

SO 320
Soil Conservation
3 Credits

Instructor: Cassandra Gnyra
Phone: 780 853 8582
Original Developer: Dr. Lee Arthur; Mel Mathison
Current Developer: Cassandra Gnyra
Reviewer: James Woodhouse
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2602 - 59 Avenue, Lloydminster, Alberta, Canada T9V 3N7. Ph: 780 871 5700
5707 College Drive, Vermilion, Alberta, Canada T9X 1K5. Ph: 780 853 8400
Toll-free in Canada: 1 800 661 6490



SO 320 Version: 18



Soil Conservation

Calendar Description

This course is a study of soil properties from a soil conservation perspective. The primary focus is on understanding soil properties to achieve soil and water conservation objectives and to prevent soil degradation. Field techniques used to assess soil degradation and to implement erosion and sediment control projects are emphasized.

Rationale

This is a required course for the Environmental Conservation and Reclamation and the Conservation and Restoration Ecology students. This course emphasizes how management can be used to reduce soil degradation, or to prevent soil degradation from occurring, on both agricultural lands and disturbed industrial sites. Soil properties that influence soil and water conservation and the management practices that affect these soil properties are reviewed. An understanding of cropping systems, cultural practices, and management techniques that affect soil factors like tilth, organic matter levels, salinity, and erosiveness is required for agricultural soil conservation. Techniques used for erosion and sediment control on highly erodible non-agricultural sites are also reviewed. These include erosion control blankets, tackifiers and other methods/devices.

Prerequisites

SO 210

Co-Requisites

None

Course Learning Outcomes

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

1. outline types, causes, and processes of land degradation.
2. determine environmental management and cultural practices that are causing soil degradation in western Canada.
3. recommend viable management practices that can insure adequate soil conservation.

4. compare the benefits and limitations faced by agricultural producers of implementing major changes in soil management practices.
5. recommend conservation plans for disturbed sites such as mining, logging, pipelines, industrial and/or residential development, and highway embankments.
6. recommend intensive control measures used to reduce erosion levels to predetermined levels, by either preventing soil movement or trapping sediment before it leaves the site.

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.

Resource Materials

Reference Materials:

Brady, N.C., and R.R. Weil. 1999. The nature and properties of soils. 12th ed. Prentice Hall, New Jersey.

Troeh, F.R., J.A. Hobbs, and R.L. Donahue. 2004. Soil and water conservation for productivity and environmental protection. 4th ed. Prentice Hall, New Jersey.

Conduct of Course

The course is approximately 42 hours of lecture and 14 hours of lab work. The classroom instruction is in a lecture-style. Questions and discussion occur during the classroom instruction to insure the material is understood. Labs are mostly in a classroom setting and will focus on applying management principles to prevent or reduce soil degradation. Case studies related to

lecture content and presentation of information by students may also be covered in labs. Field activities will be included as time and season allow.

Evaluation Procedures

Midterm	25%
Final	35%
Labs (5 @ 4%)	20%
Exercises/Quizzes	10%
Assignments	10%
Total	100%

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, 2, 3; Final/Goals 1, 2, 3, 4, 5; Lab Reports/Goals 4, 5; Assignments/Goals 1, 2, 3
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/Goals 4,5; Assignments/Goals 1, 2, 3
A3. by using libraries, Internet, technical publications, journals and other sources to find pertinent information
Evaluation(s)/Goal(s): Lab Reports/Goals 4, 5; Assignments/Goals 1, 2, 3

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/Goals 4, 5; Assignments/Goals 1, 2, 3
B2. by using interpersonal skills to resolve conflict, relate to others, and assist others
Evaluation(s)/Goal(s): Lab Reports/Goals 4, 5; Assignments/Goals 1, 2, 3
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/Goals 4, 5; Assignments/Goals 1, 2, 3
B4. by treating other members of the group open-mindedly and fairly
Evaluation(s)/Goal(s): Lab Reports/Goals 4, 5; Assignments/Goals 1, 2, 3
B5. by developing tactics/strategies to accomplish tasks
Evaluation(s)/Goal(s): Lab Reports/Goals 4,5; Assignments/Goals 1, 2, 3

C. Critical Thinking Skills

C1. by seeing critical thinking as a lifelong process of self-assessment	
	Evaluation(s)/Goal(s): Midterm/Goals 1, 2, 3; Final/Goals 1, 2, 3, 4, 5; Lab Reports/Goals 4, 5; Assignments/Goals 1, 2, 3
C2. by examining problems closely	
	Evaluation(s)/Goal(s): Midterm/Goals 1, 2, 3; Final/Goals 1, 2, 3, 4, 5; Lab Reports/Goals 4, 5; Assignments/Goals 1, 2, 3
C3. by examining beliefs, assumptions, and opinions, and weigh them against the facts	
	Evaluation(s)/Goal(s): N/A
C4. by seeking out the truth	
	Evaluation(s)/Goal(s): N/A
C5. by finding solutions; make decisions	
	Evaluation(s)/Goal(s): Lab Reports/Goals 4, 5; Assignments/Goals 1, 2, 3
C6. by incorporating new ideas that may not necessarily agree with previous thought on the topic	
	Evaluation(s)/Goal(s): Lab Reports/Goals 4, 5; Assignments/Goals 1, 2, 3
C7. by seeing connections between topics and use knowledge from other disciplines to enhance reading and learning experiences	
	Evaluation(s)/Goal(s): Lab Reports/Goals 4, 5; Assignments/Goals 1, 2, 3

D. Adaptability Skills

D1. by working independently or as part of team	
	Evaluation(s)/Goal(s): Midterm/Goals 1, 2, 3; Final/Goals 1, 2, 3, 4, 5; Lab Reports/Goals 4, 5; Assignments/Goals 1, 2, 3
D2. by carrying out multiple tasks or projects	
	Evaluation(s)/Goal(s): Lab Reports/Goals 4, 5; Assignments/Goals 1, 2, 3
D3. by being innovative and resourceful: identify and suggest alternative ways to get the job done	
	Evaluation(s)/Goal(s): Lab Reports/Goals 4, 5; Assignments/Goals 1, 2, 3
D4. by being open and respond constructively to change and uncertainty	
	Evaluation(s)/Goal(s): Lab Reports/Goals 4, 5; Assignments/Goals 1, 2, 3

E. Positive Attitude and Behavioural Skills

E1. by dealing with people, problems, and situations with honesty, integrity, and personal ethics	
	Evaluation(s)/Goal(s): Lab Reports/Goals 4, 5; Assignments/Goals 1, 2, 3
E2. by showing interest, initiative, and effort	
	Evaluation(s)/Goal(s): Midterm/Goals 1, 2, 3; Final/Goals 1, 2, 3, 4, 5; Lab Reports/Goals 4, 5; Assignments/Goals 1, 2, 3
E3. by affirming the need for positive solutions and encourage positive interaction and feedback	
	Evaluation(s)/Goal(s): Lab Reports/Goals 4,5; Assignments/Goals 1, 2, 3
E4. by balancing personal and family activities with job-related activities	
	Evaluation(s)/Goal(s): Midterm/Goals 1, 2, 3; Final/Goals 1, 2, 3, 4, 5; Lab Reports/Goals 4, 5; Assignments/Goals 1, 2, 3

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 - Major Topics (order of delivery may vary)

1. Land Degradation
 - types
 - extent of the problem (historical and present)

2. Soil Tilth
 - practices to create or maintain good soil tilth
 - effects of tillage and soil moisture on tilth

3. Soil Organic Matter
 - current status of soils
 - how to modify levels

4. Water Erosion
 - processes
 - universal soil loss equation
 - determining desired tolerance levels
 - methods of reducing water erosion (agricultural and disturbed industrial sites)
 - C-factors (vegetation, residues, mulches, soil binders, erosion control blankets, grassed waterways, etc.)
 - P-factors (terraces, contour cropping, sediment traps, straw barriers, silt fences, etc.)

5. Wind Erosion
 - processes
 - wind erodibility equation (discussion of factors involved)
 - management of erosion factors
 - management on agricultural land
 - typical management practices on reclamation/industrial sites
 - emergency control measures
 - for agricultural areas
 - typical methods for reclamation sites

6. Soil Moisture

evapotranspiration, water use efficiency, seasonal deficits

soil moisture storage

Infiltration, percolation, leaching losses, runoff

soil moisture management

- summer fallow
- irrigation
- snow management
- drainage

Laboratories/Field Trips

1. Equipment used in reclamation, erosion control examples
2. Water erosion
3. Wind erosion
4. Organic matter amendments
5. Sediment control
6. Erosion concerns in the field
7. Snow Capture and Management

Note: The order in which labs are delivered and specific lab content may vary due to weather conditions, site access arrangements, etc.



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