

SC316
Municipal Water
3 Credits

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SC316 Version: 12



Municipal Water

Calendar Description

This course provides students with the knowledge and skills required to develop and incorporate an overall integrated waste management strategy for most industries in Alberta. Topics include: solid waste management (municipal and industrial) hazardous wastes, oilfield wastes, and wastewater treatment systems. Field Trips are used to demonstrate integrated waste management systems in operation.

Rationale

This is a required course for students in the Applied Environmental Sciences major of the Environmental Sciences diploma program. Graduates of this program should have the necessary knowledge to manage society's wastes in a manner that meets public health and environmental concerns, and the public's desire to reuse and recycle waste materials. In addition, these future managers must have the knowledge to evaluate equipment and facility options, to make operational choices, and to develop an integrated waste management system.

Prerequisites

[SC110](#) and [SC200](#)

Co-Requisites

None

Course Learning Outcomes

Upon completion of this course, students will be able to

1. describe basic principles in industrial waste management and industrial waste audits.
2. describe and contrast methods used in the treatment of municipal and industrial wastewater including primary, secondary and tertiary treatment systems.
3. construct a process and instrumentation diagram for an industrial wastewater treatment facility.
4. propose strategies for cradle-to-grave solid waste management.

5. identify hazardous wastes and describe proper handling, transportation and disposal procedures.
6. identify oilfield wastes suitable for bioremediation and describe various techniques used for biodegradation of oilfield wastes.
7. describe and differentiate waste disposal methods including landfilling, incineration, deep well injection and surface impoundment.
8. design and produce an integrated waste management plan for industrial processes.

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:

None

Reference Texts:

Nathanson, J. A. 2008. Basic environmental technology. 5th ed. Pearson Prentice Hall, New Jersey, USA.

Alberta Environment. 1996. Alberta users guide for waste managers.

Alberta Environment. 1996. Code of practice for landfills.

Environmental Protection and Enhancement Act. 1996. Waste control regulation,
Alberta regulation 192/96.

Alberta Energy Resources and Conservation Board. 1996. Directive 058, oilfield
waste management requirements for the upstream petroleum industry.

Metcalf & Eddy. 1991. Wastewater engineering. 3rd ed. McGraw-Hill Inc., Toronto, ON.

Conduct of Course

The course consists of 28 hours of lecture and 28 hours of lab time. The lecture component is a formalized classroom setting where the instructor discusses pertinent topics and students normally take notes. Student questions are encouraged to clarify subject matter. The lab component consists of a number of field trips and lab activities to provide practical application of theory discussed in class.

Evaluation Procedures

The final mark consists of:

Course Activity	Portion of Final Mark
Midterm Exam	25%
Final Exam	25%
Quizzes	10%
Lab Assignments	20%
Term Project	20%
TOTAL	100%

To obtain credit for this course, **all lab exercises and the Term Project must be completed**. Late reports are not accepted and are given a mark of zero. All reports must be properly referenced. Plagiarism is dealt with in accordance with Lakeland College policy.

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; Goals 1-8; Lab/Field Trip Reports/ Goals 1-8
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; Goals 1-8; Lab/Field Trip Reports/ Goals 1-8

A3. by using libraries, internet, technical publications, journals and other sources to find pertinent information
Evaluation(s)/Goal(s): Lab/Field Trip Reports/ Goals 1-8

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/Field Trip Reports/ Goals 1-8
B2. by using interpersonal skills to resolve conflict, relate to others, and assist others
Evaluation(s)/Goal(s): Lab/Field Trip Reports/ Goals 1-8
B3. by contributing and listening to others as group determines realistic objectives, prioritizes tasks, and identifies resources and timelines
Evaluation(s)/Goal(s): Lab/Field Trip Reports/ Goals 1-8
B4. by treating other members of the group open-mindedly and fairly
Evaluation(s)/Goal(s): Lab/Field Trip Reports/ Goals 1-8
B5. by developing tactics/strategies to accomplish tasks
Evaluation(s)/Goal(s): Lab/Field Trip Reports/ Goals 1-8

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; Goals 1-8; Lab/Field Trip Reports/ Goals 1-8
C2. by examining problems closely
Evaluation(s)/Goal(s): Written Exam 1 and 2; Goals 1-8; Lab/Field Trip Reports/ Goals 1-8
C3. by examining beliefs, assumptions, and opinions, and weigh them against the facts
Evaluation(s)/Goal(s): Written Exam 1 and 2; Goals 1-8; Lab/Field Trip Reports/ Goals 1-8
C4. by seeking out the truth
Evaluation(s)/Goal(s): Written Exam 1 and 2; Goals 1-8; Lab/Field Trip Reports/ Goals 1-8
C5. by finding solutions; make decisions
Evaluation(s)/Goal(s): Written Exam 1 and 2; Goals 1-8; Lab/Field Trip Reports/ Goals 1-8
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; Goals 1-8; Lab/Field Trip Reports/ Goals 1-8
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; Goals 1-8; Lab/Field Trip Reports/ Goals 1-8

D. Adaptability Skills

D1. by working independently or as part of team
Evaluation(s)/Goal(s): Written Exam 1 and 2; Goals 1-8; Lab/Field Trip Reports/ Goals 1-8
D2. by carrying out multiple tasks or projects
Evaluation(s)/Goal(s): Written Exam 1 and 2; Goals 1-8; Lab/Field Trip Reports/ Goals 1-8
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; Goals 1-8; Lab/Field Trip Reports/ Goals 1-8
D4. by being open and respond constructively to change and uncertainty
Evaluation(s)/Goal(s): Written Exam 1 and 2; Goals 1-8; Lab/Field Trip Reports/ Goals 1-8

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; Goals 1-8; Lab/Field Trip Reports/ Goals 1-8
E2. by showing interest, initiative, and effort
Evaluation(s)/Goal(s): Written Exam 1 and 2; Goals 1-8; Lab/Field Trip Reports/ Goals 1-8
E3. by affirming the need for positive solutions and encourage positive interaction and feedback
Evaluation(s)/Goal(s): Written Exam 1 and 2; Goals 1-8; Lab/Field Trip Reports/ Goals 1-8
E4. by balancing personal and family activities with job-related activities
Evaluation(s)/Goal(s): Lab/Field Trip Reports/ Goals 1-8

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.

- 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).
- 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) Wastewater Treatment Systems
 - Preliminary and primary treatment
 - Secondary treatment
 - Tertiary treatment
 - Sludge treatment

- 2) Solid Waste Management
 - Solid Waste Management Hierarchy
 - 3 R's -- reuse, recycle, recovery

- 3) Sanitary Landfills
 - Design of landfill
 - Gas collection and disposal systems
 - Leachate collection and disposal options
 - Daily operation
 - Environmental monitoring
 - Landfill classes

- 4) Waste Audits

- 5) Hazardous Wastes
 - Classification, handling and disposal
 - Disposal options
 - Landfilling
 - Deep well injection
 - Incineration
 - Surface impoundment

- 6) Oilfield Wastes
 - Classification of wastes
 - Disposal of oilfield wastes
 - Drilling waste management

Field Trips and Lab Activities:

Laboratory sessions for this course are designed to familiarize students with processes and facilities in which monitoring and compliance technicians may work. The visits are directed towards learning about the abatement, monitoring and compliance practices of the industry. Actual field trips undertaken depend on the visiting arrangements that can be made in any particular year. The following is a list of potential co-operating facilities and lab activities;

- 1) Petroleum Refinery
- 2) Thermo-electric Generating Plant
- 3) Pulp/paper Mill
- 4) Sewage Treatment Plant (municipal)
- 5) Municipal water treatment facility
- 6) Industrial Landfill facility
- 7) Municipal landfill facility
- 8) Special wastes treatment facility
- 9) Hazardous chemicals, collection, storage and distribution centre.
- 10) Organic chemicals production plant
- 11) Sour gas processing
- 12) Land farming operation
- 13) Oil sands mining and production
- 14) Heavy oil development and production
- 15) Designing a process and instrumentation diagram (PID) of an industrial facility
- 16) Developing an integrated waste management plan for an industrial facility
- 17) Conducting an oral presentation on the waste management practices in a specific industry



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