Earth Sciences 3350Y: Advanced Field Mapping Techniques
Geology 9560: Field Structural Analysis
(May 1 to 11, 2026**)**

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Course Description

A two-week field school in a polyphase deformed metamorphic area. Emphasis will be on geological mapping techniques at multiple scales (from individual outcrops to macroscopic scales). The students will learn how to identify, measure, and document geological features at the outcrop scale and make connections between outcrops so that they produce a map on the macroscale. They are required to understand the three-dimensional structure of their map area and to reconstruct the geological history of their map area.

Pre-requisite(s): Earth Sciences 2201B and 2250Y, at least one petrology course (Earth Sciences 3313a/b, 3314a/b and 3315a/b)
Field course in May, 0.5 courses.

Recommended Readings:

Lectures posted on the course OWL site on folds, fabric, shear zone, and structural analysis.

Holcombe, R. (2017). Mapping and Structural Geology in Mineral Exploration: Where Theory Hits the Fan. Available Online from Western University Library.

Course activities: *The stages of geological fieldwork*

1. Preparation for fieldwork (**before departure**)
   - Equipment for living and fieldwork (for details, see the Logistics)
   - Base maps and/or aerial photos for mapping of suitable material, format, and scale
   - Sign appropriate forms

2. Introduction to the field area and mapping skills (large group activity, 2-3 field days)

- Visit selected areas to view the general geology and to learn field observation, documentation, and mapping skills

- Mapping exercise on a mesoscopic scale

3. Mapping and field notes (5 days)

Fieldwork consists of moving from one rock exposure to another, finding out what the rocks are, what they show, and where the contacts between mappable units are.

Recording the field observation is a mixture of the following:

- Mapping on the base map and/or aerial photo
- Describing, sketching, and photographing details of rocks
- Describing, sketching, and photographing details of contacts, structures

You should have at least 10 map stations every mapping day.

A checklist for mapping in your area:

1) Description of all rock units shown in your map area, including sketches
2) Description of contacts, faults, folds, foliations, and lineations including sketches. Note that you may have more than one generation of foliations and lineations.
3) Enough measurements (both number and distribution over the area) of each generation of structural elements for equal-area projection analysis
4) Is your map area completely covered? Are field stations reasonably distributed in the map area?

4. Writing up the final report (1 day)

Final Report Layout:

A typical report is about 12 to 15 pages (single-spaced), and it should consist of the following sections:

1) Introductory statements:

The area studied (geographically and geologically) and its boundaries.
Who did the work and when?
The base or aerial photo used, as well as the scale.
A brief statement of the geographic layout of the outcrops of different map units, their relationship to topography, degree of exposure, and general weathering condition (field sketches may be included)

2) Description of rock units

Give a description of the main rock types in the map area and a statement of how map units are defined. Describe each map unit in detail, including its mineral composition, texture, and primary structures.

3) Structures

Group structures into generations.

Explain how different generations were established by overprinting relationships. Support this with field sketches, photos, and cross-sections.
Describe these structures, generation by generation, type by type.
Present the orientation data by equal-area projection diagrams. Divide your map area into homogeneous domains if necessary.

4) Geometrical patterns and geological history

Based on your mapping as well as that of your neighbors, place the observed generations of structures in sequence.
Describe the deformation history

The report must be accompanied by the following maps:

- *a fair copy of map and related cross-sections of the area*
- *a field station map showing all the stations of your observations*
- *equal-area projections of your geometric analysis*

Marks

Field Conduct:	10%
Field Participation and Exercises:	20%
Field Notes:	25%
Final Report	45%

Accessibility Statement

Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 661-2111 x 82147 for any specific questions regarding accommodation.