



Seacoast Science Center Marine Science Fellowship Program for High School Students Spring 2022 Semester

Course Description:

This is a semester-long course to give high school sophomores, juniors or seniors an opportunity to have hands-on experiences learning about the field of marine science. Students will learn first hand about various topics that encompass marine science. They will be able to discuss career paths that marine science has to offer, as well as to meet different scientists within the field. They will also have the opportunity to create their own research project during the semester. Students may also have an opportunity for extending learning opportunity credit through their school. Students can be involved for one semester or two. The second semester will allow students to engage in greater depth into marine science topics and to continue their research project and present their research to others.

Objectives:

- To educate high school students about the impact they have on the ocean, the challenges facing our climate and what role they contribute to a sustainable and healthy ocean.
- To give students a greater understanding of the field of Marine Biology through inquiry, investigation, and hands-on experiences at Seacoast Science Center, and by fostering individuals' special interests.
- To expose students to a range of careers in marine biology and provide opportunities for them to engage with visiting professionals.
- To engage students in research and presentation skills and techniques they will be able to use later.
- To educate students about the impact they have on the ocean, the challenges facing our climate, and how they can contribute to a sustainable and healthy ocean.

Time Commitment:

3-6 hours per week. The schedule will be Saturday mornings from 10am to 1pm for the course time, with an option for a second day each week for volunteering. Wednesday from 3:30-6:00pm will act as a makeup session for those who are unable to make the Saturday class. Wednesday's class time can be changed depending on the availability of the students

Contact information:

A full contact list can be found in our Fellows 2022 S2 Class folder on Google Drive. You will have access to this folder at anytime

- Sean McKenna, Aquarist II & Marine Fellowship Coordinator
s.mckenna@sscnh.org, cell phone: 603-498-4811
- Kate Leavitt, Chief Program Officer
k.leavitt@sscnh.org, 603-436-8043, ext. 27
- Amanda Komarek, Program Manager
a.komarek@sscnh.org 603-436-8043, ext. 17

Google Folder:

A Google Folder on SSC's Google Drive, Labeled **Fellows 2022 S2** will be shared. This is where you will upload assignments concerning your projects. This folder will also have resources like a contact list, assignment list, PowerPoints and discussion topics, notes, project material, and course material.

COURSE SCHEDULE		
DATE	TOPIC	DETAILS
February 5th	Introduction: Overview of Habitats and Animals	
February 12th	Corals and Coral Reefs	Thomas Cook, guest speaker Introduce projects
February 19th	Research Day (SAG: Kate & Amanda)	Introduce Research/Inquiry project; Introduce Project Timeline; Assign Comparative Question and Methods
March 5th	Research Project Open House	Project first draft of Comparative Question due (submit online in google folder) we will be peer editing these on this date Joe will lead a writing workshop
March 12th	Marine Mammal Physiology	Nikki and Brian: guest speakers
March 26th	Research Project open house	Finale question and Methods due (submit online in google folder)
April 2nd	Invertebrate Biology	You will get back the edits from the project committee
April 9th	Marine Geology	Start Compiling Rough Draft (Results, Discussion, References) Jack McKenna: guest speaker
May 7th	What's Next	If you want further review,

		rough draft of all parts of the project should be submitted Laura: Guest Speaker
May 14th or May 21, depending on weather (class time may vary)	Kayaking	May 21st: Poster need to be in an electronic format and submitted to Google Drive
June 5th	Presentations	Symposium and Last Day, World Ocean Day Celebration

Project Outline:

Students will learn the necessary skills that are required to perform a scientific research project. They will choose a topic of their choice. The Student will then learn about the different sections of a research poster and be able to include each section in the poster. Each student will conduct their own research and present their findings in a research symposium at the end of the semester.

Check ins: Each student will meet with the leaders of the class several times. This check in is to go over their progress and to answer any questions the student may have.

Project Time in Class: On top of the 1 hour each class dedicated to the project. There will be a couple classes dedicated solely for the project. These classes will have little instruction, but the focus will be on complete the research needed for the project. It will be more of an open session for you to complete what you need.

Assignments: Different parts of the project will be due at different times. This is to ensure that we are all staying on track. This also provides the opportunity for peer review and time for us to sit down with you and review each section of the project. This way we come out with the best results. Assignment dates will be below as well as in the chart above.

Poster and PowerPoint: Each poster and PowerPoint will consist of the following sections, For more information on how to write these sections refer back to the Project PowerPoint located in the Google Drive project resource folder.

Title: Something catching and to the point about your topic

Question: Use one of the three types of questions you learned (Descriptive, Comparative, Correlative)

Hypothesis: Take a position on your question

Introduction: This is where you describe briefly and clearly why you are conducting this research project. The introduction supplies sufficient background information for the reader to understand and evaluate the experiment you did. It also supplies a rationale for the study.

Comparison/results: This is where you present the results you've gotten. Use graphs and tables if appropriate, but also summarize your main findings in the text. This section can also be your

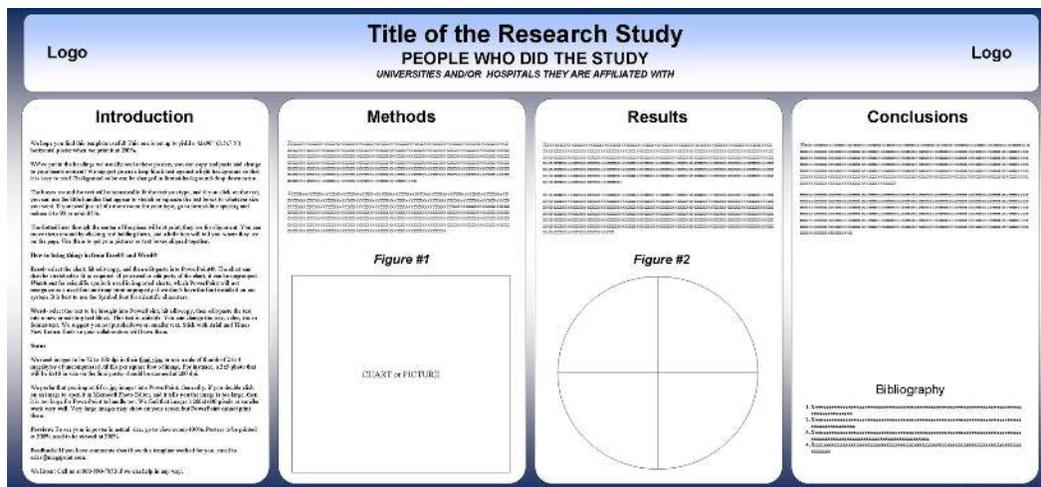
comparison section. Which means you are going to present the facts of these comparisons and then discuss them in your discussion.

Discussion: Usually the hardest section to write. You are trying to bring out the true meaning of your data without being too wordy. Talk about what you found out and include what you would do in the future

References: This is the last section of the poster. Here, you should provide an alphabetical listing of all the published work you cited in the text of the paper. This does not mean every article you found in your research; only include the works you actually cited in the text of your paper.

Some Past topics:

- Do Gulf of Maine fish show self awareness
- Do seahorses prefer smooth and flat grass to cling onto over round and wavy grass
- How temperature changes daily effects the animals
- How tides affect the temperature of tide pools
- What kind of pollution is found on the beach and where is it located
- Do Cephalopods react differently to different colors?
- Does the skate’s feeding behavior change when in solitude versus a social setting
- Where along the state parks are invasive species found
- Can phytoplankton grow in tubing for the implantation of reducing carbon emissions in urban areas by lining buildings with said tubing. Additionally, how effective would this be?
- Can coral growth be stimulated by microfracturing.
- What marine scavengers are most effective in breaking down environmental waste?
- Does Mushroom coral, Chalice coral, or Birds Nest coral grow the fastest at 80 degrees Fahrenheit?
- How are sea turtle strandings different in the Gulf of Maine vs the gulf of mexico?
- How are rising acidity levels affecting coral reefs?
- What are we learnign from tracking seals?
- How is climate change affecting the lifespan of sea stars?
- What was the most frequently found article of trash on New England beaches? What are some possible alternatives?
- How are sharks affecte by different types of food and enrichment?
- How is climate change negatively impacting endangered species?
- How do methods of coral fragmentation affect their rate of growth?
- How do lobsters react when presented with food when another lobster is near?



Important Project dates:

February 12th: Introduce project topics

February 19th: Introduce Research/Inquiry project and Introduce Project Timeline and Assign Comparative Question and Methods

March 5th: Project first draft of Comparative question Due ((submit online in google folder)we will be peer editing these on this date)

March 26th: Finale question and Methods due (submit online in google folder)

April 2nd: You will get back the edits from the project committee

April 9th: Start Compiling Rough Draft (Results, Discussion, References)

May 7th: If you want further review, rough draft of all parts of the project should be submitted

May 21st: Poster Need to be in an electronic format and submitted to google drive

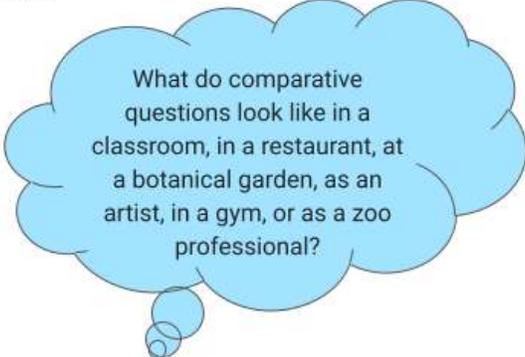
What Is A Comparative Question?

Asking Questions

The process of asking questions is a skill we can continue to develop over a lifetime. Questions can connect us to others, and when co-created in community, can serve as the basis for social or ecological change.

Creating Comparative Questions

A young investigator is interested in insects and she wonders how many insects might be under a rock. Based on her observations she decides to count the insects. She answers her question, but her answer does not lead very far. She then asks a comparative question wondering which type of rock has more insects under it: big rocks or small rocks? Her new question then led to other interesting questions. Do more insects live under big rocks just because of their size? Is there more moisture under larger rocks? Do spiders fall into the same pattern as pill bugs?



What do comparative questions look like in a classroom, in a restaurant, at a botanical garden, as an artist, in a gym, or as a zoo professional?

Check out the example project ideas and comparative questions below:

- ➡ With a focus on a water unit, my students and I created this question: In the area where you live, how does the width, depth, and stream velocity change in one stream compared to another?
- ➡ With a focus on polar bears and climate change, I created this question: Using data from existing published studies, are polar bear numbers declining with increased temperature or ice melt?