**Syllabus**

**BIO 296 (4 credits)**

**Marine Mammal Biology**

CE Study Abroad Course in Panama

UVM Summer Mon. May 27 to June 15, 2019

Instructors Instructor

Laura J. May-Collado, Ph.D. Heather Daszkiewicz

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**Pre-requisites**: Undergraduate junior or senior levels. BCOR 102, BCOR12 or WFB 150.

**Course Description**:

Marine mammals are not just beautiful and charismatic; they also share a remarkable evolutionary history that led them back (independently) to the ocean millions of years ago. The return to the sea involved a number of dramatic modifications in their anatomy, physiology, and communication. Ecologically, these animals play crucial roles as top predators, keystone species, and ecosystem engineers. For example, large whales contribute to nutrient cycling in the oceans through their poop and carcasses. For these reasons scientists are concern about how population declines of whales can potentially disrupt how nutrients are made available to nutrient poor waters. In terms of conservation, aquatic mammals are top conservation priorities among mammals. One species is already functionally extinct, the Yangtze river dolphin and several others are at the brink of extinction (e.g., the Vaquita and Mediterranean monk seals, Northern Right Whales). Whaling, overexploitation of their food supplies by fisheries, and habitat lost due to pollution (e.g., plastic, metals, noise) and climate change are among the factors threatening these animals.

The goal of this course is to introduce you to the biology of aquatic mammals, their habitats, the communities that rely on them economically, and to get students involved in field research. The course is primarily for advance undergraduates but graduate and sophomores can enroll with permission from the instructor. I want to enfasize that **this is not a recreational course** you will spend **8 hours or more at day** participating in boat surveys collecting field data on behavior, acoustics, and abundance. Days are hot and humid, and our boats have a small roof not enough to cover everyone. Students that register for this course must have a serious commitment to the course. Often there is a misconception that the dolphins will ‘perform’ as dolphins in aquaria or that students will be swimming with them. That’s not how research on marine mammals works! Studying dolphins can be tedious, they can be hard to find, and once you do they might have other plans and swim away within seconds; and NO we do not swim with dolphins in this course, we want to reduce our impact as much as possible.

 The first week of classes we will meet via zoom an online connection tool. During this lectures student will be introduced to basics on the biology marine mammals and to the methods that will be used during our surveys. On June 1st we’ll head down to Panama, and on June 2nd we will flight to my study site in the Archipelago of Bocas del Toro where we will make our home at Bocas Marine Station of the Smithsonian Tropical Research Institute located in the main island, Isla Colon. I have been studying dolphins in Bocas for almost 16 years, we know almost every single animal and how they relate to each other. This population is at risk of extinction and your participation in this course will contribute to generate biological information to designed management strategies that help protect this dolphin population and their habitat.

**Schedule Field Marine Mammal Biology (Biol 296)**

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| **May 27**Online10-10:30 Intro to the Course 10:30-11:30 Evolution and Adaptations. 11:30-12:30 Diversity of marine mammals & Field methods to study marine mammal distribution and abundance.12:35-1:35 Reproductive Biology of Marine mammals**BB Assignment** | **May 28**Online 10-11 Behavior and Social Structure11-11:30 Field methods to study marine mammal behavior11:40-12:40 Sensory Systems and Communication12:40-1:30 Acoustic methods to study marine mammal communication and their communicative space.**BB Assigment** | **May 29**Online10-12 Intro to the Dolphins of Bocas del Toro: * PhotoID
* Field Data Sheets
* Map of the Area
* Equipment
* Boat Surveys

**BB Assigment** | **May 30**Get ready for travel to Panama* Download requested programs and documents to your laptop
* Prepare your Species assignment before going to Bocas
* **Heather your TA will be available via phone to answer any question.**
 | **May 31**Get ready for travel to Panama* Make sure you double check the information on how to prepare for this trip.
* **Heather your TA will be available via phone to answer any question.**
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| **June 1**To Panama ~ flight 6:30 a.m. landing at 7:30 a.m.Spend night at house at the University Maritime International of Panama | **June 2**Flight to BocasSTRI Orientation OrientationReview of Dorsal Fin Catalogue, equipment, and your survey assignments | **June 3**Field Work: Boat 1: Distribution/Abundace/Bathymetry/PhotoIDBoat 2: Behavior/PhotoID/Acoustics/DroneNight: discussion of independent projectsData EntryBlogging | **June 4**Field Work: Boat 1: Distribution/Abundace/Bathymetry/PhotoIDBoat 2: Behavior/PhotoID/Acoustics/DroneNight: Write up 1- page proposal with presentation/discussionData EntryBlogging | **June 5**Field Work: Boat 1: Distribution/Abundace/Bathymetry/PhotoIDBoat 2: Behavior/PhotoID/Acoustics/Drone**Night: Conservation Issues faced by the local dolphins**Data EntryBlogging |
| **June 6**Field WorkBoat 1: Distribution/Abundace/Bathymetry/PhotoIDBoat 2: Behavior/PhotoID/Acoustics/Drone**Night: Noise, Stress and Reproduction (by Betzy Perez)**Data EntryBlogging | **June 7**Field Work: Boat 1: Distribution/Abundace/Bathymetry/PhotoIDBoat 2: Behavior/PhotoID/Acoustics/DroneNight: Student PPTSpecies PresentationData EntryBlogging**Building the Skeleton of Samwise the dolphin** | **June 8**Field Work: Boat 1: Distribution/Abundace/Bathymetry/PhotoIDBoat 2: Behavior/PhotoID/Acoustics/DroneNight: Student PPTSpecies PresentationData EntryBlogging**Building the Skeleton of Samwise the dolphin** | **June 9**Field Work: Boat 1: Distribution/Abundace/Bathymetry/PhotoIDBoat 2: Behavior/PhotoID/Acoustics/DroneNight: Student PPTSpecies PresentationData EntryBlogging**Building the Skeleton of Samwise the dolphin** | **June 10**Field Work: Boat 1: Distribution/Abundace/Bathymetry/PhotoIDBoat 2: Behavior/PhotoID/Acoustics/DroneNight: Species PresentationData Entry& Data AnalysisBlogging **Building the Skeleton of Samwise the dolphin** |
| **June 11**Field Work: Boat 1: Distribution/Abundace/Bathymetry/PhotoIDBoat 2: Behavior/PhotoID/Acoustics/DroneNight: Species PresentationData Entry& Data AnalysisBlogging | **June 12**Field Work: Boat 1: Distribution/Abundace/Bathymetry/PhotoIDBoat 2: Behavior/PhotoID/Acoustics/DroneNight: Data Entry& Data AnalysisPresent update on Data AnalysisBlogging | **June 13****Morning: Outreach activities with Dolphin Bay Communities****Night: submission of ms. draft.** | **June 14**Submission of Final Ms.Night: **Symposium** | **June 15**Back HomeFlight to Panama is at 7:40 a.m. landing at 8:40 a.m.  |

**Learning goals of this course:**

1. Learn about the evolution, ecology, and behavior of marine mammals in tropical waters of Panama.
2. Observe the conservation treats that these animals face every day and brainstorm about the what can be done to protect them.
3. To offer the opportunity to learn about the challenges and efforts that take to study these animals in their natural environment.
4. Engage students in all aspects of marine mammal research: literature reading and discussion, asking questions, collecting, processing, and analyzing data, learning how to interpret analytical results and how to communicate the results.
5. Learn that science is not about eureka moments! Good science takes time, involves failure, troubleshooting, discussions, re-evaluations, and yes frustration. Good science is always challenging at different levels, from collecting the data to its analysis.
6. Learn that not all research projects are equal! Different questions, systems, or species will require different approaches. My research is field based so is bound to be limited by replication, sample size, lack of controls (because there are impossible to have!), logistics! However, field based projects are essential for our understanding of our biological world, and are often the spark for more sophisticated and controlled studies.

**Grading: Lecture: 350 pts. Field:650 pts.**

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| **Assigments** | **Points** | **Due Data** |
| 3 Assigments | 50pts/each= 150 pts | May 27-29 |
| Blogging  | 100 pts | Assigned in the field |
| Species Presentation | 100 pts | Assigned in the field |
| Participation/actite/responsibility/initiative | 150 pts |  |
| Research Project * Proposal
* Manuscript Draft
* Manuscript Final
* Oral presentation
 | 50pts10010050 | June 4June 13June 14June 14 |
| Outreach Activities | 200 pts |  |

**Assignments:** Each day after lectures there will be an assignment in blackboard consisting of 3-4 questions related to the topics of the day. Each assignment is due that same day @ mid-night.

**Blogging**: Communicating our science to the public is a fundamental aspect of the life of any scientist, but particularly of field biologists working with charistmatic species that play an important role in the economy of local communities. Each student will be assigned a day of field experience to blog about. The post will be posted in the course Blog in English and Spanish, and it will be shared in several social media sources to reach a broad audience.

**Species Presentation:** Each student has an assigned species (list will be posted in BB). This assignment consists of two parts: a 2-page written summary on the biology of the species (5%) and a 5 min presentation in class (5%, 3 PowerPoint slides maximum!). The summary and presentation must haveinformation about

* Global distribution and preferred habitat and diet
* Social organization (social or solitary, group size, type of society etc.)
* Behavior (communication i.e., acoustic, foraging i.e., strategies and adaptations,
* Reproduction i.e. litter size, mating system)
* Conservation status (i.e., IUCN status, threats, conservation efforts)
* Any new cool discovery or fact about this species that you want to share.

The written summary must be turn on the day of your presentation.

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**Participation/actite/responsibility/initiative**: Students will be assigned a number of responsibilities during this course including bringing equipment from the lab to the field, and materials for the outreach activities. Once in the field students are expected to be ready to go to the field at the appointed time, collect field data as indicated in the research protocol (see BB), participate in cleaning the boat and the lab, participate in every boat-survey, show initiative and responsibility during data collection, and respect the rules of established by your instructor, STRI, and UVM. Students are expected to comply with UVM Code of Academic Integrity, as requested by Dr. May-Collado and the rules of Smithsonian Tropical Research Institute. **Students are required to participate in all course activities**. **No drug or alcohol is allowed in this course.**

**Independent Research Project**

Students can work individually or in groups. However, expectations will be higher for group projects. We expect students to develop questions that are answerable within the time frame of this course. We expect students to take charge of their independent

projects, be independent and resourceful readers of scientific literature related to their

projects and demonstrate initiative in learning the programs that can help them

address their research questions. Databases and other resources Dr. May-Collado behavioral, photoID, and spatial data for bottlenose dolphins (to use this data we will sign a MOU agreement). Dr. May-Collado acoustic data for several cetaceans (to use this data we will sign a MOU agreement).

1. **Proposal: 1 page.**
2. **Background to problem** with citations of papers or other sources that document

the information you are presenting. This background should include the

* Observations that lead to your question or hypothesis.
* Purpose and scope - Statement of the purpose of your paper.
* Hypothesis and testable prediction (s)
* Significance: How does your project advance knowledge on this field? How does your project benefits society?
1. **Materials and Methods** - What type of data have you found and what additional data

are you going to try to find? How will the data you collect be analyzed to address your

objectives, questions or hypothesis? It is important to make it clear how the scientific

method will be used to test or address either your hypothesis or the predictions you

expect if the hypothesis is true.

1. **Expected outcomes**
2. **Research Plan** - Schedule of steps to be accomplished with deadline dates.
3. **Literature Cited** - Full reference to the papers cited in the introduction and materials

and methods sections. Use format from Journal of Marine Mammal Science

1. **You will turn in an electronic version to both Laura and Heather**

**II. Manuscript: length depends on each project**

The manuscript must follow the Journal of Marine Mammal Science (MMS) format that you can read here: <https://www.marinemammalscience.org/journal/guide-for-authors/>. The first submission is not synonymous of an ‘incomplete draft’ we expect a complete manuscript in format of MMS. After figures, tables, and stats are done I recommend writing a short version of the abstract. What this does is to provide focus and a framework to write the complete draft. Save every version of your draft separately for you to see your own progress. I recommend that you read your paper over carefully and see if you can find mistakes or identify ways in which your paper could be improved. As you write keep track of the references and write the Literature Cited section as you are writing the paper rather after you are finished. Electronic submission to both instructor and TA. **The draft if due on June 13**. You will received feeback from me, after addressing fully my review the final manuscript is due **on June 14.**

**III Oral Presentation**

We will use traditional oral presentation format. You will have 10 minutes, 8 minutes for your presentation, and 2 minutes for questions for your presentation on **June 14**. Please upload the presentation in the assigned laptop in the lab in the following format: PowerPoint (PPT or PPTX), standard definition, 4:3 ratio. Please embed any videos or audio within the presentation. Also include ALL videos & audio files in a separate folder on your thumb drive. This will enable us to correct any problems on site.

**Course Materials**

1. There is not textbook in this course. Scientific Literature and Resources related to the topics of the course will be uploaded to Blackboard prior the beginning of the course.
2. Lectures will be available in Blackboard under Course Materials
3. Dolphin’fins Catalog: Please download from Blackboard-Course Materials
4. Install the following Software prior going to the field:
* Socprog compiled (free download) (not available in mac).
	+ <http://whitelab.biology.dal.ca/SOCPROG/social.htm>
	+ <http://whitelab.biology.dal.ca/SOCPROG/Manual.pdf>
* Audacity both platforms Mac and Windows free download.
	+ <https://www.audacityteam.org/download/>
* JMP or SPSS download from UVM software services.
* Word: Excel, Power Point, Word also available for student in UVM software services.

**Instructors Bios:**

Laura J. May-Collado: Native of Costa Rica. She has over 20 years of experience working with marine mammals. She earned her master’s degree at University of Costa Rica and her Ph.D. at Florida International University. She is currently a Research Associate at the University of Vermont in the Department of Biology, and has coordinated Field Biology courses for OTS in the past. Website: [lauramay-collado.com](file:///C%3A%5CUsers%5Clmaycoll%5CDropbox%5CSummer2019-MarineMammals%5CSummer2019-Field%20Marine%20Mammals%5Clauramay-collado.com)

Heather Daszkiewicz : She is American biologists that has work with dolphins and sea turtles in the past three years in Florida. She earned her B. Sc. at University of Vermont, and took this marine mammal field course in 2015.