

SC 362
Wetlands Water Systems

3 Credits

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SC 362 Version: 2



Wetlands Water Systems

Calendar Description

This course explores the hydrological functions of the most highly-valued feature on the landscape: the wetland. Students learn how wetlands are key drivers of regional hydrology, water quality, and flood and drought mitigation. Additional topics include contamination remediation, water sampling techniques, and utilizing amphibians as a water quality indicator. Current and emerging management tools including remote sensing are used to examine the hydrological effects of climate change.

Rationale

This course is required for the Environmental Sciences Diploma: Applied Environmental Sciences major.

Wetlands are among the most productive ecosystem in the world. Wetlands' microbes, plants, and wildlife are part of global cycles for water, nitrogen, and sulfur. Wetlands provide numerous beneficial services for the ecosystem, including protection and improvement of water quality, fish and wildlife habitats, shoreline stabilization, groundwater recharge, streamflow maintenance, and floodwater storage. The Alberta Wetland Policy is creating a critical need for land managers, landowners and land developers to have specific knowledge and skills about wetlands and how to protect, preserve, and restore these wetlands. Ill-informed decisions and actions can have a profound impact on wetlands and can be costly. Proper knowledge can bridge this gap and foster a greater understanding of wetlands.

Prerequisites

None

Co-Requisites

None

Course Learning Outcomes

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

1. describe the importance of climate and hydrogeology in determining wetland hydrology.
2. realize wetland values, functions and benefits.
3. recognize the role of wetlands in improving water quality and its impact on the aquatic ecosystem.
4. assess wetland value using Alberta Wetland Rapid Evaluation Tool (ABWRET-A & D).
5. identify the approaches to manage wetlands using management tools like remote sensing and constructed wetlands.
6. recognize the threats to wetlands distribution due to urban sprawl, nutrient overloading, and industrial activities.
7. identify and describe legislation and policies that address waterbodies in Alberta
8. classify wetlands using Alberta wetland classification system and determine the forms within each class.
9. delineate wetlands boundaries using delineation directives.

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 Textbook(s):

Hale, G., N. Ambrose, A. Bogen, K. Spicer-Rawe, M. Uchikura, and E. Suanders. 2005. A field guide to common riparian plant of Alberta. Cows and Fish Program.

Reference Textbook(s):

Alberta Environment and Sustainable Resource Development (ESRD). 2015. Alberta wetland classification system. Water Policy Branch, Policy and Planning Division, Edmonton, AB.

http://www.library.ualberta.ca/permalink/opac/7647458/LAKELND_LLWEB.

Government of Alberta. 2015. Alberta wetland identification and delineation directive.

Water Policy Branch, Alberta Environment and Parks, Edmonton, Alberta.

http://www.library.ualberta.ca/permalink/opac/7647226/LAKELND_LLWEB.

Fitch, L., and N. Ambrose. 2003. Riparian areas: A user's guide to health. Cows and Fish Program, Lethbridge, Alberta. <http://cowsandfish.org/publications/management.html>.

Tannis, K. 2003. Common plants of the western rangelands. 2nd ed. Vol 1: Grasses and Grass-like species. Olds College, Olds, AB. Alberta Agriculture, Food and Rural Development, Edmonton, AB.

Conduct of Course

This course consists of 42 hours of lecture (held on 3 days per week) and 28 hours of lab (held biweekly). Lectures include the presentation of the course materials using a combination of PowerPoint as well as illustrating concepts on the blackboard. Lecture material supports the lab component by providing theoretical details. Students are expected to take notes on all materials presented during lectures and laboratory sessions.

The lab component of this course consists of any of the following: field trips, in class or field exercises, assignments, and guest lectures. Field labs focus on wetland water quality monitoring and soil sampling. The student will also learn how to classify and delineate wetlands using ABWRET A & D tools and GIS. Assignments will be given in conjunction with lectures and/or labs.

Evaluation Procedures

Midterm exam	35%
Final exam	40%
Labs/Assignments/Term project	25%
Total	100%

Midterm and final exams contain multiple choice, true and false, short answers and discussion questions.

To obtain credit in this course, consider the following requirements:

- A minimum of D is required to pass this course
- All labs and field trips are mandatory
- All labs and assignments must be successfully 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.

Lakeland College is committed to the highest academic standards. Students are expected to be familiar with Lakeland College policies related to academic conduct and academic honesty and to abide by these policies. Violations of these policies are considered to be serious and may result in suspension or expulsion from the College.

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): Exams, Labs, Assignments, Field trips, Goals 1-9
A2. by using written, spoken, and/or visual formats and media to communicate and meet needs of each particular audience
Evaluation(s)/Goal(s): Exams, Labs, Assignments, Field trips, Goals 1-9
A3. by using libraries, Internet, technical publications, journals and other sources to find pertinent information
Evaluation(s)/Goal(s): Exams, Labs, Assignments, Field trips, Goals 1-9

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, Field trips, Goals 1-9
B2. by using interpersonal skills to resolve conflict, relate to others, and assist others
Evaluation(s)/Goal(s): Lab reports, Assignments, Field trips, Goals 1-9
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, Field trips, Goals 1-9
B4. by treating other members of the group open-mindedly and fairly
Evaluation(s)/Goal(s): Lab reports, Assignments, Field trips, Goals 1-9
B5. by developing tactics/strategies to accomplish tasks
Evaluation(s)/Goal(s): Lab reports, Assignments, Field trips, Goals 1-9

C. Critical Thinking Skills

C1. by seeing critical thinking as a lifelong process of self-assessment
Evaluation(s)/Goal(s): Lab reports, Assignments, Field trips, Goals 1-6, 8
C2. by examining problems closely
Evaluation(s)/Goal(s): Lab reports, Assignments, Field trips, Goals 1-9
C3. by examining beliefs, assumptions, and opinions, and weigh them against the facts
Evaluation(s)/Goal(s): Lab reports, Assignments, Field trips, Goals 1-9
C4. by seeking out the truth
Evaluation(s)/Goal(s): NA
C5. by finding solutions; make decisions
Evaluation(s)/Goal(s): Lab reports, Assignments, Field trips, Goals 1-9
C6. by incorporating new ideas that may not necessarily agree with previous thought on the topic
Evaluation(s)/Goal(s): Lab reports, Assignments, Field trips, Goals 1-9
C7. by seeing connections between topics and use knowledge from other disciplines to enhance reading and learning experiences
Evaluation(s)/Goal(s): Lab reports, Assignments, Field trips, Goals 1-9

D. Adaptability Skills

D1. by working independently or as part of team
Evaluation(s)/Goal(s): Exams, Lab reports, Assignments, Field trips, Goals 1-9
D2. by carrying out multiple tasks or projects
Evaluation(s)/Goal(s): Lab reports, Assignments, Field trips, Goals 1-9
D3. by being innovative and resourceful: identify and suggest alternative ways to get the job done
Evaluation(s)/Goal(s): Lab reports, Assignments, Field trips, Goals 1-9
D4. by being open and respond constructively to change and uncertainty
Evaluation(s)/Goal(s): Lab reports, Assignments, Field trips, Goals 1-9

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, Assignments, Field trips, Goals 1-9
E2. by showing interest, initiative, and effort
Evaluation(s)/Goal(s): Lab reports, Assignments, Field trips, Goals 1-9
E3. by affirming the need for positive solutions and encourage positive interaction and feedback
Evaluation(s)/Goal(s): Lab reports, Assignments, Field trips, Goals 1-9

E4. by balancing personal and family activities with job-related activities
Evaluation(s)/Goal(s): Lab reports, Assignments, Field trips, Goals 1-9

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

Unit 1: Introduction to Wetlands

- Wetland distribution and current status
- Wetland values, functions and benefits
- Global and provincial wetland issues

Unit 2: Wetland Hydrology

- Water quantity
 - Water balance
 - Temporal and seasonal variations
 - Landscape dynamics
- Regulating floods and impact of storms
- Drought mitigation
- Sediment transport

Unit 3: Wetland Health

- Water quality and stressors
 - Nutrient loading
 - Amphibians/invertebrate as indicator species
- Wetland sampling
- Contamination remediation
- Hydrological influence on carbon dynamics
- Links to climate change

Unit 4: Wetland Classification and Policy

- Alberta Wetland Policy
- Wetland classification using CWCS, AWCS, and S&K classification
- Wetland delineation based on soils and hydrology

Unit 5: Current and Emerging Management Tools

- Remote Sensing
- Alberta Wetland Rapid Evaluation Tool (ABWRET)
- Wetland Construction

Labs/Assignments

1. Water quality monitoring plan
2. Wetland soil sampling (mineral soil profile)
3. Alberta Wetland Rapid Evaluation Tool (ABWRET-A)
4. Alberta Wetland Rapid Evaluation Tool (ABWRET-D) including GIS component
5. Riparian Health Assessment, Cows and Fish
6. Term project



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