

**MOUNT ROYAL UNIVERSITY
DEPARTMENT OF ENVIRONMENTAL SCIENCE
COURSE OUTLINE – FALL 2020**

**ECOL 2219
AQUATIC ECOLOGY
(3 credits) 3 hours lecture, 3 hours lab**

INSTRUCTOR: Jemma Katwaroo Andersen
Email: jkandersen@mtroyal.ca
Office Hours: By appointment

CALENDAR DESCRIPTION:

The study of the structure and function of aquatic ecosystems is undertaken in this course. There is an emphasis on freshwater systems. The goal is to understand how physical, chemical, biological and anthropogenic factors influence population dynamics and community structure in aquatic ecosystems. Laboratory and field research methods used in aquatic ecology are introduced. Current literature and case studies in various areas of aquatic ecology will be critically reviewed. Aquatic biodiversity issues and sustainability issues are emphasized. The interactions and integration of industrial activities with natural aquatic systems will also be reviewed.

RATIONALE:

This course builds upon ecological concepts introduced and developed in ECOL 1111 (Terrestrial Ecology). The course will focus on developing student awareness of how freshwater aquatic ecosystems function. Impacts of human activities on aquatic ecosystems are substantial and require familiarity, attention and response. Understanding the components of freshwater aquatic ecosystems, and how they function, will be the goal of this course. This will serve as a foundation for the development of sustainable aquatic resource management planning.

Population growth, industrialization, agricultural expansion, increased demand for hydroelectric power and many other anthropogenic activities have greatly impacted and increased demand on already degraded aquatic ecosystems. Attention must be drawn to the threats aquatic ecosystems are facing. To protect freshwater ecosystems a comprehensive program of public education, research, monitoring, regulation and enforcement must occur. A rethinking of how we use and manage water and aquatic ecosystems is part of the solution. The sustainability of aquatic resources and ecosystems is the ultimate goal.

PREREQUISITES: None.

CO-REQUISITES: None.

**COURSES LEARNING OUTCOME INTEGRATION WITH
MOUNT ROYAL UNIVERSITY AIMS**

Less ←————→ More

ECOL 2219 Aquatic Ecology

COURSE LEARNING OUTCOMES		Knowledge of Human Cultures and the Physical, Natural and Technological World	Intellectual and Practical Skills	Personal and Social Responsibility	Integrative and Applied Learning	ASSESSMENT
1.	Challenge common misconceptions about the status of water and aquatic resources.	✓	✓	✓		• Exam questions
2.	Perform wetland assessments, fish habitat assessments, assessments of fish assemblage using electrofishing, aquatic macroinvertebrate sampling and analysis.	✓	✓		✓	• Field trips & Lab Assignments
3.	Analyze how aquatic organisms will respond to variable environmental conditions in aquatic ecosystems.	✓	✓		✓	• Exam questions
4.	Employ simple population estimation techniques for aquatic organisms.	✓	✓		✓	• Lab assignments
5.	Describe and differentiate major aquatic organisms and ecosystems.	✓	✓		✓	• Exam questions
6.	Examine the types of interactions that occur between organisms and evaluate their importance to aquatic ecosystem functioning.	✓	✓		✓	• Exam questions
7.	Identify, describe and differentiate between major families of aquatic macroinvertebrates in Alberta using keys.	✓	✓		✓	• Exam questions • Lab assignments
8.	Identify, describe and differentiate between all major sportfish species and any field-encountered non-sportfish species in Alberta.	✓	✓		✓	• Exam questions • Lab assignments
9.	Distinguish the most important fisheries management issues in Alberta and challenge current practices.	✓	✓		✓	• Exam questions
10.	Assess the major anthropogenic impacts on aquatic ecosystems and contribute to the development of mitigation responses.	✓	✓	✓	✓	• Exam questions
11.	Critically examine issues related to biodiversity and aquatic species at risk in Alberta.	✓		✓		• Exam questions
12.	Assist in the development of aquatic resource management plans with goals of sustainability.	✓		✓		• Exam questions • Lab assignments
13.	Retrieve, evaluate and utilize scientific information resources related to aquatic ecology.		✓		✓	• Lab assignments
14.	Write reports about aquatic resource issues using a variety of scientific and consultant formats.		✓		✓	• Lab assignments

RESOURCE MATERIALS:

1. Recommended Course Field Guides (to be discussed in first lab):

Joynt, A., and M.G. Sullivan. 2003. Fish of Alberta. Lone Pine, Edmonton, Alberta, Canada. *Currently out of print.*

- i. MRU Library (Reserve Collection) and Keyano College have copies available.
- ii. Also available at Apple Books.

<https://itunes.apple.com/ca/book/fish-of-alberta/id1248966195?mt=11>

- iii. Call customer service for Canada Book Distributors (the distribution arm of Lone Pine) at 1-800-661-9017 to order the pdf for Fish of Alberta ISBN 978-1-177213-024-9 and ask for proof of purchase to be emailed to you. Email this proof of purchase to Faye Boer fayeb@booklogic.ca and she will send you a pdf copy.

Voshell, J.R. 2002. A guide to common freshwater invertebrates of North America. McDonald and Woodward. Blacksburg, Virginia. U.S.A.

- More information coming soon on electronic access and purchasing.

2. Supplemental Course Field Guides (to be discussed in first lab):

Clifford, H.F. 1990. Aquatic invertebrates of Alberta. University of Alberta Press, Edmonton, AB.

- <https://ebookcentral.proquest.com/lib/mtroyal-ebooks/reader.action?docID=3411580>

Thorp, J.H., and D.C. Rogers. 2011. Field guide to freshwater invertebrates of North America. Academic Press. Oxford, U.K.

- More information coming soon on electronic access.

3. Courseware/Blackboard web site - <https://courseware.mymru.ca>

CONDUCT OF COURSE:

The course consists of three hours of lecture per week and a three-hour lab. Lectures will be utilized to introduce core aquatic ecology concepts and theory and are scheduled on Tuesdays and Thursdays. Tuesday's classes would be **asynchronous** and used to conduct assessments, review of course material and completion of worksheets. Thursday's class would be **synchronous** (2:30 – 3:50) with live sessions being held and recorded. Google Meet would be used for live class sessions, whereby a link would be sent to students prior to class.

Labs will be utilized to supplement lectures with hands-on experience and have an emphasis on techniques and analysis. Some lab activities will occur outside of normally scheduled hours.

Relevant Calendar Information

Students are responsible for familiarizing themselves with general information and college policies regarding their conduct in courses provided in the Introduction, Academic Regulations and Academic Status sections of the [2020-2021 Mount Royal University Calendar](#).

Please take note of the following sections and pages:

Academic Regulations	36-44
Attendance Policy	37
Examination and Grades Policies	37-43
Student Conduct (Code, Academic, Non-academic, Harassment & Discrimination)	44
Academic Standing	45-46

Students should also familiarize themselves Student Community Standards and the Code of Student Conduct.

<https://www.mtroyal.ca/CampusServices/CampusResources/StudentCommunityStandards/index.htm>

<https://www.mtroyal.ca/CampusServices/CampusResources/StudentCommunityStandards/KnowtheCode/index.htm>

Please take note the following dates:

Last day to adjust registration (Drop/Add/Cancel)	14 September
Thanksgiving Day	12 October
Fall 2020 Semester Reading Break	13-16 October
Remembrance Day	11 November
Last day to WITHDRAW from a course/program	20 November
Last Day of Fall 2020 Semester Classes	9 December
Final Examination Period	December 11-22

EVALUATION PROCEDURES:

Guidelines for assignments and tests will be posted on the Courseware website. For exams, you are responsible for all material presented in lectures and directed readings. The midterm and final exam format will include short essay and multiple-choice questions. Anyone who fails the midterm exam should meet with their professor to review their performance. Students are encouraged to contact instructors regarding problems related to any part of the course.

Courses/Workshops offered by Student Learning Services may be useful to some students in developing study skills and test-writing strategies. The final lecture exam will be comprehensive.

The [2020-2021 Mount Royal University Calendar](#) (page 9) advises students that they must be available for final examinations up to the last day of the examination period (December 22, 2020).

Assessment Schedule (tentative) and Grading Scheme

Fish assemblage report.	2 November	20%
Wetland assignment.	9 October	5%
Stream discharge assignment.	16 November	5%
Fish habitat enhancement assignment and fish habitat map.	30 November	5%
Lecture quizzes and activities.	Periodically throughout the semester	15%
Midterm exam.	27 October	15%
Final lab exam.	4 December	15%
Final exam.	Scheduled by Registrar (11-22 Dec.)	20%

MRU Common Grading System

A+	95-100%	Excellent. Superior performance, showing comprehensive understanding of subject matter.
A	85-94%	
A-	80-84%	
B+	77-79%	Good. Clearly above average performance with knowledge of subject matter generally complete.
B	73-76%	
B-	70-72%	
C+	67-69%	Satisfactory. Basic understanding of subject matter.
C	63-66%	
C-	60-62%	
D+	55-59%	Marginal performance. (Generally insufficient preparation for subsequent courses).
D	50-54%	
F	Below 50%	Fail. Unsatisfactory performance or failure to meet course requirements.

ATTENDANCE:

Classes and tests will begin promptly at scheduled times. Please be punctual for both. You are expected to review assigned textbook and web site material prior to lectures and labs. You are

expected to attend all lectures and labs. Attendance will not be recorded at lectures, but please see page 37 of the [2020-2021 Mount Royal University Calendar](#) about your responsibilities. In the past, success in this course has been strongly related to attendance. Attendance will be taken at labs. Any lab activities that are missed without a valid excuse cannot be made up. Several course activities will take place in the field and outside of regularly scheduled hours.

ANIMAL USE:

This course involves the use of animals to provide authentic learning experiences. Our use of animals is guided by best practices and oversight by the Mount Royal University Animal Care Committee. All animal use activities will be explained to students and any student not wishing to participate will be offered alternate learning activities without any academic repercussions.

YOUR MENTAL HEALTH:

Are you feeling overwhelmed, stressed and anxious? Finding it hard to be motivated, meet deadlines or attend class? Having a hard time sleeping, concentrating or retaining information no matter how much you study? Help is available! See the MRU Mental Health Services Website for all resources.

<http://www.mtroyal.ca/CampusServices/WellnessServices/MentalHealthServices/index.htm>

CAMPUS EQUITY & MEANINGFUL INCLUSION:

You are encouraged to find general information as well as information on how to address issues related to diversity, inclusion, discrimination, harassment, accommodation, healthy relationships and dating, domestic and sexual violence. See the MRU Campus Equity & Meaningful Inclusion Website for resources.

<http://www.mtroyal.ca/CampusServices/CampusResources/CampusEquityMeaningfulInclusion/index.htm>

NOTICE OF RECORDING:

Mount Royal University has contracted Google to provide educational technology software for the ECOL 2219 – Aquatic Ecology where, the instructor may record lectures using Google Meet and make them available to registered students through a link on Blackboard for up until 10 days after the course is completed. Users, including any recorded student participants, are advised that the personal information collected during the recordings will only be used for educational purposes and is collected under the authority of the FOIP Act – section 33(c) and the *Post-Secondary Learning Act* in the Province of Alberta. Users are further advised that the downloading of posted videos other than for the purposes of student personal learning through the link on Blackboard, may violate the copyright of the course instructor or others. For additional questions regarding the collection, use, disclosure and protection of personal information please contact: **Gwen O’Sullivan, Chair of EES Department** - 4825 Mount Royal Gate SW - Calgary, AB - T3E 6K6 – gosullivan@mtroyal.ca

TENTATIVE LECTURE COURSE UNITS AND SCHEDULE

Week 3 and Dates	Topic(s):
1 Sept 3 rd	Introduction to course. Field trip orientation.
2 Sept 8 th & 10 th	Introduction to freshwater ecosystems, watersheds and streams. Chemical features of freshwater ecosystems.
3 Sept 15 th & 17 th	Quiz # 1 – Sept 15th Chemical features of freshwater ecosystems.
4 Sept 22 nd & 24	Introduction to streams (cont.).
5 Sept 29 th & Oct 1 st	Quiz # 2 – Sept 29th Introduction to wetlands.
6 Oct 6 th & 8 th	Introduction to lakes.
7 Oct 13 th & 15 th	Thanksgiving Holiday, Fall Reading Break (MRU).
8 Oct 20 th & 22 nd	Quiz # 3 – Oct 20th Introduction to freshwater aquatic biota. Introduction to freshwater invertebrates.
9 Oct 27 th & 29 th	Midterm Exam.
10 Nov 3 rd & 5 th	Introduction to freshwater invertebrates (cont.).
11 Nov 10 th & 12 th	Introduction to freshwater fishes.
12 Nov 17 th & 19 th	Other freshwater aquatic biota.
13 Nov 24 th & 26 th	Biodiversity issues. Aquatic species at risk. Aquatic invasive species.
14 Dec 1 st & 3 rd	Quiz # 4 – Dec 1st Introduction to fisheries management.
15 Dec 8 th & 10 th	Introduction to fish habitat management.
16 Dec 15 th & 17 th	Quiz # 5 – Dec 15th Anthropogenic impacts on aquatic ecosystems. Introduction to watershed management. Final exam guidance (last class).
	Final exam period (scheduled by Registrar).

ECOL 2219 LAB ACTIVITIES AND SCHEDULE – Calgary Students (Tentative)

(most REMOTE DELIVERY lab activities will be synchronous and in accordance with Academic Schedule)

Day	Topics
September 4	Electrofishing orientation. Wildlife safety. COVID-19 safety. Field trip preparation. REMOTE DELIVERY via Google Meet – approx. 3 hours. Lab sections participate at scheduled times.
September 11-13	Fish inventory field trips. (Dogpound Creek). FIELD – attend 1 day only.
September 18-20	Fish inventory field trips. (Dogpound Creek). FIELD – attend 1 day only.
September 25	Wetland assessment field trip. Location TBD. FIELD – approx. 3 hours at scheduled times. Laurie Hamilton will be instructor.

October 2	Fisheries report assistance. Wetland field trip follow-up. Field trip 2 preparation. REMOTE DELIVERY via Google Meet – approx. 3 hours at scheduled times.
October 9	No regularly scheduled lab. Informal
October 23, 24	Benthic macroinvertebrate sampling, fish habitat assessment, redd count/ field trip (Dogpound Creek) – FIELD – attend 1 day only.
October 30	Measurement of stream discharge (Sandy Beach). Development of a stream hydrograph. FIELD – approx. 3 hours at scheduled times.
November 6	Invertebrate identification and analysis. REMOTE DELIVERY via Telepresence/Webex or Google Meet – approx. 3 hours at scheduled times.
November 13*	Riparian issues and fish habitat enhancement (Bow River Demonstration site). FIELD – approx. 3 hours at scheduled times.
November 20	Bow Habitat Station/Sam Livingston Fish Hatchery field trip. FIELD – approx. 3 hours at scheduled times.
November 27	Fish taxonomy. Fish anatomy. Aging fish. REMOTE DELIVERY via Telepresence/Webex or Google Meet. 3 hours at scheduled times.
December 4	Final Lab Exam. REMOTE DELIVERY (Blackboard timed exam).

*REMOTE DELIVERY alternatives will be available in case of bad weather.

ECOL 2219 LAB ACTIVITIES AND SCHEDULE – Ft. McMurray Students (**Tentative**)

Day	Topics
September 4 (Sept. 7 th if not possible)	Electrofishing orientation. Wildlife safety. COVID-19 safety. Field trip preparation.
September 14	No regularly scheduled lab.
September 18-21	Fish inventory field trips (Dogpound Creek) – no regularly scheduled labs. Perhaps other activities in Calgary.
September 28	Wetlands field trip (tentative). Laurie Hamilton instructor.
October 2 (October 5 th if not possible)	Fisheries report assistance. Wetland field trip follow-up.
October 12	Thanksgiving Holiday
October 19	No regularly scheduled lab.
October 26	Invertebrate sample preparation.
November 2	Introduction to invertebrate identification (Brian ?).
November 9	Invertebrate analysis (Keyano lab).
November 16	Invertebrate analysis (Keyano lab).
November 23	Riparian issues and fish habitat enhancement.
November 30	Fish taxonomy. Fish anatomy. Aging fish.
December 7	Final Lab Exam