This course presents essential topics in physical geology and earth sciences, including: plate tectonics and the geological cycle; identification and physical properties of rocks, soil and minerals; igneous, metamorphic and sedimentary rock formation; weathering and soil formation; structural geology and geological mapping; relative age relationships; and, near-surface geological processes and resulting landforms. The course also briefly introduces the students to the topics of earthquakes, landslides and other natural hazards and develops links to the physical properties. Prerequisite: ESSE 1012 3.0.

Topics covered in the course: The course covers the following topics:
- Introduction to physical geology and earth science: Reasoning for studying geology and earth science, earth’s interior, the plate tectonics theory, the geological cycle and surficial processes, geological time
- Minerals and rocks: crystalline structure, the silica-oxygen tetrahedron, non-silicate minerals, variations in mineral structure and composition, Bowen reaction series, physical properties of common rock forming minerals
- Igneous rocks: the rock cycle, magma formation and composition, plate tectonics and igneous activity, intrusive bodies, volcanic and extrusive rocks
- Metamorphism and metamorphic rocks: types of metamorphism, classification of metamorphic rocks, plate tectonics and metamorphism
- Weathering and erosion: mechanical and chemical weathering, factors affecting rate and type of weathering, soil horizons, factors affecting soil formation, soil erosion, soil classification
- Near-surface processes and agents of sediment transport: air, water, and ice, streams and floods, groundwater, glaciers and glaciation, deserts and wind action, waves, beaches, and coastal environment, types of landforms and their identification
- Sediments and sedimentary rocks: transportation, deposition, preservation, lithification and diagenesis, types of sedimentary rocks including, detrital, chemical, and organic sedimentary rocks, sedimentary structures, fossils, origins of oil and gas
- Structural geology: tectonic forces, geological maps and field methods, folds, geometry and interpretation, fracture in rocks, joints and faults
- Introduction to natural hazards: landslides, causes, monitoring, prediction, and prevention; earthquakes, causes, location, measurement, world distribution, prediction and forecasting; other natural hazards

Laboratory component: The course has four 3-hr lab sessions (total 12 hrs.).
Metamorphism and metamorphic rocks: types of metamorphism, classification of metamorphic rocks, plate tectonics and metamorphism

Weathering and erosion: mechanical and chemical weathering, factors affecting rate and type of weathering, soil horizons, factors affecting soil formation, soil erosion, soil classification

Near-surface processes and agents of sediment transport: air, water, and ice, streams and floods, groundwater, glaciers and glaciation, deserts and wind action, waves, beaches, and coastal environment, types of landforms and their identification

Sediments and sedimentary rocks: transportation, deposition, preservation, lithification and diagenesis, types of sedimentary rocks including, detrital, chemical, and organic sedimentary rocks, sedimentary structures, fossils, origins of oil and gas

Structural geology: tectonic forces, geological maps and field methods, folds – geometry and interpretation, fracture in rocks – joints and faults

Introduction to natural hazards: landslides – causes, monitoring, prediction, and prevention; earthquakes – causes, location, measurement, world distribution, prediction and forecasting; other natural hazards

LABORATORY SESSIONS:

Lab 1: Visual identification of rocks and minerals
Lab 2: Stereoscopic identification of landforms from aerial photographs
Lab 3: Mapping and visualization of geological units and structures
Lab 4: Interpretation of geological maps and data for plotting a geological cross-section

COURSE LEARNING OUTCOMES:

1. Explain the plate tectonic theory and its relationship to geological processes and features
2. Identify common rocks and minerals and explain their formation and physical properties
3. Identify sediments and explain their origins and formation
4. Identify landforms and explain the development of these landforms
5. Describe and interpret geological structures
6. Interpret geological and topographical maps and develop cross-sections and topographic profiles
7. Identify areas prone to landslides and earthquakes based on their knowledge of geological processes

GRADE ASSESSMENT

Assignments: 10%
Laboratory Reports: 20%
Term Tests (2 tests; 15% each): 30%
Final Examination: 40%

ACADEMIC INTEGRITY LINKS

• Senate Policy on Academic Honesty - http://secretariat-policies.info.yorku.ca/policies/academic-honesty-senate-policy-on/
• Academic Integrity - http://lassonde.yorku.ca/academic-integrity

STUDENT LINKS

• Student Rights and Responsibilities - http://oscr.students.uit.yorku.ca/student-conduct
• Religious Observance - https://w2prod.sis.yorku.ca/Apps/WebObjects/cdm.woa/wa/regobs
• Academic Accommodation for Students with Disabilities - http://secretariat-policies.info.yorku.ca/policies/academic-accommodation-for-students-with-disabilities-policy/
• Counselling and Disability Services - http://cds.info.yorku.ca/
• York University’s Policies on Sexual Violence -
  http://secretariat-policies.info.yorku.ca/policies/sexual-violence-policy-on/
• York University’s Policies on Gender/LGBTQ*/Positive Space - http://rights.info.yorku.ca/lgbtq/

LAND ACKNOWLEDGEMENT
• We acknowledge our presence on the traditional territory of many Indigenous Nations. The area known as
  Tkaronto has been care taken by the Anishinabek Nation, the Haudenosaunee Confederacy, the
  Huron-Wendat, and the Métis. It is now home to many Indigenous Peoples. We acknowledge the current
  treaty holders, the Mississaugas of the New Credit First Nation. This territory is subject of the Dish With One
  Spoon Wampum Belt Covenant, an agreement to peaceably share and care for the Great Lakes region.
• The Indigenous Framework for York University: A Guide to Action can be found here:
  http://indigenous.info.yorku.ca/
• Meaning of a land acknowledgement: http://healthydebate.ca/opinions/indigenous-land-acknowledgements

Many courses utilize Moodle, York University’s course website system. If your course is using Moodle,
click here to access it.
Moodle @ York University