

SC 430
Industrial Waste Management

3 Credits

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SC 430 Version: 11



Industrial Waste Management

Calendar Description

This course focuses on industrial waste treatment and management, with emphasis on pertinent regulations and best management practices for the treatment and disposal of drilling and hazardous wastes. Major topics include an introduction to industrial waste & waste audit, drilling mud properties, oilfield and hydrovac wastes, drilling waste disposal options, hazardous waste management, treatment & disposal.

Rationale

This is a required course for the Environmental Conservation & Reclamation major and the Applied Environmental Sciences major of the Environmental Sciences diploma program. Drilling waste management is an integral part of modern petroleum exploration and development, and is an important source of employment for graduates and practitioners in the Conservation and Reclamation field.

Prerequisites

None

Co-Requisites

None

Course Learning Outcomes

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

1. assess and support knowledge of drilling and hazardous waste management regulations.
2. evaluate common drilling mud additives and wastes generated.
3. recommend drilling waste disposal options.
4. appraise various on-site and off-site disposal operations.
5. assess regulatory rationale in choosing appropriate disposal options.
6. conduct proper sampling and analysis for drilling waste and disposal sites.
7. assess hazardous waste treatment and disposal options.
8. distinguish between hydrovac and hazardous waste management options.

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

Required Text:

None.

Reference Text:

1. Drilling Waste Management Directive 050. Alberta Energy Regulator, 2016.
2. Alberta User Guide for Waste Managers. AEP, 1996.
3. Waste Control Regulation. AR 192/1996.

Conduct of Course

This course consists of 42 hours of lecture and 28 hours of lab.

The lecture is a formalized classroom situation where the instructor discusses pertinent topics and students normally take notes. Student questions and class discussion are encouraged to clarify subject areas. Lectures variously consist of multimedia presentations, text discussions, directed study and glossary study. Students are expected to complete assigned text readings in advance of class discussions.

Lab periods on alternating weeks are used for field trips, laboratory exercises or lecture presentations depending on local conditions, industry activity and class interest. The instructor will discuss this time allocation as it pertains to your timetable and expected hours of homework, etc. Normally, a summary report or assignment is required for each lab activity, and students are **expected to take notes and hand assignments in on time**. All field trip material is **examinable**.

Personal protective equipment is required for all field trips. Students are required to provide their own approved (CSA) safety footwear (appropriate to the season). Hard hats, safety glasses and flame-retardant coveralls are available (students may wish to bring their own as not all sizes are available).

Evaluation Procedures

Lecture exams contain discussion-type, short answer, matching, true-false-justify, and multiple-choice questions. There are regular quizzes and lab reports are graded for spelling, punctuation, grammar and content. The final grade for the course is weighted according to the following schedule:

Midterm Exam	30%
Final Exam	35%
Assignments/Quizzes	10%
Labs	20%
Subjective grade	5%
Total	100%

To obtain credit in this course, all labs and assignments must be completed. Lab/field trip reports are due two weeks after each lab/field trip unless stated otherwise. Please note that late reports WILL NOT BE ACCEPTED, a mark of zero will be assigned for late reports.

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): Written Exam 1 and 2; Quizzes; Goals 1-8; Lab Assignments/Goals
A2. by using written, spoken, and/or visual formats and media to communicate and meet needs of each particular audience
Evaluation(s)/Goal(s): Written Exam 1 and 2; Quizzes; Goals 1-8; Lab Assignments/Goals

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

Evaluation(s)/Goal(s): Lab Assignments/Goals

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 Assignments/Goals

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

Evaluation(s)/Goal(s): Lab Assignments/Goals

B3. by contributing and listening to others as group determines realistic objectives, prioritizes tasks, and identifies resources and timelines

Evaluation(s)/Goal(s): Lab Assignments/Goals

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

Evaluation(s)/Goal(s): Lab Assignments/Goals

B5. by developing tactics/strategies to accomplish tasks

Evaluation(s)/Goal(s): Lab Assignments/Goals

C. Critical Thinking Skills

C1. by seeing critical thinking as a lifelong process of self assessment

Evaluation(s)/Goal(s): Written Exam 1 and 2; Quizzes; Goals 1-8; Lab Assignments/Goals

C2. by examining problems closely

Evaluation(s)/Goal(s): Written Exam 1 and 2; Quizzes; Goals 1-8; Lab Assignments/Goals

C3. by examining beliefs, assumptions, and opinions, and weigh them against the facts

Evaluation(s)/Goal(s): Written Exam 1 and 2; Quizzes; Goals 1-8; Lab Assignments/Goals

C4. by seeking out the truth

Evaluation(s)/Goal(s): Written Exam 1 and 2; Quizzes; Goals 1-8; Lab Assignments/Goals

C5. by finding solutions; make decisions

Evaluation(s)/Goal(s): Written Exam 1 and 2; Quizzes; Goals 1-8; Lab Assignments/Goals

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

Evaluation(s)/Goal(s): Written Exam 1 and 2; Quizzes; Goals 1-8; Lab Assignments/Goals

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

Evaluation(s)/Goal(s): Written Exam 1 and 2; Quizzes; Goals 1-8; Lab Assignments/Goals

D. Adaptability Skills

D1. by working independently or as part of team

Evaluation(s)/Goal(s): Written Exam 1 and 2; Quizzes; Goals 1-8; Lab Assignments/Goals

D2. by carrying out multiple tasks or projects

Evaluation(s)/Goal(s): Written Exam 1 and 2; Quizzes; Goals 1-8; Lab Assignments/Goals

D3. by being innovative and resourceful: identify and suggest alternative ways to get the job done

Evaluation(s)/Goal(s): Written Exam 1 and 2; Quizzes; Goals 1-8; Lab Assignments/Goals

D4. by being open and respond constructively to change and uncertainty

Evaluation(s)/Goal(s): Written Exam 1 and 2; Quizzes; Goals 1-8; Lab Assignments/Goals

E. Positive Attitude and Behavioural Skills

E1. by dealing with people, problems, and situations with honesty, integrity, and personal ethics

Evaluation(s)/Goal(s): Written Exam 1 and 2; Quizzes; Goals 1-8; Lab Assignments/Goals

E2. by showing interest, initiative, and effort

Evaluation(s)/Goal(s): Written Exam 1 and 2; Quizzes; Goals 1-8; Lab Assignments/Goals

E3. by affirming the need for positive solutions and encourage positive interaction and feedback

Evaluation(s)/Goal(s): Written Exam 1 and 2; Quizzes; Goals 1-8; Lab Assignments/Goals

E4. by balancing personal and family activities with job-related activities

Evaluation(s)/Goal(s): Lab Assignments/Goals

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 for 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

Lecture

1. Introduction to Industrial Waste and Waste Audit
 - Difference between Industrial and municipal waste
 - Main sources of IW
 - Common contaminants of concern in IW and wastewater
 - Objectives of Waste audit and common methods
 - Best management practices
2. Oilfield Waste
 - Drilling Mud
 - Introduction to Drilling Waste Management (DWM)
 - Regulatory considerations with Drilling Waste Management
 - Drilling Waste Disposal Methods
3. Hazardous & Hydrovac (H&H) Waste
 - Hazardous Waste – definition, characteristics, classification
 - Hydrovac waste – definition, site assessment, equipment
 - H&H Waste Management and Regulations
 - Roles and responsibilities of waste generator, carrier and receiver
 - Regulatory expectations
 - Hazardous Waste Treatment
 - Physical HW Treatment
 - Chemical HW Treatment
 - Biological Treatment
 - H&H Waste Disposal options
 - Landfill
 - Deep-well injection
 - Salt Caverns
 - Incineration

4. Industrial Waste Water Treatment
 - Characteristics of industrial waste water
 - Commonly used treatment technologies

Laboratory

Field Trips (number and destination subject to industry activity and local conditions) and labs

1. Drilling operation and waste disposal options
2. Drilling waste testing
3. Riley landfill site visit
4. Tervita Hazardous waste disposal
5. Fire school industrial waste water treatment



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