



Faculty of Science Course Syllabus
Department of Biology

MARI 3627.03 - Biology and Conservation of Sharks, Skates and Rays Dalhousie University, Seaside Summer Course, Summer 2022

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Voluntary Co-Instructor: Dr. Manuel Dureuil, Sharks of the Atlantic Research and Conservation Centre (ShARCC); Dartmouth, NS B2Y 1K2, Canada; Email: manuel.dureuil@dal.ca

Voluntary Co-Instructor: Dr. Chris-Harvey Clarke, University Director of Animal Care, Office Phone: 494-1270; Email: charveyc@dal.ca

Demonstrators: Scarlett Taylor, Email: scarlett.taylor@dal.ca

Lectures: August 11th – August 30th, 9:00am - 5:00pm. (Students should be aware that course work may include weekends depending on the availability of guest speakers and the dates of the shark tagging trips).

Laboratories: Exact dates TBD.

Field trips: TBA. Full day boat tagging trips. Each student will only be able to go on one of the tagging trips (limited space on boat). See schedule for details. *Dates may be changed due to weather.*

Dalhousie COVID-19 information and updates: <https://www.dal.ca/covid-19-information-and-updates.html>

Course Description

This course offers a combination of lectures, labs, and field trips that explore the elements of elasmobranchs (shark, skate and ray) biology and conservation. Students are introduced to current methods used in shark research, such as tagging, and learn about the role of sharks in ecosystems.

Course Prerequisites

Biology 2060.03 (or BIOA 3001.03) (Introductory Ecology) and Biology 2003.03 (Diversity of Life)

Overview

This course will introduce students to the diversity of elasmobranchs and how they can be identified using mostly visible features (focus on Atlantic Canadian species). Furthermore, the anatomy, physiology and function of different organs will be studied in detail, including dissections of sharks and skates. This also contains an aging module where students will learn how to age elasmobranchs, and a genomics module, where students will learn about the role genomics can play in shark and ray conservation. Current threats, the status and tools for protection of this group will be discussed in detail. Students will, in particular, learn why elasmobranchs react to exploitation the way they do and will be introduced into methods that are used to assess the status. The role of elasmobranchs in the ecosystem and tools for protection will also be presented. The students will learn how to tag elasmobranchs, assist with blue shark tagging off the coast of Halifax, and be introduced theoretically about how to work with sharks in the water.

Course Objectives/Learning Outcomes**CLASSROOM:**

By the end of this course, students will be able to:

1. Identify the roles elasmobranchs play in marine ecosystems.
2. Identify the conservation status of elasmobranchs on a global, national, and regional scale.
3. Describe basic shark anatomy and physiology.
4. Identify common species of elasmobranchs.
5. Define and discuss the varying types of field methods for shark research.
6. Analyse and discuss important topics in shark biology, life history, population dynamics and assessments, effects of human impact, management and conservation, and shark conservation concerns.
7. Define and discuss the different types of policies/regulations that apply to the management and conservation of sharks.
8. Investigate, analyse, interpret, and report on an issue related to shark biology, conservation or management.
9. Understand and describe different roles genomics can play in shark and ray management and conservation.

FIELD:

By the end of this course students will be able to:

1. Demonstrate working and collecting data in the field on sharks.
2. Recognize the basics on how to properly tag and release a shark.
3. Identify defining characteristics of sharks' anatomy, physiology, and make field observations.

LAB:

By the end of this course students will be able to:

1. Identify anatomical features of several species of shark, skate, or ray.

2. Demonstrate hands on experience with necropsy of cartilaginous fish.
3. Demonstrate experience in applying age-determination techniques.

Course Materials

- Required: Lecture handouts, including papers from primary literature. **WWF Identification Guide to Sharks, Skates, Rays and Chimaeras of Atlantic Canada – available on Brightspace.** Literature may also be available through Brightspace, as will be all course material.
- Suggested: ‘Biology of Sharks and Their Relatives’, by J.C. Carrier, J.A. Musick, M.R. Heithaus (Eds.) CRC Press

Course Assessment

For preliminary dates and times of tests, quizzes, assignments and exams see schedule below.

Component	Weight (% of final grade)	
Biodiversity quiz	5%	Monday, August 15 th (afternoon)
Dogfish lab quiz	5%	Tuesday, August 16 th (morning)
Skate lab quiz	5%	Friday, August 19 th (morning)
Individual Project	20%	Wednesday, August 24 th (all day)
Group project work	15%	Monday, August 29 th (all day)
Final exam	30%	Tuesday, August 30 th (morning)
Participation	20%	Throughout

Other course requirements

The students should be okay with working on dead animals and should be okay to spend several hours on a boat.

Conversion of numerical grades to Final Letter Grades follows the Dalhousie Common Grade Scale

A+ (90-100)	B+ (77-79)	C+ (65-69)	D (50-54)
A (85-89)	B (73-76)	C (60-64)	F (<50)
A- (80-84)	B- (70-72)	C- (55-59)	

Course Policies

Missed assignments or exams will count 0%, unless the student is excused prior to the exam or assignment due to circumstances out of his or her control (e.g. illness, death in the family). In case of illness, a doctor's note is needed to avoid lower marks and repeat the exam.

Attendance is mandatory - **You are expected to attend all lectures, field, and lab sessions.** It is your responsibility to ask the Instructor for notes, or missed lecture material, and to reschedule exams if absolutely necessary.

Schedule Changes - **The student is responsible for knowing when a schedule change takes place,** by emailing or asking the teacher, checking Brightspace. or writing down announcements in class.

Preparation for Field Trips - Excluding transportation, the student is expected to prepare for all field trips, see below for details.

Course Schedule (tentative – may change due to weather, availability of guest speakers, etc.)

DRAFT Schedule: Biology and Conservation of Sharks, Skates and Rays (Summer, 2022)

LC= Lecture; **GS=** Guest Speaker; **FT=** Field Trip; **LB=**Lab; **PW=**Project Work; **OT=**Other; **P=** Presentation; **QZ=** Quiz; **R=**Review; **FE=** Final Exam **Room Locations:**

-All regular lectures or computer work will be held online unless otherwise stated.

-All labs will be held online

Date	Day	AM Time	AM	PM Time	PM	Location
AUG 11 th	Th	9:00-10:30 4012	(LC) Kirsti Burnett Introduction to Course	1:30-2:00	(OT) Form groups (3 students per group)	4012
		10:30 – 11:00 4012	(OT) Introduce yourselves!	2:00-4:30	(LC) CHC - Shark Physiology and Anatomy I	4012
		11:00-12:30 4012	(LC) Manuel Dureuil Introduction to Biology/Ecology (LC)			
		12:30-1:30	Break			
AUG 12 th	Fr	9:30-12:00 4012	(LC) CHC - Diversity and Evolution of Elasmobranchs	1:00-3:30	(LC) CHC - Shark Physiology and Anatomy II	4012
		12:00-1:00	Break			



Aug 13 th	Sa	OFF		OFF		
Aug 14 th	Su	OFF		OFF		
Aug 15 th	Mo	9:30-10:00 4012 10:00-11:00 4012 11:00-12:00 4012 12:00-1:00	(R) Biodiversity Review (OT) Sharkwater Discussion (GS) TBA Ecosystem Effects Break	1:00-1:15 1:15-3:00 3:00-4:00	(LC) Spiny Dogfish (LB) Dogfish and Skate Dissection (link on Brightspace) (QZ) Biodiversity Quiz	2112 2112 4012
Aug 16 th	Tu	9:00-9:30 4012 9:30-10:30 4012 10:30-12:00 4012 12:00-1:00	(R) Dogfish Dissection Review (QZ) Dogfish lab quiz (GS) TBA White Sharks in the NW Atlantic Break	1:00-2:30 2:30-3:30 3:30-5:00	(LC) Manuel Dureuil Global Status, threats, and fisheries (GS) TBA Canadian Status, Threats and Species (FT) TBA Sharks and the Ocean Tracking Network	4012 4012 4012

AUG 17th	We	9:00-10:15 4012 10:30-12:00 4012 12:00-1:00	(LC) Manuel Dureuil Life History I Growth and Reproduction (LC) Manuel Dureuil Life History II Longevity and Natural Mortality Break	1:00–2:00 2:15–3:15 3:30–4:30	(LC) Manuel Dureuil Population Biology and Assessments (GS) TBA Elasmobranch Conservation & Mngmt (GS) TBA MPAs and Sharks	4012 4012 4012
AUG 18th	Th	9:00-10:00 4012 10:15-11:15 4012 11:30-12:30 4012 12:30-1:30	(GS) TBA Global Fin Print (GS) TBA Historical ecology of sharks (GS) Manuel Dureuil Historical Ecology Cont'd Break	1:00-4:00	(LB) Skate Dissection	2112
AUG 19th	Fr	10:00-10:30 4012 10:30-11:30 4012 11:30-12:00 4012 12:00-1:00	(R) Skate Dissection Review (QZ) Skate Lab Quiz (OT) Kirsti Burnett Blue Shark Charters Break	1:00-2:00 2:00-4:00	(LC) CHC - Animal Ethics and Shark Conservation (LC) CHC- Shark-Smart – all about field work aspects of working with sharks	4012 4012
AUG 20th	Sa	OFF		OFF		
AUG 21st	Su	Eastern Passage	(FT) Shark Tagging - Group A x 6 (GW) Group Work B and C	All day	(FT) Shark Tagging - Group A x 6 (GW) Group Work B and C	Eastern Passage
AUG 22nd	Mo	Eastern Passage	(FT) Shark Tagging - Group B x 6 (GW) Group Work A and C	All day	(FT) Shark Tagging - Group B x 6 (GW) Group Work A and C	Eastern Passage
Aug 23rd	Tu	Eastern Passage	(FT) Shark Tagging - Group C x 6	All day	(FT) Shark Tagging - Group C x 6	Eastern Passage

			(GW) Group Work A and B		(GW) Group Work A and B	
AUG 24th	We	9:00-12:00 4012	(PW) Individual Presentations	1:00-4:00	(PW) Individual Presentations	4012
AUG 25th	Thu	9:00-12:00 4012 12:00-1:00	(LC) Kirsti Burnett Cabo Verde, Guitarfish and Population Genomics Break	1:00-2:00 2:15-3:15	(LC/OT) Kirsti Burnett Intro to GenBank and Exercise (GS) Scarlett Taylor Life after shark class - Basking sharks	4012 4012
AUG 26th	Fri	9:00-10:00 4012 10:00-12:00 2112 12:00-1:00	(GS) TBA Aging methods (LB) TBA Aging lab Break	1:00-3:30 3:30-4:30	(LC/OT) Manuel Dureuil Growth discussion and exercise (OT) Exam Review	4012 4012
AUG 27th	Sa	OFF		OFF		
AUG 28th	Su	OFF		OFF		
AUG 29th	Mo	10:00-12:00 4012	(PW) Group Project Presentations	1:00-5:00	(PW) Group Project Presentations	4012
Aug 30th	Tu	10:00-12:00 4012 12:00-1:00	(FE) Final Exam Break	1:00-4:00	(OT) <i>Film (TBD) and course discussion</i>	TBD

What to bring on field trips

Appropriate footwear for wet conditions, camera, lunch, water snacks, pencils, notebook, sunscreen, sunglass, head, jacket for wind or rain.

University Policies and Statements

This course is governed by the academic rules and regulations set forth in the University Calendar and by Senate

Academic Integrity

At Dalhousie University, we are guided in all of our work by the values of academic integrity: honesty, trust, fairness, responsibility and respect (The Center for Academic Integrity, Duke University, 1999). As a student, you are required to demonstrate these values in all of the work you do. The University provides policies and procedures that every member of the university community is required to follow to ensure academic integrity.

Information: https://www.dal.ca/dept/university_secretariat/academic-integrity.html

Accessibility

The Advising and Access Services Centre is Dalhousie's centre of expertise for student accessibility and accommodation. The advising team works with students who request accommodation as a result of a disability, religious obligation, or any barrier related to any other characteristic protected under Human Rights legislation (Canada and Nova Scotia).

Information: https://www.dal.ca/campus_life/academic-support/accessibility.html

Student Code of Conduct

Everyone at Dalhousie is expected to treat others with dignity and respect. The Code of Student Conduct allows Dalhousie to take disciplinary action if students don't follow this community expectation. When appropriate, violations of the code can be resolved in a reasonable and informal manner—perhaps through a restorative justice process. If an informal resolution can't be reached, or would be inappropriate, procedures exist for formal dispute resolution.

Code: https://www.dal.ca/dept/university_secretariat/policies/student-life/code-of-student-conduct.html

Diversity and Inclusion – Culture of Respect

Every person at Dalhousie has a right to be respected and safe. We believe inclusiveness is fundamental to education. We stand for equality. Dalhousie is strengthened in our diversity. We are a respectful and inclusive community. We are committed to being a place where everyone feels welcome and supported, which is why our Strategic Direction prioritizes fostering a culture of diversity and inclusiveness

Statement: <http://www.dal.ca/cultureofrespect.html>

Recognition of Mi'kmaq Territory

Dalhousie University would like to acknowledge that the University is on Traditional Mi'kmaq Territory. The Elders in Residence program provides students with access to First Nations elders for guidance, counsel and support. Visit or e-mail the Indigenous Student Centre (1321 Edward St) (elders@dal.ca).

Information: https://www.dal.ca/campus_life/communities/indigenous.html

Important Dates in the Academic Year (including add/drop dates)

https://www.dal.ca/academics/important_dates.html

University Grading Practices

https://www.dal.ca/dept/university_secretariat/policies/academic/grading-practices-policy.html

Student Resources and Support

Advising

General Advising https://www.dal.ca/campus_life/academic-support/advising.html

Science Program Advisors: <https://www.dal.ca/faculty/science/current-students/academic-advising.html>

Indigenous Student Centre: https://www.dal.ca/campus_life/communities/indigenous.html

Black Students Advising Centre: https://www.dal.ca/campus_life/communities/black-student-advising.html

International Centre: https://www.dal.ca/campus_life/international-centre/current-students.html

Academic supports

Library: <https://libraries.dal.ca/>

Writing Centre: https://www.dal.ca/campus_life/academic-support/writing-and-study-skills.html

Studying for Success: https://www.dal.ca/campus_life/academic-support/study-skills-and-tutoring.html

Copyright Office: <https://libraries.dal.ca/services/copyright-office.html>

Fair Dealing Guidelines <https://libraries.dal.ca/services/copyright-office/fair-dealing.html>

Other supports and services

Student Health & Wellness Centre: https://www.dal.ca/campus_life/health-and-wellness/services-support/student-health-and-wellness.html

Student Advocacy: <https://dsu.ca/dsas>

Ombudsperson: https://www.dal.ca/campus_life/safety-respect/student-rights-and-responsibilities/where-to-get-help/ombudsperson.html

Safety

Biosafety: <https://www.dal.ca/dept/safety/programs-services/biosafety.html>

Chemical Safety: <https://www.dal.ca/dept/safety/programs-services/chemical-safety.html>

Radiation Safety: <https://www.dal.ca/dept/safety/programs-services/radiation-safety.html>

Scent-Free Program: <https://www.dal.ca/dept/safety/programs-services/occupational-safety/scent-free.html>