Objectives
Following the completion of this lab project students will be able to:
- research a scientific paper using online databases
- understanding the difference between sources of literature
- Understand how to make measurements utilizing varying tools
- Analyze the design of an experiment
- Design own experiment

Introduction
The Bolsa Chica Ecological Reserve is a coastal estuary that encompasses approximately 4.55 sq km (1300 acres) of land in Huntington Beach, CA. The estuarine environment includes tidal mud flats, open water to a max depth of 4 meters, salt marshes, and riparian environments (Freedman & Lowe 2014, https://www.wildlife.ca.gov). The history of the area includes oil exploration and attempts at developing the area for residential use (Bolsachica.org). Bolsa Chica wetlands are home to numerous different species of animals (both marine & terrestrial), plants, and migratory birds. To learn more about the specific ecology of the area visit: http://bolsachica.org/the-wetlands/ecology/.

Project Description

September 9
Optional field trip to the Bolsa Chica wetlands. This trip is to introduce students to local wetlands. Students will gain a better understanding of the area that they will be designing a project about.

September 12
Lab:
Library orientation with Sarah Bosler. Mrs. Bosler will be introducing students to the Biology 125 resource page that has been designed specifically for our class. She will also provide students with a step by step tutorial on using library resources to search scientific information (journals, encyclopedias, videos etc..) Students will also receive a general wetlands information packet that will provide them with background information about wetlands.

Homework:
Students will be arranged in groups of 4 based on the 4 people that are at their lab bench. Each member of the group must find a scientific journal about wetlands that is of interest to them. Using the note taking template handed out in class (also found in the back of the “how to read a research article” on blackboard) students should read their chosen article multiple times and create a set of detailed notes using the template. Students are required to have this done before the next week in lab (this will be worth points). Students should bring their article along with their notes to lab the following week.

September 19
Lab:
One hour of lab will be dedicated to 10 questions activity. Students are responsible for posing 10 questions about wetlands that they would like to investigate. The questions will usually take the form of How, What, or Why. There are limits to the questions that science can investigate and there also limits to what we can investigate in this lab.

Homework:
Students are to complete their 10 well thought out questions of interest and bring them to lab the following week typed out and ready to be discussed with the lab class as a whole. (10 question are worth points)
September 26
Lab:
A portion of lab will be dedicated to examining the 10 best and most plausible questions that we as a group can further investigate. As a group of 4 you will make a list of the 10 best questions for your group and present those to the other groups in lab. As an entire lab you will decide which are the 10 best questions overall. From these 10 questions you will then decide the 3 best and most do-able research questions that we can carry out as a lab. With 3 final questions you will as a group have to research ways in which you can design an experiment to test these questions (each lab bench will work on 1 final question)

Homework:
As a group/ individual come up with detailed methods/ design to carry out the final question that your lab bench are responsible for. This requires an extensive and exhaustive search of the internet for sampling materials, instruments, and design. Your question and experiment design are due the following week in lab (this is worth points). In next weeks lab we will decide on which experimental design is the most feasible given are time and resources. This will be your labs project. NOTE: Design of an experiment is extremely difficult task. It will require you to do an exhaustive search of the internet for resources.

October 10
Lab:
Each group will present their proposed method for their designated project to the lab group. (worth points). As a lab you will decide which project or projects you would like to do based on all the findings from the previous few weeks. Keep in mind the most sound project will be the one that provides the most interesting research.

Homework:
Continue search the literature and internet for methods and techniques to carry out our research project.

October 17
Lab:
Each lab group begins to work on their materials and methods section for their project with finalized details regarding carrying out the sampling regime for project.

Homework:
Final draft of materials and methods due the following week

November 14
lab:
Groups will carry out sampling and data collection at Bolsa Chica Wetlands

November 21
Lab:
Groups will work on creating graphs and tables of their data and organizing information for their posters.

Homework:
Groups will be finalizing posters

November 28
Lab: Posters will be presented in lab
BIOLOGY 125 WETLANDS RESEARCH PROJECT

Timeline

September 9
- Optional Trip to Bolsa Chica Ecological Reserve (meeting time 9:00am)

September 12
- Library Introduction with Sarah Bosler
- How to search research sources on the internet and EBSCO
- Introduction to Wetlands

September 19
- Every student brings a wetlands research paper of interest to class (5 points)

September 26
- Groups present 10 questions that you would want to answer regarding wetlands (5 points)
- Lab discussion about research questions (i.e. is question something we can answer in our class)
- Narrow down (i.e. is question something we can answer) to 3 questions that are most testable

October 10
- Lab will decide on best project to explore and further develop the experiment

October 17
- Groups will work on writing their materials and methods section based on the previous week’s search for sampling techniques

Nov 14
- Groups will sample/collect data from the Bolsa Chica wetlands
Final poster presentation in lab

Nov 28
- Groups will turn in final draft poster for Bolsa Chica wetlands