SO340

Soil Classification and Land Forms

3 Credits

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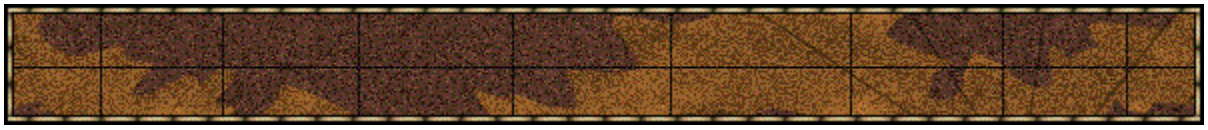

Soil Classification and Land Forms

Calendar Description

This is an in-depth study of the Canadian System of Soil Classification with emphasis on the factors affecting soil genesis and taxonomy. Topics include geology, glaciation, weathering and the chemistry and physics of Canadian soils. Extensive fieldwork focuses on methods of classifying soils and landforms, soil mapping and report preparation/use, and basic procedures in land assessment.

Rationale

This is a required course for students in Conservation and Restoration Ecology, Environmental Conservation and Reclamation, and Applied Environmental Sciences majors of the Environmental Sciences diploma. This course is also a senior level course in the Reclamation and Remediation major of the Bachelor of Applied Science Degree program in Environmental Management.

Students in these programs require extensive knowledge of soils in order to skillfully manage soil and water resources in Canada. Fundamental to this is an understanding of soil and landscape genesis, soil responses to human activities and suitability of soils for various land uses. This course provides the student with the above critical knowledge via a detailed study of soil genesis and the Canadian System of Soil Classification. Graduates of this course are aware of the wide variety in kinds and characteristics of soils as they occur in nature.

Prerequisites

SO210 or equivalent.

Co-Requisites

None

Course Learning Outcomes

Upon successful completion of this course, students will be able to

1. describe the role of soil and land classification in land use planning.

2. differentiate between and classify common landforms, parent materials, soils, and associated plant communities.
3. produce a detailed soil pedon description based on chemical, physical, and biological characteristics.
4. examine a soil pedon and classify its parent material, order, great group, and sub group using the Canadian system of soil classification and describe pertinent soil forming processes for various Canadian soils.
5. apply soil survey techniques, use, assess and analyze soil survey reports and maps.
6. describe the general characteristics of various soils and their suitability to support common land uses including agriculture, forestry, oil/gas, mining and wildlife.
7. operate workplace equipment safely.

Essential Employability Skills

Essential employability skills are critical for workplace success and lifelong learning. Lakeland College prepares its graduates for the workplace and lifelong learning by integrating and promoting essential employability skills development in its curricula. Each credit course offered at Lakeland College emphasizes one or more of the following five essential employability skills:

A. **Communication Skills** that enable individuals to listen, interpret, express, and convey knowledge and ideas so that they are received and understood.
B. **Teamwork Skills** that enable individuals to respect the thoughts and opinions of others as they work together to plan activities, meet deadlines, complete projects, and contribute to an organization's goals.
C. **Critical Thinking Skills** that enable individuals to conceptualize and analyze issues from various perspectives while rationally evaluating the strengths and limitations of each perspective and deciding what action to take.
D. **Adaptability Skills** that enable individuals to respond quickly, willingly, and positively to new conditions and changing times.
E. **Positive Attitude and Behavioural Skills** that enable individuals to be confident about themselves and to deal with people, problems, and situations with honesty, integrity, and personal ethics.

Please refer to the Knowledge/Skills Matrix of this course outline to review the essential employability skills emphasized in this course.

Resource Materials

Required Texts:

Agriculture Canada. 1998. The Canadian system of soil classification. 3rd ed. Agriculture Canada, Ottawa.

Day, J.H. (Ed.). 1983. The CanSIS manual for describing soils in the field.1982 Revised. Agriculture Canada, Ottawa.

SO340 Lecture and lab supplement (handouts), notes.

Reference Text:

Brady, N.C., and R.R Weil. 2004. Elements of the nature and properties of soils. 2nd ed.

Pearson Education Inc., Upper Saddle River, New Jersey 07458.

Conduct of Course

Total course hours are 42 hours of lecture and 28 hours of lab work. The instructor discusses this time allocation as it pertains to your timetable and expected hours of homework, etc.

The lecture is a formalized classroom situation where the instructor discusses pertinent topics and students normally take notes. Student-questions are encouraged, to clarify subject areas.

The lab component is comprised of field trips and lab exercises, where students participate in work groups at field sites. Lab exercises are designed to provide practical application of theory discussed in lectures. Weekly or alternate-weekly lab reports or assignments are required and are typically prepared by participation in working groups to write and hand in lab reports for grading.

Evaluation Procedures

The final grade is an aggregate of the following components:

	Value	**Approximate Date**
Lecture Midterm Exam	25%	Week 7
Lecture Final Exam	30%	Week 15
Lab Reports and Assignments	15%	Due when requested
Field Spot Test	10%	Week 7 –9
Lab Exam	10%	Week 14
Quizzes/In Class Assignments	10%	

To obtain credit for this course:

- all lab reports and assignments must be completed and handed in
- all labs must be attended

Lab reports are word processed and printed by a computer program. Late lab reports and assignments are not graded; a grade of zero (0) is assigned.

Knowledge/Skills Matrix

Students apply and demonstrate their knowledge and skills to use

A. Communication Skills

A1. by listening, reading, interpreting information, and communicating effectively	
	Evaluation(s)/Goal(s): Midterm/Goals 1-6, Final exam/Goals 1-6, Field Spot Test /Goals 1-7, Lab Exam/Goals 1-7, Lab reports & assignments/Goals 1-6
A2. by using written, spoken, and/or visual formats and media to communicate and meet needs of each particular audience	
	Evaluation(s)/Goal(s): Lab reports & assignments/Goals 1-6
A3. by using libraries, Internet, technical publications, journals and other sources to find pertinent information	
	Evaluation(s)/Goal(s): Midterm/Goals 1-6, Final exam/Goals 1-6, Field Spot Test /Goals 1-7, Lab Exam/Goals 1-7, Lab reports & assignments/Goals1-6

B. Teamwork Skills

B1. by using interpersonal skills to create an atmosphere that maximizes the strengths of group members to accomplish tasks	
	Evaluation(s)/Goal(s): Lab reports & assignments/Goals 1-7
B2. by using interpersonal skills to resolve conflict, relate to others, and assist others	
	Evaluation(s)/Goal(s): Lab reports & assignments/Goals 1-7
B3. by contributing and listening to others as group determines realistic objectives, prioritizes tasks, and identifies resources and timelines	
	Evaluation(s)/Goal(s): Lab reports & assignments/Goals 1-7
B4. by treating other members of the group open-mindedly and fairly	
	Evaluation(s)/Goal(s): Lab reports & assignments/Goals 1-7
B5. by developing tactics/strategies to accomplish tasks	
	Evaluation(s)/Goal(s): Field Spot Test /Goals 1-7, Lab Exam/Goals 1-7, Lab reports & assignments/Goals 1-7

C. Critical Thinking Skills

C1. by seeing critical thinking as a lifelong process of self-assessment	
	Evaluation(s)/Goal(s): Midterm/Goals 1-6, Final exam/Goals 1-6, Field Spot Test /Goals 1-7, Lab Exam/Goals 1-7, Lab reports & assignments/Goals 1-7
C2. by examining problems closely	
	Evaluation(s)/Goal(s): Midterm/Goals 1-6, Final exam/Goals 1-6, Field Spot Test /Goals 1-7, Lab Exam/Goals 1-7, Lab reports & assignments/Goals 1-6
C3. by examining beliefs, assumptions, and opinions, and weigh them against the facts	
	Evaluation(s)/Goal(s): Midterm/Goals 1-6, Final exam/Goals 1-6, Field Spot Test /Goals 1-7, Lab Exam/Goals 1-7, Lab reports & assignments/Goals 1-6
C4. by seeking out the truth	
	Evaluation(s)/Goal(s): N/A

C5. by finding solutions; make decisions	
	Evaluation(s)/Goal(s): Midterm/Goals 1-6, Final exam/Goals 1-6, Field Spot Test /Goals 1-7, Lab Exam/Goals 1-7, Lab reports & assignments/Goals 1-6
C6. by incorporating new ideas that may not necessarily agree with previous thought on the topic	
	Evaluation(s)/Goal(s): Midterm/Goals 1-6, Final exam/Goals 1-6, Field Spot Test /Goals 1-7, Lab Exam/Goals 1-7, Lab reports & assignments/Goals 1-6
C7. by seeing connections between topics and use knowledge from other disciplines to enhance reading and learning experiences	
	Evaluation(s)/Goal(s): Midterm/Goals 1-6, Final exam/Goals 1-6, Field Spot Test /Goals 1-7, Lab Exam/Goals 1-7, Lab reports & assignments/Goals 1-6

D. Adaptability Skills

D1. by working independently or as part of team	
	Evaluation(s)/Goal(s): Field Spot Text/Goals 1-7, Lab Exam/Goals 1-7, Lab reports & assignments/Goals 1-6
D2. by carrying out multiple tasks or projects	
	Evaluation(s)/Goal(s): Field Spot Test /Goals 1-7, Lab Exam/Goals 1-7, Lab reports & assignments/Goals 1-6
D3. by being innovative and resourceful: identify and suggest alternative ways to get the job done	
	Evaluation(s)/Goal(s): Field Spot Test /Goals 1-7, Lab Exam/Goals 1-7, Lab reports & assignments/Goals 1-6
D4. by being open and respond constructively to change and uncertainty	
	Evaluation(s)/Goal(s): N/A

E. Positive Attitude and Behavioural Skills

E1. by dealing with people, problems, and situations with honesty, integrity, and personal ethics	
	Evaluation(s)/Goal(s): Field Spot Test /Goals 1-7, Lab Exam/Goals 1-7, Lab reports & assignments/Goals 1-6
E2. by showing interest, initiative, and effort	
	Evaluation(s)/Goal(s): Field Spot Test /Goals 1-7, Lab Exam/Goals 1-7, Lab reports & assignments/Goals 1-6
E3. by affirming the need for positive solutions and encourage positive interaction and feedback	
	Evaluation(s)/Goal(s): N/A
E4. by balancing personal and family activities with job-related activities	
	Evaluation(s)/Goal(s): Midterm/Goals 1-6, Final exam/Goals 1-6, Field Spot Text/Goals 1-7, Lab Exam/Goals 1-7, Lab reports & assignments/Goals 1-6

Grade Equivalents and Course Pass Requirements

A minimum grade of D (50%) (1.00) is required to pass this course.

Letter	F	D	D+	C-	C	C+	B-	B	B+	A-	A	A+
Percent Range	0-49	50-52	53-56	57-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94	95-100
Points	0.00	1.00	1.30	1.70	2.00	2.30	2.70	3.00	3.30	3.70	4.00	4.00

Students must maintain a cumulative grade of C (GPA - Grade Point Average of 2.00) in order to qualify to graduate.

Attendance

Classroom and laboratory attendance is considered vital to the learning process and as significant to the students' evaluation as examinations and reports, therefore absenteeism is recorded.

a. Students having a combination of excused and/or unexcused absence of 20 percent or higher for the scheduled course hours can be required to withdraw and would then automatically receive a "RW" (required withdrawal) for the course, regardless of any other evaluation results. (RW is a failing grade).
b. An excused absence is one that is verified with your instructor. Verification should be prior to the absence or the next class day following the absence. Verification of the absence may take the form of a note from your doctor/College nurse regarding illness, or a note from another instructor regarding a field trip or other activity, or authorization by your instructor following an in-person meeting. Be sure to contact your instructor and ask what they will require from you as verification of each absence. An unexcused absence is anything NOT verified by the instructor prior to the absence or the next class day following the absence.

NOTE: Any exceptions to the above attendance policy (e.g. timetable conflicts, work-related issues) must be approved in writing by the Department Chair prior to the beginning of the course.

It is the students' responsibility to know their own absentee record.

Normal hours are 8:30 a.m. to 6:30 p.m., with potential for evening courses, exams or extended field trips. Students are expected to be available for classes during these times.

Course Units/Topics

Lectures:
Unit I - Introduction

1. Land Management defined
2. Land Classification and more
3. Foundations for land use planning

Unit II - Introduction to Soil Formation

1. Pedological definition of soil
2. Factors of soil formation
3. Geological history of Alberta
4. Origin, nature and classification of parent materials

5. Weathering and soil formation
6. The soil profile

Unit III - Processes of Soil Formation

1. Additions
2. Removals
3. Translocations
4. Transformations

Unit IV - Canadian System of Soil Classification

1. Objectives of system
2. Units of system
3. Study of Canadian soil orders (to great group and subgroup level) with focus on classification, geographic distribution, significance and use:
    - Chernozemic
    - Solonetzic
    - Luvisolic
    - Podzolic
    - Brunisolic
    - Regosolic
    - Gleysolic
    - Organic
    - Crysolic
    - Vertisolic

Unit V - Canadian System of Landform Classification (Lectures 39-41)

1. Objectives
2. Genetic material components and modifiers
3. Surface expression
4. Slope
5. Modifying geological processes and qualifying descriptors
6. Mapping techniques and format

Unit VI - Soil and Land Capability Rating and Assessment (Lectures 42)

1. Soil ratings by CLI and other systems
2. Land assessment procedures

Assignments and Unsupervised Projects:

Assignments using the C.S.S.C. to classify soils.

Laboratory/Shop Contents:

Nomenclature of the CSSC system and soil description

Soil classification in labs and field trips

Week 1-2: Describing soil characteristics and horizons.

Week 3-4: Pedon description and pedogenic processes– Catenary sequence

Week 5-6: Pedon description and pedogenic processes – Catenary sequence

Week 7-8: Pedon description and pedogenic processes

Week 9-10: Field Spot Text, Pedon description and pedogenic processes

Week 11-12: Monolith Profile Classification

Week 13-14: Indoor Lab exam

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