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 2020**

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

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

Demonstrator: Kirsti Burnett, burnettkirsti@gmail.com

Lectures: AUG 12th – AUG 31st, 9:00am - 5:00pm, Studley LSC 4012.

Laboratories: Studley LSC lab 2112. For dates see schedule

Field trips: AUG 19th – AUG 21st 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 elementals of elasmobranch's (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 as 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 to 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, 2020)

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
AUG 12th	**We**	9:00-10:30 **4012** 10:30-12:00 **4012** 12:00-1:00	**(LC)** Introduction to Course **(LC)** Chris Harvey-Clark Animal Ethics and Shark Conservation Break	1:00-3:30 3:30-4:00	**(GS)** Chris Harvey-Clark Diversity and Evolution of Elasmobranchs Form groups (3 students per group)	**4012** **4012**
AUG 13th	**Th**	10:00-11:00 **4012** 11:00-12:00 **4012** 12:00-1:00	**(LC)** Introduction to Biology/Ecology **(LC)** Global status, threats and fisheries Break	1:00-2:00 2:00-3:00 3:00-5:00	**(GS)** TBA Canadian status, threats and fisheries **(LC)** Kirsti Burnett ShARCC and The Cabo Verde Project **(OT)** SHARKWATER	**4012** **4012** **4012**
AUG 14th	**Fr**	9:00-9:30 **4012** 9:30-12:00 **4012** 12:00-1:00	**(R)** Review of Species ID **(LC)** Chris Harvey-Clark Shark Physiology and Anatomy I Break	1:00-1:15 1:15-2:30 2:30-3:00 3:00-4:00	**(LC)** Spiny Dogfish **(LB)** Dogfish Dissection **(LB)** Spiral Valve Casts **(QZ)** Species ID Quiz	**2112** **2112** **2112** **4012**
AUG 15th	**Sa**	OFF	Unless weather does not permit planned tagging trips	OFF	Unless weather does not permit planned tagging trips	
AUG 16th	**Su**	OFF	Unless weather does not permit planned tagging trips	OFF	Unless weather does not permit planned tagging trips	
AUG 17th	**M**	9:00-9:30 **4012** 9:30-11:00 **4012** 11:15-12:00 **4012** 12:00-1:00	**(R)** Dogfish Dissection Review **(GS)** TBA Skates and rays **(LC)** Chris Harvey-Clark Shark Physiology and Anatomy II Break	1:00-2:30 2:30-3:00 3:00-4:00	**(LB)** Skate Dissection **(LB)** Spiral Valve Casts **(QZ)** Dogfish Lab Quiz	**2112** **2112** **4012**

AUG 18th	**Tu**	9:00-9:30 **4012** 9:30-11:00 **TBA** 12:00-1:00	**(R)** Skate Dissection Review **(GS)** TBA Acoustic Telemetry and Ocean Tracking Network Break	1:00-3:30 3:30-4:30	**(LC)** Chris Harvey-Clark Sharksmart-all about field work aspects of working with sharks **(QZ)** Skate Lab Quiz	**4012** **4012**
AUG 19th	**We**	**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**
AUG 20th	**Th**	**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**
AUG 21st	**Fr**	**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**
AUG 22nd	**Sa**	OFF	Unless weather does not permit planned tagging trips	OFF	Unless weather does not permit planned tagging trips	
AUG 23rd	**Su**	OFF	Unless weather does not permit planned tagging trips	OFF	Unless weather does not permit planned tagging trips	
AUG 24th	**M**	10:00-12:00 **4012** 12:00-1:00	**(P)** Research paper presentations Break	1:00-5:00	**(P)** Research paper presentations	**4012**
AUG 25th	**Tu**	9:00-10:00 **4012** 10:15-11:15 **4012** 11:30-12:30 **4012** 12:30-1:30	**(GS)** TBA Ecosystem effects **(GS)** TBA Historical ecology of sharks **(GS)** TBA Sharks and Protected Areas Break	1:30-2:30 2:30-3:30 3:30-4:30	**(GS)** TBA Elasmobranch conservation and management **(OT)** TBA Conservation genetics eDNA Exercise **(LC)** R Session	**4012** **4012**
AUG 26th	**We**	9:00-10:00 **4012** 10:00-11:00 **4012** 11:00-12:00 **4012** 12:00-1:00	**(LC)** Life history I Growth and reproduction **(LC)** Life history II Longevity and natural mortality **(LC)** Statistics and model fitting Break	1:00-2:30 2:30-4:00	**(LC)** Population biology and assessment methods **(LC)** Intro FishBase and R Exercise	**4012** **4012**

AUG 27th	**Th**	9:00-10:30 **4012** 10:30-12:00 **4012** 12:00-1:00	**(GS)** TBA White Sharks in the NW Atlantic **(GS)** TBA Aging methods Break	1:00-3:00 3:30-4:30	**(LB)** TBA Aging lab **(GS)** TBA Social Media and Public Outreach	**2112** **4012**
AUG 28th	**Fr**	9:00-12:00 **4012** 12:00-1:00	**(PW)** Group Project Presentations Break	1:00-4:00 4:00-5:00	**(PW)** Group Project Presentations **(R)** Exam review	**4012** **4012**
AUG 29th	**Sa**	OFF	Unless weather does not permit planned tagging trips	OFF	Unless weather does not permit planned tagging trips	
AUG 30th	**Su**	OFF	Unless weather does not permit planned tagging trips	OFF	Unless weather does not permit planned tagging trips	
AUG 31st	**M**	10:00-12:00 **4012** 12:00-1:00	**(FE)** Final Exam Break	1:00-4:00	**(OT)** SHARKWATER EXTINCTION	**TBA**

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, seasickness medication

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

Missed or Late Academic Requirements due to Student Absence (policy)
https://www.dal.ca/dept/university_secretariat/policies/academic/missed-or-late-academic-requirements-due-to-student-absence.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