

**SC408**  
**Reclamation Field Methods**

**3 Credits**

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## SC408 Version: 6



# Reclamation Field Methods

## Calendar Description

This course examines the common reclamation field methods used in Western Canada. The major soil disturbances are discussed including wellsite reclamation, pipeline construction and mining operations. Common problems associated with oil and gas developments are also discussed, including oil spills, brine spills, and soil sterilants.

## Rationale

This is a required course for Environmental Conservation and Reclamation and also for the Reclamation/Remediation major of the Bachelor of Applied Science: Environmental Management students. The course is designed to familiarize you with typical processes used and potential problems encountered with major types of land disturbances. The objective is to minimize problems by proper planning and implementation of a reclamation plan. Typical reclamation procedures are discussed to show how reclamation may be conducted to meet various legislative requirements. Examples are used to ensure you can recognize soil chemical and physical properties that may need adjusting during land reclamation. Alternatives available for dealing with small hydrocarbon spills, brine spills, and sterilants found on oil leases are discussed.

## Prerequisites

SO210

## Co-Requisites

SO340

## Course Learning Outcomes

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

1. describe, plan and assess the typical processes involved in reclaiming major land disturbances.
2. help prepare, design and implement plans in advance of a site disturbance to minimize problems with reclamation.
3. recognize, analyze and assess reclamation problems when they are encountered.

4. assess and evaluate the severity of problems, including use of appropriate physical and chemical analysis.
5. plan, carry out and appraise typical reclamation procedures.
6. describe some of the applications and safe practices for selected earth moving and agricultural equipment.

## 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 Text(s):*

None required

### *Reference Texts:*

Alberta Environment. 2010. Reclamation criteria for wellsites and associated facilities for cultivated lands. Edmonton, AB.

Alberta Environment. 2010. Reclamation criteria for wellsites and associated facilities for forested lands. Edmonton, AB.

Alberta Environment. 2010. Reclamation criteria for wellsites and associated facilities for native grasslands. Edmonton, AB.

Alberta Land Conservation and Reclamation Council. Research Technical Advisory Committee. 1992. A user guide to pit and quarry reclamation in Alberta. Edmonton, AB.

Alberta Environment. 2004. A Guide to the Code of Practice for Pits 2004. Alberta Environment. Edmonton, Alberta. pp. 84.

Alberta Environment. 2001. Salt contamination assessment and remediation guidelines. Edmonton, AB

Alberta Environment Land Reclamation Division. 1988. Environmental handbook for pipeline construction. Edmonton, AB.

Alberta Environment Land Reclamation Division. Reclamation assessment criteria for pipelines 2001 draft. Edmonton, AB.

## Conduct of Course

The course is approximately 75 hours of lecture and 15 hours assigned for lab or seminar work. Labs are used to demonstrate some of the common problems often encountered at reclamation sites. The classroom instruction is in a lecture-style, with use of power point presentations. Questions and discussion occur during classroom instruction to insure the material is understood.

## Evaluation Procedures

Midterm Exam	25%
Final Exam	35%
Labs	20%
Assignments	<u>20%</u>
Total	100%

## Knowledge/Skills Matrix

**Students apply and demonstrate their knowledge and skills to use**

### A. Communication Skills

<b>A1. by listening, reading, interpreting information, and communicating effectively</b>
<b>Evaluation(s)/Goal(s):</b> Midterm exam (Units 1-11)/Goals 1-5; Lab reports (Units 7-10)/Goals 3-5; Assignments (Units 1- 10)/Goals 1-6; Final Exam (Units 1-10)/Goals 1-6.
<b>A2. by using written, spoken, and/or visual formats and media to communicate and meet needs of each particular audience</b>
<b>Evaluation(s)/Goal(s):</b> Midterm exam (Units 1-11)/Goals 1-5; Lab reports (Units 7-10)/Goals 3-5; Assignments (Units 1- 11)/Goals 1-5; Final Exam (Units 1-110)/Goals 1-5.

**A3. by using libraries, Internet, technical publications, journals and other sources to find pertinent information**

**Evaluation(s)/Goal(s):** Midterm exam (Units 1-1)/Goals 1-5; Lab reports (Units 7-10)/Goals 3-5; Assignments (Units 1- 10)/Goals 1-6; Final Exam (Units 1-10)/Goals 1-6.

**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 (Units 7-10)/Goals 3-5.

**B2. by using interpersonal skills to resolve conflict, relate to others, and assist others**

**Evaluation(s)/Goal(s):** Lab reports (Units 7-10)/Goals 3-5.

**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 (Units 7-10)/Goals 3-5.

**B4. by treating other members of the group open-mindedly and fairly**

**Evaluation(s)/Goal(s):** Lab reports (Units 7-10)/Goals 3-5.

**B5. by developing tactics/strategies to accomplish tasks**

**Evaluation(s)/Goal(s):** Lab reports (Units 7-10)/Goals 3-5.

**C. Critical Thinking Skills****C1. by seeing critical thinking as a lifelong process of self-assessment**

**Evaluation(s)/Goal(s):** Midterm exam (Units 1-10)/Goals 1-5; Lab reports (Units 7-10)/Goals 3-5; Assignments (Units 1- 10)/Goals 1-5; Final Exam (Units 1-10)/Goals 1-5.

**C2. by examining problems closely**

**Evaluation(s)/Goal(s):** Midterm exam (Units 1-10)/Goals 1-5; Lab reports (Units 7-10)/Goals 3-5; Assignments (Units 1- 10)/Goals 1-5; Final Exam (Units 1-10)/Goals 1-5.

**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):** n/a

**C6. by incorporating new ideas that may not necessarily agree with previous thought on the topic**

**Evaluation(s)/Goal(s):** Assignments (Units 1- 11)/Goals 1-5.

**C7. by seeing connections between topics and use knowledge from other disciplines to enhance reading and learning experiences**

**Evaluation(s)/Goal(s):** Midterm exam (Units 1-11)/Goals 1-5; Lab reports (Units 7-10)/Goals 3-5; Assignments (Units 1- 10)/Goals 1-6; Final Exam (Units 1- 10)/Goals 1-6.

**D. Adaptability Skills****D1. by working independently or as part of team**

**Evaluation(s)/Goal(s):** Lab reports (Units 7-10)/Goals 3-5.

**D2. by carrying out multiple tasks or projects**

**Evaluation(s)/Goal(s):** n/a

<b>D3. by being innovative and resourceful: identify and suggest alternative ways to get the job done</b>
<b>Evaluation(s)/Goal(s):</b> Lab reports (Units 7-10)/Goals 3-5.
<b>D4. by being open and respond constructively to change and uncertainty</b>
<b>Evaluation(s)/Goal(s):</b> Lab reports (Units 7-10)/Goals 3-5.

#### **E. Positive Attitude and Behavioural Skills**

<b>E1. by dealing with people, problems, and situations with honesty, integrity, and personal ethics</b>
<b>Evaluation(s)/Goal(s):</b> Lab reports (Units 7-10)/Goals 3-5.
<b>E2. by showing interest, initiative, and effort</b>
<b>Evaluation(s)/Goal(s):</b> Midterm exam (Units 1-11)/Goals 1-5; Lab reports (Units 7-10)/Goals 3-5. Assignments (Units 1- 10)/Goals 1-6; Final Exam (Units 1-10)/Goals 1-6.
<b>E3. by affirming the need for positive solutions and encourage positive interaction and feedback</b>
<b>Evaluation(s)/Goal(s):</b> n/a
<b>E4. by balancing personal and family activities with job-related activities</b>
<b>Evaluation(s)/Goal(s):</b> n/a

### **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**

### **1. Definitions**

- a) reclamation, restoration
- b) equivalent land capability
- c) guidelines, criteria

### **2. Reclamation planning**

### **3. End Land Uses**

- a) concept of end land use
- b) examples of reclaiming to different end land use objectives
- c) decision making for end land use objectives

### **4. Wellsite reclamation**

- a) wellsite criteria
- b) reclamation of dry and abandoned wellsites
- c) reclamation issues with production wellsites
  - soil storage and replacement
  - gravel on lease and access roads
  - hydrocarbon spills
  - gas leaks at wellheads
  - sterilants
  - produced water spills
  - typical issues with old leases
  - orphan well association

**5. Gravel pits**

- a) current regulations/guidelines
- b) soil handling practices for gravel pits

**6. Pipelines**

- a) pipeline criteria (2001 draft)
- b) agricultural capability classification for reclamation
- c) general reclamation procedures for pipelines
- d) options for dealing with sensitive or problem areas (water crossings, steep grades, highly erodible sites)

**7. Open pit mining**

- a) concept of approvals versus criteria
- b) typical processes used in prairie and Rocky Mountain coal mining
- c) major problems often encountered and how to deal with them
- d) oil sands production

**Specific Issues:**

**8. pH adjustments**

- a) raising and lowering pH
- b) basic calculation of amendments required

**9. Brine spills**

- a) brine composition
- b) effect on soil, plants
- c) cleanup options
- d) basic calculation of amendment requirements

**10. Oil spills**

- a) effect on soil, plants and animals
- b) cleanup options and effect on reclamation (burning, flushing, absorbents, removal, containment)
- c) basic methods of bioremediation (land farming, biopiles, windrows)

**11. Wetland Reclamation**

- a) function and appeal
- b) policy
- c) reclamation tools and examples



**12. Urban site reclamation**

- a) brownfields
- b) common challenges

**13. Reclamation issues and techniques**

- a) winter construction
- b) ice road construction
- c) rough and loose
- d) pile supported roads
- e) woody debris
- f) differences in Provincial regulations
- g) role of Alberta Environmental Protection and Alberta Energy and Utilities Board

**14. Reclamation Equipment**

- a) overview of common equipment
- b) safety and Operation

**Laboratory component:** These labs are weather dependent and based on availability.

- 1) Equipment operation - Introduction to agricultural and heavy equipment operation and safety
- 2) Field work - Pre-site assessment
- 3) Tours – Local reclamation sites, pipeline
- 4) Environmental protection plan use in field activities



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