

Faculty of Science Course Syllabus
Department of Biology

MARI 3627(2) - Biology and Conservation of Sharks, Skates and Rays
Dalhousie University, Seaside Summer Course, Summer 2022

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Lectures: July 25th – August 9th, 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 and rays 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 intrinsic biology and conservation of chondrichthyans (sharks, skates, rays, and chimaeras). Students will learn all about sharks and rays through a combination of classroom instruction, hands-on experiential learning, guest lectures from shark scientists of various career stages, and the communication of science through peer-reviewed literature and exercises in science communication for a broad audience. Students will get hands-on instruction in the anatomy, physiology and function of different organs through the dissections of sharks and skates. The integration of intrinsic biology for conservation will be covered in multiple modules using real-world for analysis and visualization in the R computing language. Students will have the opportunity to learn shark tagging and the safe and ethical handling of animals in the field. Finally students will

participate in a final day symposium linking their new knowledge of shark and ray biology, ecology, and conservation through oral presentations.

Course Objectives/Learning Outcomes

CLASSROOM:

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

1. Understand the intrinsic biology and evolutionary ecology of elasmobranchs.
2. Identify the roles elasmobranchs play in marine ecosystems.
3. Identify the conservation status of elasmobranchs on a global, national, and regional scale.
4. Describe basic shark anatomy and physiology.
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, fisheries management, and human wildlife interactions.
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. Perform basic analysis and visualization of data in R.
10. Create and share science communication materials about shark and ray biology, conservation, or management to a broad audience.

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 assessing the neuroecology of sharks and rays.

Course Materials

- Required: Lecture handouts and recordings, including papers from primary literature, and selected book chapters and videos. All materials will be available on brightspace.

- Suggested: 'Biology of Sharks and Their Relatives 3rd Edition', by J.C. Carrier, C.A. Simpfendorfer, M.R. Heithaus, and K.E. Yopak (Eds) CRC Press

Course Assessment

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

Component	Weight (% of final grade)
General Biology quiz 5%	Wednesday, July 27th (afternoon)
Guest Lecture quiz 5%	Friday, August 5th (afternoon)
Dogfish and Skate lab quiz 5%	Monday, August 8th (afternoon)
Individual Project 20%	Fri and Sat, August 5-6 (afternoon)
Group project work 20%	Monday, August 29th (all day)
Final Presentation 20%	Tuesday, August 9th (all day)
Participation 25%	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.

Date	Day	Morning	Time/Location	Afternoon	Time/Location
25-Jul	Mon	Introduction to the Course and Syllabus	9:00 - 10:30	Paleobiology and Biodiversity	1:00 - 2:30
		Introduction to Marine Ecology, Biology, and Physiology	10:30 - 12:00	The Shark EDGE project	2:30 - 4:00
26-Jul	Tue	Shark and Ray Anatomy	9:00 - 10:30	Age and Growth/Energetics	1:00 - 2:30
		Shark and Ray Physiology	10:30 - 12:00	Sensory Biology	2:30 - 4:00
27-Jul	Wed	Reproductive Biology/Mating Systems	9:00 - 10:30	Movement Ecology	1:00 - 2:30
		Shark Crash Course	10:30 - 12:00	Reading a scientific paper General Shark and Ray Biol Quiz	2:30 - 4:00
28-Jul	Thur	Conservation Science	9:00 - 10:30	Guest Lecture: Ana Martins, Dalhousie	1:00 - 2:30
		Guest Lecture: Olga Koubrak, Dalhousie	10:30 - 12:00	Science Communication	2:30 - 4:00
29-Jul	Fri	Ecological Lifestyles	9:00 - 10:30	Acoustic Telemetry exercise	1:00 - 2:30
		Ecological Roles	10:30 - 12:00	Guest Lecture: Emily Sklar, Dal	2:30 - 4:00
30-Jul	Sat	Guest Lecture: Aaron Judah, Dalhousie	9:00 - 10:30	Guest Lecture: Scarlett Taylor, Dal	1:00 - 2:30
		Sharkpedia exercise	10:30 - 12:00	Primer for Fieldwork and Safe and Responsible Shark Handling	2:30 - 4:00
31-Jul	Sun	OFF	OFF	OFF	OFF
01-Aug	Mon	Shark Tagging Group 1	9:00 - 10:30	Shark Tagging Group 1	1:00 - 2:30
		Project Work Group 2 and 3	10:30 - 12:00	Project Work Group 2 and 3	2:30 - 4:00
02-Aug	Tue	Shark Tagging Group 2	9:00 - 10:30	Shark Tagging Group 2	1:00 - 2:30
		Project Work Group 1 and 3	10:30 - 12:00	Project Work Group 1 and 3	2:30 - 4:00
03-Aug	Wed	Shark Tagging Group 3	9:00 - 10:30	Shark Tagging Group 3	1:00 - 2:30
		Project Work Group 1 and 2	10:30 - 12:00	Project Work Group 1 and 2	2:30 - 4:00
04-Aug	Thu	Group Work Presentations	9:00 - 10:30	Guest Lecture: Dovi Kacev, UCSD	1:00 - 2:00
		Guest Lecture: Kara Yopak, University of North Carolina Wilmington	10:30 - 12:00	Guest Lecture: Nathan Pacoureau, SFU	2:30 - 4:00
05-Aug	Fri	Dogfish Dissection	9:00 - 10:30	Guest Lecture: Kady Lyons, Georgia Aquarium	1:00 - 2:00
		Dogfish Dissection	10:30 - 12:00	Paper Discussions: Group 1	2:30 - 4:00
06-Aug	Sat	Skate Dissection	9:00 - 10:30	Paper Discussion: Group 2	1:00 - 2:30
		Skate Dissection	10:30 - 12:00	Paper Discussions: Group 3	2:30 - 4:00
07-Aug	Sun	OFF	OFF	OFF	OFF
08-Aug	Mon	BRAINS LAB!	9:00 - 10:30	Brain Evolution	1:00 - 2:30
		Brains exercise	10:30 - 12:00	Something Fun	2:30 - 4:00
09-Aug	Tue	Final Symposium	9:00 - 10:30	Final Symposium	1:00 - 2:30
		Final Symposium	10:30 - 12:00	Final Symposium	2:30 - 4:00