

**Faculty of Science Course Syllabus**  
**Department of Biology**  
MARI 3090  
Marine Mammalogy  
Winter 2019

**Instructor(s):** Tonya Wimmer / Margaret Cooper    twimmer@dal.ca / mhcooper@dal.ca

**Lectures:**            MWF 1435-1525pm                            Location: Chemistry 125

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**Course Description**

*The course will examine the characteristics that mammals brought with them when they returned to the ocean, the evolution of the different groups of marine mammals, some of their special adaptations, the roles of marine mammals in oceanic ecosystems and general principles of marine mammal population biology. Students will use information on the biology of marine mammals to explore conservation/management issues.*

**Course Prerequisites**

*BIOL 2060.03 (or BIOA 3001.03)*

**Course Objectives/Learning Outcomes**

Student learning outcomes that are covered by this course.

1. Describe the differences and similarities between marine and terrestrial mammals and their relative ecological importance.
2. Understand the origins, taxonomic diversity, structure and ecological importance of the marine mammal orders and families.
3. Recall the general biology of marine mammal taxa.
4. Understand the meaning of life history and the life history characteristics of cetaceans and pinniped and the factors that shape their evolution.
5. Understand how marine mammal abundance is measured and the significance of life history parameters in population dynamics and have a basic understanding of the factors which contribute to the formation of new colonies.
6. Understand how social systems have evolved, the types of social systems in marine mammals and the evolution of mating strategies as an example of a social system.
7. Describe the influence of social structure on vocal categories.
8. Demonstrate a basic understanding of sound propagation in water, fundamental sound component analysis (e.g. amplitude, frequency), sound production and receiving mechanisms in various marine mammal taxa and the impacts harmful sound can have on populations.
9. Demonstrate a basic understanding of optimal foraging theory, the pros and cons of dietary techniques for estimating diet and the importance of the development of new technologies.
10. Demonstrate an awareness that science, law and politics play an important role in the conservation and management of marine mammals, threats they face and mitigation options.

11. Demonstrate a basic understanding of the concepts and role genetics plays in conservation of marine mammals.
12. Describe the physiological adaptations marine mammals have evolved to adapt to diving, cold and swimming.
13. Evaluate scientific data, opinions and theories with respect to a scientific or conservation questions.

### Course Materials

*No supplementary materials*

### Course Assessment

For the term project, you will choose a topical issue to examine from a *practical* perspective. For most topics, you will be asked to weigh an issue related to marine mammal conservation, ethics, research etc. and to provide advice to an “organization” and make a management and/or conservation recommendation.

**\*\*You need to indicate your order of preference for all 15 topics by Friday 11 January 2019\*\*** A list of the issues will be available online by the second day of classes.

These topics are all current and hotly debated issues. For the term projects, you will be required to work as a group, in pairs and individually to complete the various components. Each topic will be examined by a maximum of **four** students, whom will work **individually** to create an outline (see Assignment #1) and deliver a final paper (see Assignment #2) and as an **assigned group and pairs** to deliver a presentation debate on the topic (see Assignment #3).

Details of the three assignments are as follows:

#### 1. Create an outline with references – Due **Friday 25 January 2019 by 4:30 pm**

This assignment will be conducted **individually**. First, research the basic information surrounding the issue. From this, make an outline of the information you will need to thoroughly research on the issue from a scientific standpoint. List all of the relevant parts of your report in order, while also considering how you will organize your final report (see below). The outline should be no more than 3 pages, including reference list, single-spaced text (letter sized page, size 12 font, 1” margins for sides and top/bottom). The report is to be submitted as a word file (.doc) to Brightspace, named as: Student Name\_Outline.doc **You will need to include at least five key references, formatted in the correct manner as described below.**

#### 2. Write a final report – Due **Wednesday 6 March 2019 by 4:30 pm**

This assignment will be conducted **individually**. Each member of the group is required to write an individual final report. Do not write this report together, rather consider this your opportunity to evaluate the topic and feel open to take a different viewpoint to your partners. The report should summarize the different sides of the issue, provide the scientific background (e.g. biology of species concerned relevant to the issue, action of threats), and explain what action you think should be taken and why. Make sure you focus on

your specific question and give only **relevant** background information. The report should be a document that can be read quickly and easily by the “executive of the organization” that commissioned the report.

Maximum length: 5 single-spaced pages (letter sized page, size 12 font, 1” margins for sides and top/bottom) including a 200-word (maximum) summary but excluding the reference list, figures and tables. Tables and figures must be labelled correctly (with descriptive titles, located *above* the tables or *below* the figures, and referenced if from another source). The report is to be submitted as a word file (.doc) to Brightspace, named as: Student Name\_Final.doc

#### **Notes on References:**

For the outline and final report, cite and list sources in the correct format, i.e. according to the **Canadian Journal of Zoology format**. Wherever possible cite references from peer reviewed journals, and avoid references from grey literature (i.e. reports, theses, government documents etc.). For opinions, concerns, or legal information you can cite internet sources (in the correct format!). If you’re unsure of how to format a reference, talk to your TA. The order of preference for sources of information is:

- a) Published, peer-reviewed primary or review journals (e.g. *Canadian Journal of Zoology*, *Nature*)
- b) Edited collections of papers (e.g. “*Handbook of Marine Mammals*” series)
- c) Non- peer reviewed journals and technical reports (e.g. *Scientific Reports of the Whales Research Institute of Tokyo*)
- d) Scientific books (e.g. “*The ecology of whales and dolphins*”)
- e) Semi-popular journals (e.g. *Oceanus*, *Scientific American*)
- f) Semi-popular books (e.g. “*Seals of the World*”)
- g) Published abstracts (e.g. from *Biennial Marine Mammal Conferences*)
- h) Internet (unless reproduction of something in one of categories above), popular books, etc.

#### **Wikipedia, lecture notes or spoken words from a lecture are not valid references**

### 3. Design and Give a Debate Presentation – to be presented during the period **1 April – 8 April 2019**

Each debate will involve three groups of students: a group of two students that will support one side of the issue (Side 1), an opposing group that will support the other side of the issue (Side 2), and a group of four students that will pose questions and judge the quality of the arguments and performance of the debate (the ‘judges’). If there is time, questions may also be posed by the class audience. Given the size of the class, students will be assigned to 2 different rooms.

Individuals will be assigned to their debate room, group and the side of the debate randomly by the professors (to be done by 8 March 2019).

You will present and attend presentations in the same room for the entire four days of student presentations. You will only be asked questions on the final exam from the room to which you were assigned.

***The format of the debate will be as follows:***

Student A from Side 1 will present their argument (3 minutes)

Student A from Side 2 will present their argument (3 minutes)

Student B from Side 1 will present further arguments, highlight issues with the opposing team's arguments and address questions that may have been raised by the opposite side (3 minutes)

Student B from Side 2 will present further arguments, highlight issues with the opposing team's arguments and address questions that may have been raised by the opposite side (3 minutes)

*\*\* It is recommended to use a Powerpoint presentation for delivering the arguments. Be sure to provide a review of your main pro/con arguments, your scientific support and your recommendations\*\**

Students from Side 1 of the debate now present a rebuttal to arguments raised by the second, opposing side (2 minutes)

Students from Side 2 of the debate present their rebuttal to arguments raised by the first side (2 minutes)

After the presentation, the two sides will be open to questions from the judges (~8 minutes)

*\*\*Each of the four judges will be required to ask at least one question. Students will be assigned to a particular day for which they are responsible for asking questions following student presentations. Student participation as judges is mandatory and part of your final grade. \*\**

After the judging period, questions will open to the class followed by a vote on which side performed the best. However, no marks will be awarded to the successful team.

Finally, judges and the instructor will provide a grade for each side of the debate based on arguments given and performance; the final grade will be an average of these grades.

**MIDTERM (one hour) – Monday, 4<sup>th</sup> February 2019**

A series of short-answer style questions on topics covered in lectures up to and including **30<sup>th</sup> January 2019**.

**FINAL EXAM (two hours) – TBD**

A series of short-answer questions on topics covered in lectures and student presentations, from **6<sup>th</sup> February to 8<sup>th</sup> April** inclusive. You will only be asked questions on the student presentations given in your room.

<b>Component</b>	<b>Weight (% of final grade)</b>	<b>Date</b>
<i>Midterm exam</i>	15%	Feb 4 <sup>th</sup>
<i>Final exam</i>	25%	TBD
<i>Paper Outline</i>	10%	January 25 <sup>th</sup>
<i>Final paper</i>	30%	March 6 <sup>th</sup>
<i>Presentation</i>	15%	April 1 <sup>st</sup> – April 8 <sup>th</sup>
<i>Participation</i>	5%	April 1 <sup>st</sup> – April 8 <sup>th</sup>

**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**

All assignments must be submitted to Brightspace (as a .doc file) by 4:30 p.m. on the due date. 10% will be taken off for each day late until the assignment is handed back in class, after which a 0 will be given (except for legitimate medical reasons). If you're not going to be able to hand in an assignment on the day it's due or attend an exam, email one of the professors immediately **prior** to the deadline/exam date to make alternative arrangements (if excuse is valid).

**Course Content (Approximate Schedule)**

7 Jan: Introduction to class and assignments  
 9 Jan: Diversity of Marine Mammals  
 11 Jan - 27 March: Attributes of Marine Mammals  
 4 Feb: Midterm  
 1 Apr – 8 Apr: Student presentations (debates)

	<u>Date</u>			<u>Assignment Due Dates</u>	<u>Lecturer</u>
M	Jan	7	Introduction to Marine Mammalogy		MC
W		9	Diversity of Marine Mammals		MC
F		11	Evolution	Sign up for assignments electronically	TW
M		14	Life history of cetaceans		TW
W		16	Population biology of cetaceans		TW
F		18	Life history of pinnipeds		MC
M		21	Population biology of pinnipeds		MC
W		23	Cetacean social systems		TW
F		25	Pilot whale	Outline Due	LZ
M		28	Orca		LZ
W		30	Whale culture		HW
F	Feb	1	<i>Munro Day – no classes</i>		
M		4	<b>Midterm</b>		
W		6	Diving Physiology		AP
F		8	Pinnipeds/ocean sensing		DL
M		11	Pinniped Social Systems		MC
W		13	Foraging ecology of pinnipeds		MC
F		15	Humpback whale		KK
		18-22	<i>Heritage Day &amp; Winter Break - no classes</i>		
M		25	Acoustics I - Intro to sound and pinniped vocalizations		HMM
W		27	Acoustics II - Cetacean vocalization		HMM
F	Mar	1	Conservation/management of cetaceans Pt1		TW
M		4	Sperm whale		HW
W		6	Conservation/management of cetaceans Pt2	Final Paper Due	TW
F		8	Baleen whales and habitat use		HJ
M		11	Conservation/Management of Pinnipeds		MC
W		13	Walrus and Genetics		BM
F		15	Harbour/Grey seals		MC
M		18	Harp/Hooded seals		MC
W		20	Gray whales		LF
F		22	Manatees		TW
M		25	Marine Mammal Response		TW
W		27	Bottlenose dolphin		TH
F		29	TBD		
M	Apr	1	Assignment presentations (2 per room; 2 rooms)		TW/MC
W		3	Assignment presentations (2 per room; 2 rooms)		TW/MC
F		5	Assignment presentations (2 per room; 2 rooms)		TW/MC
M		8	Assignment presentations (2 per room; 2 rooms)		TW/MC