

SC 437

Aquatic Habitat Protection

3 Credits

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Created: 19/01/2010

Revised: 01/06/2020

Approval: 11/062020

The Implementation Date for this Outline is 01/09/2020

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SC 437 Version: 9



Aquatic Habitat Protection

Calendar Description

This course looks at various human activities known to have an impact on freshwater habitats, and why/how these impacts occur. Students are also introduced to techniques used to eliminate or minimize the impacts of an activity on freshwater habitat, as well as those commonly used in attempts to restore such habitat where degradation has already occurred.

Rationale

This is a required course for students in the Applied Environmental Sciences major within the Environmental Science diploma. As human impacts continue to increase, the need for responsible management of water resources becomes ever more important. Making informed management decisions requires data collected by field staff who can understand potential impacts on freshwater habitats, how to recognize and measure impacts in the field, and the methods used for impact mitigation. This course is fundamental to the understanding of the interrelationships between water, the environment and human activities.

Prerequisites

BI 205

Co-Requisites

SC 301

Course Learning Outcomes

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

1. describe and explain what the characteristics of a 'healthy' freshwater system are.
2. identify key habitat features and associated species utilizing the key habitat features within freshwater systems.
3. describe and explain how and why riparian zones are important to freshwater systems.
4. identify key habitat features within a riparian area and the species utilizing these features (i.e., amphibians, waterfowl).

5. describe and explain how various land use practices and industries (e.g. road construction, infrastructure, logging, oil and gas, agriculture) can impact/alter freshwater systems.
6. describe, explain and analyze river crossings, specifically related to culverts in Alberta.
7. describe and explain what is available, how it is used, and the intended goal of various instream and out of stream physical manipulations to freshwater habitats intended to restore freshwater systems and associated aquatic habitat.
8. describe, explain, and suggest various techniques for surface water management/sediment control.

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:

None

Conduct of Course

This course offering is 3 days a week of lecture and a bi-weekly lab period. This course is conducted using a combination of lectures/guest seminars and laboratory/assignment exercises. Students are encouraged to ask questions and participate in discussion throughout the course.

Evaluation Procedures

The marks for this course are derived from lecture exams, field labs, quizzes and a final term paper.

Course Activity	Portion of Final Mark
Midterm Exam	15%
Final Exam (cumulative)	30%
D2L Unit Quizzes (5 @ 2% each)	10%
Laboratory Assignments (6 @ 5% each)	30%
Final Term Report	15%
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): Labs & assignments, examinations/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): Labs & assignments/Goals 1-8
A3. by using libraries, internet, technical publications, journals and other sources to find pertinent information
Evaluation(s)/Goal(s): Labs & assignments/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): Labs & assignments/Goals 1-8
B2. by using interpersonal skills to resolve conflict, relate to others, and assist others
Evaluation(s)/Goal(s): Labs & assignments/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): Labs & assignments/Goals 1-8
B4. by treating other members of the group open-mindedly and fairly
Evaluation(s)/Goal(s): Labs & assignments/Goals 1-8

B5. by developing tactics/strategies to accomplish tasks
Evaluation(s)/Goal(s): Labs & assignments/Goals 1-8

C. Critical Thinking Skills

C1. by seeing critical thinking as a lifelong process of self assessment
Evaluation(s)/Goal(s): Labs & assignments/Goals 1-8
C2. by examining problems closely
Evaluation(s)/Goal(s): Labs & assignments/Goals 1-8
C3. by examining beliefs, assumptions, and opinions, and weigh them against the facts
Evaluation(s)/Goal(s): Labs & assignments/Goals 1-8
C4. by seeking out the truth
Evaluation(s)/Goal(s): Labs & assignments/Goals 1-8
C5. by finding solutions; make decisions
Evaluation(s)/Goal(s): Labs & assignments/Goals 1-8
C6. by incorporating new ideas that may not necessarily agree with previous thought on the topic
Evaluation(s)/Goal(s): Labs & assignments/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): Labs & assignments/Goals 1-8

D. Adaptability Skills

D1. by working independently or as part of team
Evaluation(s)/Goal(s): Labs & assignments/Goals 1-8
D2. by carrying out multiple tasks or projects
Evaluation(s)/Goal(s): Labs & assignments/Goals 1-8
D3. by being innovative and resourceful: identify and suggest alternative ways to get the job done
Evaluation(s)/Goal(s): Labs & assignments/Goals 1-8
D4. by being open and respond constructively to change and uncertainty
Evaluation(s)/Goal(s): Labs & assignments/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): Labs & assignments/Goals 1-8
E2. by showing interest, initiative, and effort
Evaluation(s)/Goal(s): Labs & assignments/Goals 1-8
E3. by affirming the need for positive solutions and encourage positive interaction and feedback
Evaluation(s)/Goal(s): Labs & assignments/Goals 1-8
E4. by balancing personal and family activities with job-related activities
Evaluation(s)/Goal(s): Labs & assignments/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.

- 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

1. Fresh Water Systems in Alberta
 - a) Introduction to Fresh Water Systems
 - Lentic v.s. Lotic Systems
 - Introduction to Watersheds
 - Identifying Watersheds from Aerial Imagery
 - b) Fluvial Freshwater Systems in Alberta
 - Channel Geomorphology
 - Types of Fluvial systems found in Alberta (human-made and naturally occurring)
 - Water Act Code of Practice Maps and stream Classification
 - c) Introduction to Acts and Regulations Protecting Fresh Water Systems in Alberta
 - The *Federal Fisheries Act*
 - The *Water Act* (as it pertains to river systems) and associated Codes of Practice
 - The *Forestry Act* and *Forestry Regulations* (as it pertains to watercourse crossings)
 - The Federal and Provincial *Species at Risk Acts*
 - The *Environmental Protection and Enhancement Act* (as it pertains to water quality)
 - The *Soil Conservation Act* (a subset of EPEA, as it pertains to the loss of topsoil into freshwater systems)
 - *Occupational Health and Safety Act* - right to refuse unsafe work
2. Fresh-Water Aquatic Species in Alberta
 - a) Introduction to key Fish Species within Alberta (i.e., species of concern)
 - b) Utilizing the Alberta Water Act Code of Practice Maps to identify Restricted Activity Periods for Fish Species
 - c) Introduction to key wildlife species linked to freshwater systems (i.e., amphibians and waterfowl)
 - d) Utilizing regulations to identify key species of concern for the purposes of aquatic habitat protection
3. Habitats of Freshwater Systems
 - a) Definition of and role of aquatic habitats both in-stream and within the riparian area
 - b) Instream Aquatic Habitats
 - Definition and role of instream habitats
 - Characteristics of good quality in-stream aquatic habitat
 - Species utilization and timing
 - Identification of key habitats through Aerial Imagery interpretation
 - Conducting an Instream Aquatic Habitat Assessment
 - c) Riparian Habitats
 - Definition of and role of riparian areas
 - Characteristics and species of healthy riparian habitats
 - Species utilization and timing
 - Identification of riparian areas/habitats through Aerial Imagery Interpretation
 - Conducting a Riparian Area and Riparian Habitat Assessment/Evaluation

4. Industry Activities and Freshwater Systems
 - a) Key industry activities and the potential risk of these activities to freshwater systems
 - Transportation (Highways)
 - Logging
 - Oil and gas
 - Agriculture
 - Mining
 - Other (i.e., urban sprawl, rail, dams, etc).
 - b) Construction Activities and Identifying Risk
 - c) Watercourse Crossings
 - Exploration of the primarily watercourse crossing methods used throughout industry in Alberta
 - Identification of the key potential impacts to aquatic habitat (instream and riparian) during watercourse crossing activities

5. Surface Water Management and Erosion and Sediment Control
 - a) Erosion and sediment control theory
 - Definition of erosion, sedimentation and surface water management as it applies to Alberta soils and soil regions
 - The role of a pre-work erosion and sediment control plan
 - Erosion and sediment control and the link to aquatic habitat protection
 - b) Commonly used erosion and sedimentation control/surface water management practices and materials
 - Introduction to best management practices
 - Introduction to resources for best management practices and sourcing materials
 - c) Planning, construction and maintenance of controls
 - Identifying proper measures based on environmental conditions, pre-existing features and project goals
 - Emergency response for aquatic habitat protection - identifying key concerns
 - reporting and compliance

6. Water Quality Monitoring
 - a) Water quality parameters
 - Linking water quality parameters to aquatic species utilization and habitat
 - b) Deleterious material and the potential effects on aquatic habitat
 - c) Monitoring and mitigation
 - d) Emergency response

7. Aquatic Habitat Reclamation and Restoration
 - a) Stream bed reclamation and restoration planning and practices
 - b) Stream channel reclamation and restoration planning and practices
 - c) Riparian area reclamation and restoration planning and practices
 - d) Macrophyte/invasive species control

LABORATORY SCHEDULE

The labs in this course will work together to form the basis of your Term Project. Each lab will be submitted, marked and returned, with feedback from the instructor. You are expected to address the feedback and incorporate the information into your final term report throughout the duration of the semester.

1. Online Databanks and Reporting Resources (introduction to the term project)
2. Hydrology and Stream Geomorphology - Instream Aquatic Habitat Conditions
3. Culvert Assessment
4. Erosion Control Design and Riparian Area Habitat Conditions
5. Assessment of Water Quality Analytical Results - Fish Habitat Identification
6. Reclamation Planning Design



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