We have modified our program to offer new virtual field trip modules! Module descriptions and curriculum links to the new Bio 2201 curriculum as well as some Science 1206 links below.

Here is what you can expect with this new format:

- Sessions will be offered between November 16 and December 15, 2020.
- The cost is $50 per virtual module. We suggest a max. of 30 students per session. Please contact Danielle Nichols if you have a larger group.
- Each module is an independent 35-40 minute experience delivered by graduate students live via Google Meet.
- Given NLESD’s platform restrictions, you will need to generate a Google Meet link from your account and share it with us prior to the session so we can join as guest presenters. If there are students joining from home, they can join your session.
- You will need access to: a reliable internet connection, a screen and speakers so your students can see and hear the live feed, a camera with microphone so we can see and hear your students.
- We will use different engagement tools such as live polls or questions that require immediate student feedback. Students will need access to classroom-approved devices to interact with our graduate students throughout the session.
Virtual Module Descriptions & Curriculum Links

All modules can help foster these GCO 4 - Attitudes Outcomes in Bio 2201 & Science 1206:
- appreciate that the applications of science and technology can raise ethical dilemmas
- consider further studies and careers in science- and technology-related fields
- use factual information and rational explanations when analyzing and evaluating
- value the processes for drawing conclusions
- show a continuing and more informed curiosity and interest in science and science-related issues

AQUA LAB MODULE: Aquaculture and commercial meat yield, ecosystem services.
Our grad students will walk through detailed steps on how aquaculture managers have to measure mussels and will show students how to calculate mussel meat yield to determine if the mussels are market-ready. Students will also learn how water quality tests are done and be exposed to all the appropriate tools and instruments for this lab. Students will gain an understanding of the value of aquaculture to NL’s economy, learn about the ecosystem services mussels provide within an ecosystem, and will be introduced to the concept and importance of scientific measurement.

Aqua Lab Module Curriculum Links:
New Biology 2201:
7.0 estimate quantities [GCO 2]
10.0 select and use apparatus and materials safely [GCO 2]
15.0 interpret patterns and trends in data, and infer or calculate linear and nonlinear relationships among variables [GCO 2]
17.0 evaluate the relevance, reliability, and adequacy of data and data collection methods [GCO 2]
26.0 identify and describe science- and technology-based careers related to this science [GCO 1]
29.0 use the concept of the energy pyramid to explain the production, distribution, and use of food resources [GCO 3]
34.0 provide examples of how science and technology are an integral part of their lives and their community [GCO 1]

Science 1206:
10.0 estimate quantities [GCO 2]
14.0 select and use apparatus and materials safely [GCO 2]
18.0 interpret patterns and trends in data, and infer or calculate linear and nonlinear relationships among variables [GCO 2]
20.0 evaluate the relevance, reliability, and adequacy of data and data collection methods [GCO 2]
21.0 identify and explain sources of error and uncertainty in measurement and express results in a form that acknowledges the degree of uncertainty [GCO 2]
68.0 illustrate and explain the cycling of matter through biotic and abiotic components of an ecosystem by tracking carbon, nitrogen, and oxygen [GCO 3]
70.0 describe the mechanisms of bioaccumulation, and explain its potential impact on the viability of and diversity of consumers at all trophic levels [GCO 3]
**BIO LAB MODULE:** Invertebrate ecology, feeding adaptations, classification, herring dissection and body systems of bony fishes. Our graduate students will share information about invertebrate ecology, morphology and feeding adaptations using live specimens such as sea stars, urchins, crabs, and sea cucumbers. Your students will be introduced to classification systems and how to identify the species/taxa by using a dichotomous key. Our grad student will do a live herring dissection using the appropriate tools and share each step on camera while interacting with students as they learn about the circulatory, digestive, and respiratory systems of bony fishes.

**Bio Lab Module Curriculum Links:**
*New Biology 2201:*
- 10.0 select and use apparatus and materials safely [GCO 2]
- 12.0 describe and apply classification systems and nomenclatures used in the sciences [GCO 2]
- 26.0 identify and describe science- and technology-based careers related to this science [GCO 1]
- 34.0 provide examples of how science and technology are an integral part of their lives and their community [GCO 1]
- 58.0 describe the impact of environmental factors on homeostasis [GCO 3]

*Science 1206:*
- 6.0 evaluate and select appropriate instruments for collecting evidence and appropriate processes for problem solving, inquiring, and decision making [GCO 2]
- 16.0 describe and apply classification systems and nomenclatures used in the sciences [GCO 2]
- 25.0 communicate questions, ideas, and intentions, and receive, interpret, understand, support, and respond to the ideas of others [GCO 2]
- 73.0 explain how the biodiversity of an ecosystem contributes to its sustainability [GCO 3]

**ECO LAB MODULE:** Ecosystem diversity, rhodolith beds and benthic habitats.
In this module, students will get introduced to coralline algae and learn about the growth, biodiversity, and ecology of rhodolith beds in Newfoundland. They will begin to understand the importance of depth and other abiotic factors on photosynthesis (primary production). Our graduate students will crack open one of these ‘tiny worlds’ and walk your students through discovering how rhodoliths act as tiny nursery habitats that contribute to the diversity of benthic habitats. They will also learn about the invertebrates and other organisms found within rhodoliths, the relationships between them, and some of their adaptations.

**Eco Lab Module Curriculum Links:**
*New Biology 2201:*
- 26.0 identify and describe science- and technology-based careers related to this science [GCO 1]
- 27.0 analyze natural systems to interpret and explain their structure and dynamics [GCO 1]
- 28.0 analyze interactions within and between populations [GCO 3]
- 29.0 use the concept of the energy pyramid to explain the production, distribution, and use of food resources [GCO 3]

*Science 1206:*
- 71.0 analyze the impact of external factors on an ecosystem [GCO 3]
- 73.0 explain how the biodiversity of an ecosystem contributes to its sustainability [GCO 3]
- 74.0 explain why different ecosystems respond differently to short-term stresses and long-term changes [GCO 3]
**SEAWEED LAB MODULE:** Population dynamics, seaweed ecology, marine food webs.

In this module, your students get introduced to the important ecological roles of microalgae (phytoplankton) and macroalgae (seaweeds) within marine ecosystems and food webs. They will discover how algae helps support life on earth! In addition to being introduced to the basic classification of algae, our graduate students will explain, using graphs and videos, how the population dynamics between kelp and sea urchins help us understand population growth and how species interact within different ecosystems.

**Seaweed Lab Module Curriculum Links:**

**New Biology 2201:**
12.0 describe and apply classification systems and nomenclatures used in the sciences [GCO 2]
27.0 analyze natural systems to interpret and explain their structure and dynamics [GCO 1]
28.0 analyze interactions within and between populations [GCO 3]
29.0 use the concept of the energy pyramid to explain the production, distribution, and use of food resources [GCO 3]
31.0 describe population growth and explain factors that influence population growth [GCO 3]

**Science 1206:**
16.0 describe and apply classification systems and nomenclatures used in the sciences [GCO 2]
17.0 compile and display evidence and information, by hand or computer, in a variety of formats, including diagrams, flow charts, tables, graphs, and scatter plots [GCO 2]
18.0 interpret patterns and trends in data, and infer or calculate linear and nonlinear relationships among variables [GCO 2]
67.0 explain various ways in which natural populations are kept in equilibrium and relate this equilibrium to the resource limits of an ecosystem [GCO 3]
71.0 analyze the impact of external factors on an ecosystem [GCO 3]
73.0 explain how the biodiversity of an ecosystem contributes to its sustainability [GCO 3]
74.0 explain why different ecosystems respond differently to short-term stresses and long-term changes [GCO 3]