**Course-based Undergraduate Research Experience:**

**LASP PROGRAM (BIOL 096)**

Spring 2020

Course Instructor

*Laura J May-Collado, Ph.D.*

**Meeting Time: Tuesday 10:05-11:55 a.m.** **in 217A Marsh Life Science Bldg**

E-mail: lmaycoll@uvm.edu

CURE Website: http://www.lauramay-collado.com/cure-lab.html

**Course description:** Course-based Undergraduate Research Experiences (CUREs) provide early opportunities to undergrads to participate in scientific research. CUREs allow students to get hands-on experience in the process of scientific discovery, which increases students interest in science. While Biol096 is a short version (1 credit) of the CURE in Soundscape and Behavior (Biol 188A-4 credits), you will experience all aspects of field scientific research. The learning goals of this course is to

1. Engage students in all aspects of research: literature reading and discussion, and data processing.
2. Introduce students to data analysis and interpretation.
3. Introduce students in scientific writing and communication.
4. Create an environment that promotes active collaboration and contributions among students and instructor during the semester through problem solving and analysis.
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 there is not a single “right” way to do science!* Different questions, systems, or species will require different approaches. For example, some research questions rely on well-planned experimental designs involving multiple controls. My research is field based which is bound to be limited by replication, sample size, and logistics. However, field-based projects are essential for our understanding of our biological world and are often the spark for more controlled experimental studies.

**Course expectations**:

* I expect students will be engage in a dynamic and respectful environment for scientific communication and collaboration
* I expect students to take charge of their assigned projects, be independent and resourceful readers of scientific literature related to their assigned projects and demonstrate initiative in learning new programs or analysis that can help them address their research questions.

Recommendation: Read about other CURE students experiences : <http://www.lauramay-collado.com/2019cure-blog>

**Available Group Projects**

1. **Temporal changes of the soundscape of a tropical marine community in Panama:** Biodiversity survey methods are labor-intensive and limited to a few locations and short periods of time. This is true when it comes to study marine communities. New acoustic technology provides marine scientists the opportunity to study community dynamics using sound as a cue for biodiversity. My recent research aims to use underwater acoustic technology to study biologically important marine communities in Central America. My goal is to provide information on overall biodiversity, target species (i.e., fish, dolphins, whales) and human activity. Students working on this project will dedicate a significant amount of time processing passive acoustic data and learn how animal species-specific acoustic signals can help in estimating marine biodiversity.
2. **Dolphin acoustic behavior:** Most dolphins live in complex fission-fusion societies, where animals associate with different individuals in a fluid manner. The strength of these associations appears to vary across groups and over time. In a society such as this, individuals play various roles in maintaining the integrity of the overall social structure of a population. Dolphin group structure is also maintained by learning to recognize others, and this is done by using signature whistles. Students working on this project will be processing a significant amount of passive acoustic data and learning how to analyze communicative signals of dolphins.
3. **Toadfish Acoustic Behavior:** You will be surprise at the number of fish species that emit sounds! Fish can be quite chatty! Students in this CURE course have developed projects studying the acoustic activity of toadfish. Male toadfish are territorial and emit sounds to attract females to lay eggs in their territory. Presumably, females assess the quality of the male prior releasing their eggs. We have learned that in Bocas del Toro Panama toadfish acoustic activity is primarily during dark hours, and that they respond to boat presence in various ways. Because they are important component of marine communities, toadfish presence is used to evaluate marine community’s health. Students working on this project will be processing a significant amount of passive acoustic data to study the temporal changes in toadfish acoustic activity.

**Recommended Sources**

## Basics of Sound: [https://dosits.org](https://dosits.org/)

How to write a scientific paper: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3474301/>

Read previous CURE projects: <http://www.lauramay-collado.com/cure-lab.html>

Statistics for Biologists: <https://www.nature.com/collections/qghhqm>

Acoustic Ecology: <https://www.acousticecology.org/scienceprograms.html>

**Course Calendar**

|  |  |
| --- | --- |
| Week | Chronogram |
| Jan 14/16 | Introduction to this courseDescription of projects. Library resources to find scientific papers. |
| Jan. 21/23 | RAVEN and ARBIMON Workshop |
| Jan 28/20 | Research your project research topic of interest. Prepare* A 500-word summary: Background, Question, Significance
* Least a minimum of 10 references from the reviewed literature
* Prepare a 10 min presentation with the above information including a plan on how you would answer the proposed question.
 |
| Feb 4/6  | Project proposal due (see specifics below).Setting up rules for data collection and computer schedule.* Begin Data collection Feb 4th
* End Data collection March 31st
* Weekly Progress report due Tuesday/Thursday.
* *Sing up for computer time*
 |
| Mar 31 | Data visualization and analysis workshop |
| Mar. 31.April 2 | * Submit *Title*, *Running title*, *Introduction, Keywords,* and *Material and Methods* section (follow JASA format see below)
* Data analysis.
 |
| Ap.7/9  | * Feedback
* Continuation of Data analysis
* Submit *Results* sections with accompanying figures and tables (follow JASA format see below)
 |
| Ap.14/16 | * Feedback
* Continuation of Data analysis
* Submit *Discussion,* *Abstract,* and *Reference List* (follow JASA format see below)
 |
| Ap. 21/23 | Full Research Paper Due: * Manuscripts that are not in the requested format will have a 20 pts Penalty.
* Manuscripts that are not submitted on time will have a 10-pts penalty for each day after deadline.
 |
| Ap.28/30 | Oral presentation (see specifics below) |
| May 1 | Blog on your LASP-CURE experience see examples here: <http://www.lauramay-collado.com/2019cure-blog>  |

**Grading**

|  |  |
| --- | --- |
| Showing up to the lab! | 100 pts |
| 500-word summary+references+ppt  | 100 pts |
| Proposal  | 100 pts |
| **8 Weekly Written progress reports due on*** February: 4, 11,18,25
* March:3,17,24,31
 | 12.5 % each=100 pts |
| Written paper* *Title, Running Title, Introduction, Keywords, Materials & Methods*
* *Results*
* *Discussion, Abstract, Reference List*
* Full Manuscript
 | 100 pts |
| Oral presentation **April 28/30** | 100 pts |
| Blogging about your project and experience for others to learn about CURE **May 1st** | 100 pts |
| **Total** | **700 pts** |

**INDEPENDENT RESEARCH PROPOSAL FORMAT**

The proposal must consist of the following parts.

* **Introduction** – (1 page)
	+ ***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, this may be how you are testing your hypothesis. If you use hypothesis you need to make predictions about the hypothesis. Predictions will also go here.
	+ ***Significance:*** How does your project advance knowledge on this field? How does your project benefit society?
* **Materials and Methods** – (1 page) 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.
* **Research Plan** – (1 page) Schedule of steps to be accomplished with deadline dates.
* **Literature Cited** –(1 page) Full reference to the papers cited in the introduction and materials and methods sections. Use format from Journal of the Acoustical Society of America. **See example** [**https://asa.scitation.org/doi/10.1121/1.5139205**](https://asa.scitation.org/doi/10.1121/1.5139205)

**MANUSCRIPT**

We will be writing each section of the paper by parts as shown in the schedule above. Each section should be in the format of *Journal of the Acoustical Society of America*. Go to the journal and download the guidelines for authors.

Here is a summary of the guidelines:

<https://asa.scitation.org/pb-assets/files/publications/jas/JASA_AuthorChecklist-1508440990393.pdf>

Here is an example of a JASA published manuscript:

<https://asa.scitation.org/doi/10.1121/1.5139205>

**Other important resources**

Steps to organizing your scientificmanuscript

<https://www.elsevier.com/connect/11-steps-to-structuring-a-science-paper-editors-will-take-seriously>

How to write a scientific paper: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3474301/>

Statistics for Biologists <https://www.nature.com/collections/qghhqm>

**ORAL PRESENTATION**

You will have 10 minutes, 8 minutes for your presentation, and 2 minutes for questions.

**Deliver your presentations 1 day prior to the symposium.**

• 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.

**DATA USE**

The data that you will using to develop your project is of my property as the PI of the projects involving the collection of this data. Some data sets are shared with collaborators that significantly contributed to data collection, and thus ownership is shared. You will sign a contract of ethical use of the data. **No sharing of data on social media or with other parties is allow without my consent. This includes photographs, acoustic fields, or any other data from my databases**. We will develop a space for outreach activities and research experience communication through a blog where you can post sound files, summaries, photographs, and updates on data processing with my approval.

**ACADEMIC HONESTY**

Academic honesty is expected of all students. The University of Vermont has a very strict policy concerning academic honesty and plagiarism. Please see the statement on academic honesty http://www.uvm.edu/~uvmppg/ppg/student/acadintegrity.pdf.

**Plagiarism constitutes a violation of Academic Honesty.** Plagiarism of ANY sort will NOT be tolerated. The consequences of plagiarism or cheating range from a score of zero on the assignment, failure in the course, to filing a complaint with the University’s Coordinator for Academic Honesty, which can result in expulsion from the University.

**COURSE CONTENT AND DATA IS THE PROPERTY OF THE INSTRUCTOR**.

Consistent with the University’s policy on intellectual property rights, all teaching and curricular materials (including but not limited to classroom lectures, class notes, exams, handouts, and presentations), and **research data**, are the property of the instructor. Therefore, electronic recording and/or transmission of classes or class notes is prohibited without the express written permission of the instructor. Such permission is to be considered unique to the needs of an individual student (e.g. ADA compliance), and not a license for permanent retention or electronic dissemination to others. For more information, please see the UVM policy on Intellectual Property, sections 2.1.3 and 2.4.1

**RELIGIOUS HOLIDAYS:** Students should submit in writing to their instructors **by the end of the second full week of classes** their documented religious holiday schedule for the semester. Students who miss work for the purpose of religious observance will be allowed to make up this work.

**Student disability policy. In keeping with University policy, any student with a documented disability interested in utilizing accommodations should contact ACCESS, the office of Disability Services on campus.  ACCESS works with students and faculty in to find reasonable and appropriate accommodations, which are communicated to faculty in an accommodation letter.  Contact ACCESS: A170 Living/Learning Center; 802-656-7753;** **access@uvm.edu****; or** [**www.uvm.edu/access**](http://www.uvm.edu/access)**.**