NRMT/BIOL 2110 FOREST SOILS AND WATER
COURSE SYLLABUS: FALL 2024

INSTRUCTOR:	Nathan Basiliko, Professor Faculty of Natural Resources Management
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EMAIL:	nathan.basiliko@lakeheadu.ca
OFFICE HOURS:	Thursdays: 12:30-2:30 (or by appointment)
OFFICE:	Braun Building BB 1007B
LECTURES:	Friday 2:30PM - 4:30PM Braun Building BB1054
LABORATORY:	Thursday 2:30- 5:30pm Greenhouse Lab 1004 (and other locations TBA)
TEACHING ASSISTANT:	Wren Mangelli, MSc-Forestry student
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TECHNOLOGIST:	Keri Pidgen-Welyki, MSc, Greenhouse Manager, Faculty of Natural Resources Management
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COURSE DESCRIPTION: Soils play critical roles in sustaining life. They support plants and silviculture and agriculture, serve as home to a plethora of organisms, recycle organic matter and nutrients, provide materials for construction, art, and medicine, preserve paleoecological and archaeological records, regulate global climate through the exchange of greenhouse gasses, and filter contaminants in water and waste. This course introduces fundamentals of soil formation, physical, chemical and biological characteristics, and classification schemes. It explores the role of, and how humans interact with, soils particularly in Canadian forests, but also in wetlands, agricultural systems, and other settings. Soil-Water interactions are highlighted, and aspects of carbon, nutrient, and pollutant biogeochemistry in soils are also explored in detail. In the first laboratory meetings, soils will be sampled from near Lakehead and analyzed through the term in subsequent laboratory exercises. Results will be presented and interpreted in laboratory reports.

COURSE OBJECTIVES:

1) Learn fundamentals of soil formation, classification, soil-water interactions, and soil chemical, physical, and biological properties.
2) Understand the role of soils in different environments as they both influence, and are influenced by, other ecosystem processes.
3) Explore soils in Canadian ecosystems in detail (drawing on 1 and 2 above) including environmental changes (silviculture, climate change, and others) that alter soil functioning.
4) Collect, analyze, and interpret soil data from contrasting local forest ecosystems to help meet objectives 1 through 3 and to provide a primary dataset to develop scientific communication skills.

USE OF D2L: Course information and announcements, lecture slides (pdf versions), links to recorded lectures, laboratory information and exercises, and marks will be posted on the D2L system.

TEXTBOOK AND OTHER RESOURCES: The textbook for this course is ***Digging into Canadian Soils: An Introduction to Soil Science***. (2021, edited by Krzic, Walley, Diochon, Paré, and Farrell; ISBN 978-0-88880-668-0). It is an open access

open-source text published by the Canadian Society of Soil Science and is available: https://openpress.usask.ca/soilscience/front-matter/4733/ Note that the instructor is the lead author on Chapter 6 and Lakehead Earth Sciences Prof. Amanda Diochon is one of the book editors!

Additionally, the course will use ***The Canadian System of Soil Classification 3rd Edition***. Agriculture & Agri-food Canada (1998) ISBN 0-600-17404-9. Available online at: https://sis.agr.gc.ca/cansis/publications/manuals/1998-cssc-ed3/index.html

Any additional resources will be shared/available on D2L.

EVALUATION: Laboratory worksheets (10%) Laboratory reports (30%) Term test (20%) Final exam (40%)

LECTURES: Attendance is not taken, *however material presented is the primary information on which the term test and final exam will be based.*

LABORATORY ATTENDANCE AND PARTICIPATION: Laboratory attendance and participation is mandatory, and only legitimate, documented excuses will be accepted for missing lab exercises. In these cases, arrangements must be made with the TA to make up the lab or field work and worksheets. Short worksheets can be easily completed after each laboratory exercise. The worksheets are intended to make sure that students actively complete the laboratory exercises and accurately record data. Each is worth two points in the final course mark and must be submitted before leaving the laboratory session. Students must also keep a notebook with all data and notes from the laboratory exercises/sessions. These will be required for completing laboratory reports.

LABORATORY REPORTS: Laboratory reports (typically, ca. 1p typed) must be written in the outline format of a scientific journal article (with introduction, objective, methods, results, and discussion sections). There will be 4 reports (see schedule below). Specific details will follow.

MIDTERM TEST: The midterm test will be held as an open-book online D2L quiz during the on Friday October 25 lecture and will be drawn primarily from lectures. *Material from the text that is not covered in class will not be on the test*. For students with an absence due to a medical condition or other serious event who miss the term-test, the final exam will be re-weighted.

FINAL EXAM: The final exam will take place during the scheduled exam period from Dec 6 to 16 in a similar format to the midterm test (online, open-book D2L quiz). It will mainly cover lecture material from the entire term; however more emphasis will be placed on material covered after the midterm test. *Material from the textbook that is not covered in class will not be on the exam.*

COMMUNICATION AND EMAIL POLICY: You are encouraged to ask questions in class, laboratory sessions, and during office hours. If you have a course conflict with my scheduled office hours, please contact me to set up a time when we can meet. To avoid inadvertent loss through spam- filtering, all e-mails should be from a LakeheadU account, include NRMT/BIOL2011in the subject heading, and your full name in the text.

MISSED TERM WORK: Late lab reports will be subject to a penalty of 10% per day (including weekends) of the total marks for the assignment. Assignments submitted five calendar days beyond the due date will be assigned a grade of zero. Accommodation can be made when an assignment is late for legitimate University-verified reasons. There will be no re-writes or make-ups for the term test missed for university-accepted, verifiable reasons. Instead, the final exam will be re-weighted. Lab attendance and worksheets missed for university-accepted, verifiable reasons will be assigned based on reweighting of the sessions the student has attended. A student who has missed work must inform the TA and instructor as soon as possible to be considered for accommodation.

ACADEMIC INTEGRITY/HONESTY OR ACADEMIC OFFENSES: It is your responsibility as a student at Lakehead University to familiarize yourself with, and adhere to the Code of Academic Integrity that addresses issues of academic dishonesty, among others: https://www.lakeheadu.ca/faculty-and-staff/departments/services/provost-vice-president-academic/academic-integrity-plans-policies

ACCESSIBILITY: Student Accessibility Services at Lakehead provides academic accommodations and services to students who have a physical, sensory, or learning disability, mental health condition, acquired brain injury, or chronic health condition, be it visible or hidden. For more information, please visit: https://www.lakeheadu.ca/students/student-life/student-services/accessibility

COURSE SCHEDULE (SUBJECT TO CHANGE): Corresponding readings in parentheses are from the textbook Digging in to Canadian Soils: An Introduction to Soil Science, and the Canadian System of Soil Classification (CSSC), 3rd Edition

September 5-6: No class or lab meeting (NRMT Field Schools are still in session)
Laboratory (Sep 12)*:* Soil sampling on campus: leave from the NRMT Greenhouse at 2:40pm sharp for soil sampling outdoors rain or shine!
September 13: Welcome to Forest Soils and Water; The soils around us (text chapter 1); Intro to soil classification (CSSC Chapter 1)
Laboratory (Sep 19 note this meeting will be lecture content in BB1075)*:* Soil formation (text chapter 2)
September 20: No class meeting today
Laboratory (Sep 26)*:* Soil moisture content, bulk density, and structure*; Laboratory worksheet 1 due*
September 27: Physical properties of soil (text chapter 4), Soils and water (text chapter 4)
Laboratory (Oct 3)*:* Soil moisture and bulk density part II; Soil organic matter and carbon determination*; Laboratory worksheet 2 due*
October 4: Soil roles in global biogeochemical cycles of water and carbon; Soil carbon cycling and organic matter (text chapter 3)
Laboratory (Oct 10)*:* Soil organic matter determination part II; Soil solution chemistry*; Laboratory worksheet 3 due; Laboratory report 1 due*
October 11: Soil colloidal chemical properties (text chapter 5 and 14)
*October **14-18:** Fall Study Week*
Laboratory (Oct 24)*: no lab meeting today (study for the term test)*
October 25: Term test online via D2L Quizzes
Laboratory (Oct 31): Soil texture Part I; *Laboratory worksheet 4 due; Lab report 2 due*
November 1: Nutrient cycling in soils (text chapter 7)
Laboratory (Nov 7)*:* Soil texture Part II; Litter decomposition I, Soil respiration and fauna extraction (outdoors)
November 8: Soil biodiversity and ecology (text chapter 6) Soil acidification and pollution (text chapter 5 and 16;
Laboratory (Nov 14; note that most of this meeting will be lecture content)*:* Litter decomposition part II; Canadian forest soils I (portions of CSSC chapters 4, 8, 10, and text 9-13)
November 15: Canadian forest soils II (portions of CSSC chapters 4, 8, 10, and text 9-13); Canadian wetland soils (CSSC chapter 7 and 9)
Laboratory (Nov 21)*:* Integrating field and lab data across the class and final soil classification work; *Laboratory report 3 due*
November 22: Canadian prairie soils (CSSC chapter 5 and text chapter 10); More problems in soils (erosion and salinization; text chapter 15);
Laboratory (Nov 28 Note this meeting will be lecture content in BB1075): Arctic soils (CSSC chapter 6 and portions of text chapter 9 focused on permafrost affected soils); revisiting soil classification; *Laboratory report 4 due*
November 29: Tropical forest soils; course wrap-up

*********Students are responsible for knowing the content of the syllabus*********