



**DALHOUSIE
UNIVERSITY**

**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 2019

Instructor: Manuel Dureuil, Ph.D. Candidate, Department of Biology, Room 4134, Life Sciences Centre, Office Phone: 494-2146; Email: manuel.dureuil@dal.ca

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

Demonstrator: Kirsti Burnett, burnettkirsti@gmail.com

Lectures: Jun 14th – Jun 30th, 9:00am - 5:00pm, Studley LSC 4012.

Laboratories: Studley LSC lab 2112. For dates see schedule

Field trips: Jun 24th – Jun 26th full day. Boat tagging trip. Each student will only be able to go on one of these dates (limited space on boat). See schedule for details.

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 Canada 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. 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 also 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. Analyze and discuss important topics on 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, analyze, interpret, and report on an issue related to shark biology, conservation or management.

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. 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)***Tests***

Research paper 20%

Species identification quiz 5%

Dogfish lab quiz 5%

Skate lab quiz 5%

Group project work 15%

Final exam 30%

Participation 20%

Other course requirements

The students should be ok with working on dead animals and should be ok 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 previous 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, 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, etc.)

Schedule, may change do to availability of guest speakers and weather conditions.

DRAFT Schedule: Biology and Conservation of Sharks, Skates and Rays (Summer, 2019)

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 in Studley LSC 4012.

-All labs will be held in BIOL 2112, 2nd floor of the LSC

Date	Day	AM Time	AM	PM Time	PM	Location
JUN 14 th	Fr	9:00-10:30 4012	(LC) Introduction to Course	1:00-3:30	(GS) Chris Harvey-Clark Diversity and Evolution of Elasmobranchs	4012
		10:30-12:00 4012	(LC) Chris Harvey-Clark Animal Ethics and Shark Conservation	3:30-4:00	Form groups (3 students per group)	4012
		12:00-1:00	Break			
JUN 15 th	Sa	10:00-11:00 4012	(LC) Introduction to Biology/Ecology	1:00-2:00	(LC) Kirsti Burnett ShARCC and The Cabo Verde Project	4012
		11:00-12:00 4012	(LC) Global status, threats and fisheries	2:00-3:00	(OT) ID-Exercise	4012
		12:00-1:00	Break	3:00-5:00	(OT) SHARKWATER	4012
JUN 16 th	Su	OFF		OFF		
JUN 17 th	M	9:00-9:30 4012	(R) Review of Species ID	1:00-1:15 1:15-2:30	(LC) Spiny Dogfish (LB) Dogfish Dissection	2112 2112
		9:30-12:00 4012	(LC) Chris Harvey-Clark Shark Physiology and Anatomy I	2:30-3:00 3:00-4:00	(LB) Spiral Valve Casts (QZ) Species ID Quiz	2112 4012
		12:00-1:00	Break			
JUN 18 th	Tu	9:00-9:30 4012	(R) Dogfish Dissection Review	1:00-2:30 2:30-3:00	(LB) Skate Dissection (LB) Spiral Valve Casts	2112 2112
		9:30-11:00 4012	(GS) TBA Skates and rays	3:00-4:00	(QZ) Dogfish Lab Quiz	4012
		11:15-12:00 4012	(LC) Chris Harvey-Clark Shark Physiology and Anatomy II			
		12:00-1:00	Break			
JUN 19 th	We	9:00-9:30 4012	(R) Skate Dissection Review	12:30-1:30	(LC) Life history I Growth and reproduction	4012
		9:30-10:30 4012	(GS) TBA Canadian status, threats and fisheries	1:30-3:00	(LC) Life history II Longevity and natural mortality	4012
		10:30-11:30 4012	(GS) TBA Ecosystem effects	3:00-4:00	(QZ) Skate Lab Quiz	4012
		11:30-12:30	Break			

JUN 20th	Th	9:00-10:00 4012	(LC) Statistics and model fitting	1:00-2:00	(GS) TBA Shark sanctuaries and Marine Protected Areas	4012	
		10:00-11:00 4012	(LC) Population biology and assessment methods	2:15-3:15	(GS) TBA Elasmobranch conservation and management	4012	
		11:00-12:00 4012	(LC) Intro FishBase and Exercise				
		12:00-1:00 4012	Break	3:30-4:30	(GS) TBA Social Media and Public Outreach	4012	
JUN 21st	F	9:00-10:45 4012	(GS) TBA Acoustic Telemetry Workshop	1:00-2:00 2:00-4:00	(GS) TBA Global Fin Print (LC) Chris Harvey-Clark Sharksmart-all about field work aspects of working with sharks	4012	
		11:00-12:00 4012	(GS) TBA Sharks and The Ocean Tracking Network			4012	
		12:00-1:00 4012	Break				
JUN 22nd	Sa	10:00-12:00 4012	(P) Research paper presentations	1:00-5:00	(P) Research paper presentations	4012	
		12:00-1:00 4012	Break				
JUN 23rd	Su	OFF		OFF			
JUN 24th	M	Eastern Passage 4012	(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 4012	
JUN 25th	Tu	Eastern Passage 4012	(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 4012	
JUN 26th	We	Eastern Passage 4012	(FT) Shark Tagging-Group C x 6 (GW) Group work A and B	All day	(FT) Shark Tagging-Group C x 6 (GW) Group work A and B	Eastern Passage 4012	
JUN 27th	Th	9:00-10:30 4012	(OT) Open Discussion and Questions	1:00-2:00	(GS) TBA Aging methods	2112	
		10:30-12:00 4012	(GS) TBA White Sharks in the NW Atlantic	2:00-5:00	(LB) TBA Aging lab		
		12:00-1:00 4012	Break				
JUN 28th	F	9:00-12:00 4012	(PW) Group Project Presentations	1:00-4:00	(PW) Group Project Presentations	4012	
		12:00-1:00 4012	Break	4:00-5:00	(R) Exam review	4012	



JUN 29 th	Sa	10:00-12:00 4012	(FE) Final Exam	1:00-4:00	(OT) SHARKWATER EXTINCTION	TBA
		12:00-1:00	Break			
JUN 30 th	Su	OFF		OFF		

What to bring on field trips

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

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ACCOMMODATION POLICY FOR STUDENTS

Students may request accommodation as a result of barriers related to disability, religious obligation, or any characteristic protected under Canadian Human Rights legislation. The full text of Dalhousie's Student Accommodation Policy can be accessed here:

http://www.dal.ca/dept/university_secretariat/policies/academic/student-accommodation-policy-wef-sep--1--2014.html

Students who require accommodation for classroom participation or the writing of tests and exams should make their request to the **Advising and Access Services Centre (AASC)** prior to or at the outset of the regular academic year. More information and the ***Request for Accommodation*** form are available at www.dal.ca/access.

ACADEMIC INTEGRITY

Academic integrity, with its embodied values, is seen as a foundation of Dalhousie University. It is the responsibility of all students to be familiar with behaviours and practices associated with academic integrity. Instructors are required to forward any suspected cases of plagiarism or other forms of academic cheating to the Academic Integrity Officer for their Faculty.

The Academic Integrity website (<http://academicintegrity.dal.ca>) provides students and faculty with information on plagiarism and other forms of academic dishonesty, and has resources to help students succeed honestly. The full text of Dalhousie's ***Policy on Intellectual Honesty*** and ***Faculty Discipline Procedures*** is available here:

http://www.dal.ca/dept/university_secretariat/academic-integrity/academic-policies.html

STUDENT CODE OF CONDUCT

Dalhousie University has a student code of conduct, and it is expected that students will adhere to the code during their participation in lectures and other activities associated with this course. In general:

“The University treats students as adults free to organize their own personal lives, behaviour and associations subject only to the law, and to University regulations that are necessary to protect

- the integrity and proper functioning of the academic and non – academic programs and activities of the University or its faculties, schools or departments;
- the peaceful and safe enjoyment of University facilities by other members of the University and the public;
- the freedom of members of the University to participate reasonably in the programs of the University and in activities on the University's premises;
- the property of the University or its members.”

The full text of the code can be found here:

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

SERVICES AVAILABLE TO STUDENTS

The following campus services are available to help students develop skills in library research, scientific writing, and effective study habits. The services are available to all Dalhousie students and, unless noted otherwise, are free.

Service	Support Provided	Location	Contact
General Academic Advising	Help with <ul style="list-style-type: none"> - understanding degree requirements and academic regulations - choosing your major - achieving your educational or career goals - dealing with academic or other difficulties 	Killam Library Ground floor Rm G28 <i>Bissett Centre for Academic Success</i>	In person: Killam Library Rm G28 By appointment: <ul style="list-style-type: none"> - e-mail: advising@dal.ca - Phone: (902) 494-3077 - Book online through MyDal
Dalhousie Libraries	Help to find books and articles for assignments Help with citing sources in the text of your paper and preparation of bibliography	Killam Library Ground floor Librarian offices	In person: Service Point (Ground floor) By appointment: Identify your subject librarian (URL below) and contact by email or phone to arrange a time: http://dal.beta.libguides.com/sb.php?subject_id=34328
Studying for Success (SFS)	Help to develop essential study skills through small group workshops or one-on-one coaching sessions Match to a tutor for help in course-specific content (for a reasonable fee)	Killam Library 3rd floor Coordinator Rm 3104 Study Coaches Rm 3103	To make an appointment: <ul style="list-style-type: none"> - Visit main office (Killam Library main floor, Rm G28) - Call (902) 494-3077 - email Coordinator at: sfs@dal.ca or - Simply drop in to see us during posted office hours All information can be found on our website: www.dal.ca/sfs
Writing Centre	Meet with coach/tutor to discuss writing assignments (e.g., lab report, research paper, thesis, poster) - Learn to integrate source material into your own work appropriately	Killam Library Ground floor Learning Commons & Rm G25	To make an appointment: <ul style="list-style-type: none"> - Visit the Centre (Rm G25) and book an appointment - Call (902) 494-1963 - email writingcentre@dal.ca - Book online through MyDal We are open six days a week See our website: writingcentre.dal.ca



	- Learn about disciplinary writing from a peer or staff member in your field		
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