sexualized-violence-policy.html

Scent-Free Program: https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html

Learning and Support Resources

General Academic Support – Advising (Halifax): https://www.dal.ca/campus_life/academic-support/advising.html

General Academic Support – Advising (Truro): https://www.dal.ca/about-dal/agricultural-campus/ssc/academic-support/advising.html

Student Health & Wellness Centre: https://www.dal.ca/campus_life/health-and-wellness.html

On Track (helps you transition into university, and supports you through your first year at Dalhousie and beyond): https://www.dal.ca/campus_life/academic-support/On-track.html

Indigenous Student Centre: https://www.dal.ca/campus_life/communities/indigenous.html

Indigenous Connection: https://www.dal.ca/about-dal/indigenous-connection.html

Elders-in-Residence (The Elders in Residence program provides students with access to First Nations elders for guidance, counsel, and support. Visit the office in the Indigenous Student Centre or contact the program at elders@dal.ca or 902-494-6803: https://cdn.dal.ca/content/dam/dalhousie/pdf/academics/UG/indigenous-studies/Elder-Protocol-July2018.pdf

Black Student Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html

International Centre: https://www.dal.ca/campus_life/international-centre.html

South House Sexual and Gender Resource Centre: https://southhousehalifax.ca/about/

LGBTQ2SIA+ Collaborative: https://www.dal.ca/dept/vpei/edia/education/community-specific-spaces/LGBTQ2SIA-collaborative.html

Dalhousie Libraries: http://libraries.dal.ca/

Copyright Office: https://libraries.dal.ca/services/copyright-office.html

Dalhousie Student Advocacy Services: https://www.dsu.ca/dsas?rq=student%20advocacy

Dalhousie Ombudsperson: https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html

Human Rights and Equity Services: https://www.dal.ca/dept/hres.html

Writing Centre: https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html

Study Skills/Tutoring: http://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html

Faculty of Science Advising Support: https://www.dal.ca/faculty/science/current-students/undergrad-students/degree-planning.html

Safety

Biosafety: http://www.dal.ca/dept/safety/programs-services/biosafety.html

Chemical Safety: https://www.dal.ca/dept/safety/programs-services/chemical-safety.html

Radiation Safety: http://www.dal.ca/dept/safety/programs-services/radiation-safety.html

Laser Safety: https://www.dal.ca/dept/safety/programs-services/radiation-safety/laser-safety.html