SHOALS MARINE LABORATORY (BIOSM)

BIOSM 1500 - Investigative Marine Biology Laboratory (3 Credits)
This course is a 2 week, 3 credit, field intensive marine-based introduction to the scientific method and experimental biology. We take advantage of the unique learning opportunities in the intertidal zone around Appledore Island, Maine at the Shoals Marine Laboratory. The course philosophy is to allow students to learn the scientific method by doing research under the guidance of veteran marine biologists. The course is structured around two research projects that are designed to expose students to diverse research areas within marine biology: Ecomechanics and Ecophysiology. This course is suitable for life sciences majors.
Distribution Requirements: (BIO-AG, BSC-AG, OPHLS-AG), (BIO-AS)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Summer 2025, Summer 2024, Summer 2023, Summer 2022
Learning Outcomes:

- Scientific method. Students will be able to: a. apply principles of good experimental design and data collection. b. apply the structure of the scientific method. c. articulate the power and limitations of science as a way of knowing. d. execute statistical testing, analysis, and graphing using R software.
- Scientific information literacy. Students will be able to: a. use online research tools for scholarly literature and bioinformatics. b. cite sources using proper format.
- Scientific communication. Students will be able to: a. demonstrate understanding of the structure of scientific papers and their relationship to the scientific method via four writing assignments. b. demonstrate principles of data analysis, slide design, and oral communication via participation in a scientific symposium at the end of the course.
- Knowledge of and ability to use equipment in the lab and field. Students will be able to: a. demonstrate the importance of measurement in the scientific process b. demonstrate proper use of equipment such as pipets, calipers, micrometers, gel electrophoresis rigs, force transducers, and dissolved oxygen probes. c. demonstrate proficiency with the use of remote sensing devices such as CTD probes, and HoboTemp temperature probes. d. demonstrate proficiency with biological imaging using microscopes and cameras. e. demonstrate proficiency with image processing using Image software.
- Conceptual knowledge pertaining to two laboratory modules. Students will master introductory concepts in two areas: a. Marine Ecophysiology b. Marine Biomechanics
- Additional goals. Students will: a. practice critical thinking skills as background for MCAT and GRE. b. work cooperatively with others toward a common goal. c. take ownership of the material. d. be empowered to undertake their own scientific investigations.

Schedule of Classes (https://classes.cornell.edu/)

BIOSM 1610 - Ecology and the Marine Environment (3 Credits)
This course provides an introduction to ecology, covering interactions between marine organisms and the environment at scales of populations, communities, and ecosystems. This course is suitable for life sciences majors.
Forbidden Overlaps: BIOEE 1610, BIOSM 1610
Distribution Requirements: (BIO-AG, BSC-AG, OPHLS-AG), (BIO-AS)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Summer 2024, Summer 2022, Summer 2021, Summer 2019
Learning Outcomes:

- Students will be able to explain where and why different biomes occur globally as a function of Earth's climate dynamics.
- Students will be able to describe how plants and animals cope with environmental variation through a range of adaptations that modify their respective heat and water balances.
- Students will be able to describe processes of autotrophic and heterotrophic means of energy acquisition, and tradeoffs among these strategies.
- Students will be able to apply fundamental principles of population growth and demography, including application to human populations and population harvest.
- Students will be able to explain species interactions including predation, parasitism, competition, and mutualism.
- Students will be able to describe community ecology, including factors that control patterns of species distribution, diversity, and abundance.
- Students will be able to apply their understanding of broad biogeographical patterns of species distributions, including hypotheses explaining latitudinal species gradients, species diversity on islands, and the application of island biogeography theory to the design of nature reserves.
- Students will be able to identify and describe threats to biodiversity and key principles of conservation biology.
- Students will be able to describe major pathways and mechanisms of nutrient cycling, including nutrient inputs, acquisition strategies, limitation, and losses, and major human impact on these cycles.
- Students will be able to identify causes, general magnitudes, and likely consequences of human-driven alterations to global cycles of carbon, nutrients, and climate.

Schedule of Classes (https://classes.cornell.edu/)

BIOSM 1620 - Marine Environmental Science (4 Credits)
This course focuses on issues in environmental science from a marine perspective. Basic scientific research methods, equipment, and group research projects are introduced. Laboratory exercises and fieldwork include work on Appledore Island's intertidal zone and offshore oceanographic sampling exercises.
Prerequisites: two, year-long high school courses in science, and completion of grades 10, 11 or 12.
Distribution Requirements: (BIO-AS), (OPHLS-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Summer 2025, Summer 2024, Summer 2023, Summer 2022
Learning Outcomes:

- Identify by characteristics, adaptations, and scientific names 25-30 intertidal organisms that will be included in field studies.
- Demonstrate an understanding of the characteristics and adaptations of the major phyla associated with the oceans-with in depth concentration on the phyla Mammalia and Aves.
- Gather data in the field with a number of types of scientific equipment and in a number of different coastal/marine settings.
- Perform background research, develop a hypothesis, design an experiment, collect data for 7 days, and demonstrate an understanding of the results. Each student will demonstrate proficiency by giving a presentation of their work to the class and by writing a technical paper that includes the full scientific method.
- Describe local micro-habitats by conducting a comparative study of the physical, chemical, and biological characteristics of the protected, and then exposed, sides of Appledore island. Students will demonstrate this understanding by writing a field report of their comparative study.
- Demonstrate through class exercises a detailed understanding of the human impacts associated with a marine environment. Students will be concentrating on the causes, effects, and both global and personal solutions to these issues.
- Communicate the knowledge they have gained using through public speaking and writing.

Schedule of Classes (https://classes.cornell.edu/)

BIOSM 1640 - Introduction to the Biology of Sharks, Skates, and Rays (2 Credits)
This course is aimed at high school students. Our main objective is to cover the current state of knowledge of elasmobranch (shark, skate & ray) biology and explore areas for future research and conservation initiatives. This includes separating fact from fiction, analyzing various types of media including peer reviewed scientific literature, and exploring experimental methods in both laboratory and field settings for studying elasmobranchs and other marine life.
Last Four Terms Offered: Summer 2025, Summer 2024, Summer 2023, Summer 2022
Learning Outcomes:

- Demonstrate knowledge of elasmobranch (shark, skate & ray) biology; anatomical features, evolution and ecology.
- Identify future research questions for elasmobranchs.
- Describe elasmobranch conservation initiatives.
- Separate fact from fiction, e.g. how sharks are portrayed in the media and popular culture.

Schedule of Classes (https://classes.cornell.edu/)

BIOSM 1650 - Marine Vertebrates of the Gulf of Maine (2 Credits)
Last Four Terms Offered: Summer 2025
Schedule of Classes (https://classes.cornell.edu/)

BIOSM 1780 - Evolution and Marine Diversity (4 Credits)
This class focuses on patterns of biodiversity and processes of evolution. Topics include the diversity of life, the fossil record, macroevolutionary patterns, the genetics and developmental basis of evolutionary change, processes at the population level, evolution by natural selection, modes of speciation, long-term trends in evolution, and human evolution. This course is suitable for life sciences majors.
Forbidden Overlaps: BIOEE 1780, BIOEE 1781, BIOSM 1780
Enrollment Information: Enrollment limited to: students who are either: a) matriculated students at Cornell, UNH or at any 4-year college or university; or b) incoming first-year students who will arrive at Cornell or UNH in fall.
Distribution Requirements: (BIO-AG, BSC-AG, OPHLS-AG), (BIO-AS)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Summer 2025, Summer 2023, Summer 2022, Summer 2021
Learning Outcomes:

- Students will be able to describe in scientific terms the underlying causal principles of evolutionary diversification.
- Students will be able to apply these principles to understand historical and contemporary evolutionary scenarios.
- Students will be able to identify core taxa in the tree of life, their characteristics, and describe the relationships among them.
- Students will be able to apply basic conceptual and analytical tools to describe complex relationships within the tree of life.
- Students will be able to apply a number of experimental and synthetic approaches to analyzing and discovering evolutionary processes (microevolution) and establishing evolutionary patterns (macroevolution).
- Students will be able to articulate the dimensions of evolutionary issues that require decisions in our society.

Schedule of Classes (https://classes.cornell.edu/)

BIOSM 2040 - Biological Illustration (3 Credits)
In this course, students build a foundation of skills needed for biological illustration using the many visual opportunities that Appledore Island offers for natural science subjects. Lectures and demos introduce each of five projects using a variety of media including graphite and graphite dust, pen & ink, watercolor, and colored pencil. Basic standards needed in the creation of professional work are covered, include observational drawing, attention to detail and accuracy, composition, color, tonal values, and perspective. The class will visit many locations on the island for inspiration and visual reference. Students will create a final project demonstrating skills they have developed with one of the media covered in the course.
Distribution Requirements: (LA-AG)
Last Four Terms Offered: Summer 2025, Summer 2010, Summer 2009, Summer 2008
Learning Outcomes:

- Use skills in observational drawing to analyze and distinguish details that are needed to communicate a particular natural science illustration.
- Apply materials and techniques to a variety of artistic mediums.
- Produce accurate and clear biological illustrations and communicate concepts. ? Demonstrate knowledge of composition, color, tonal values, and perspective.
- Evaluate the quality of a work and how to solve problems related to drawing, composition, color, and tonal values.

Schedule of Classes (https://classes.cornell.edu/)

BIOSM 2350 - R by the Sea: Data Analysis in the Marine Sciences (3 Credits)
This course introduces students to basic data analysis and programming tools commonly used throughout the life sciences. Students will develop skills in R programming, including data wrangling and cleaning, the principles of open and reproducible science, building maps, and simple linear regression. In the first half of the course (on-line), students will learn R fundamentals and then, in the second half, relocate to Shoals Marine Lab (Gulf of Maine; in-person) to apply their coding skills to long-term data sets (intertidal counts, video fisheries observations, marine mammal censuses), as well as to biological data that they collect in the field around Appledore Island.
Last Four Terms Offered: Summer 2023
Learning Outcomes:

- Students will be able to implement best practices for data management.
- Students will be able to compare and contrast different tools for data management (Excel, SQL, etc.)
- Students will be able to use R statistical software for basic data cleaning and statistics.
- Students will be able to use R markdown to build reproducible workflows and documents.
- Students will be able to adhere to data ethics, especially related to data related to vertebrates.
- Students will be able to load, clean, and plot simple spatial data in R.

Schedule of Classes (https://classes.cornell.edu/)

BIOSM 2450 - Field Bioacoustics and Soundscape Ecology (3 Credits)
Students will gain hands-on experience in bioacoustic research, including; concepts behind animals' sound production and hearing mechanisms, skills for deploying acoustic sensors, and data analysis. Lectures cover concepts in acoustics, soundscapes, and digital sound signal processing. Students will deploy acoustic sensors and conduct field experiments, then analyze collected data in computer-lab sessions. Focus is on Passive Acoustic Monitoring, the non-invasive recording of sounds in an environment (soundscapes) with microphones (land) or hydrophones (underwater). Terrestrial field work targets seabirds, while opportunistic recordings may be made of other vocalizing animals, including mammals, fishes, and invertebrates. Students will study the contributions of anthropogenic sounds (human-made) to natural soundscapes. Field -based acoustic playback experiments will be conducted to study how different properties of gull vocalizations influence gull behavior.
Prerequisites: one semester of college level biology, or instructor permission.
Last Four Terms Offered: Summer 2025
Learning Outcomes:

- Deploy and recover passive acoustic sensors (microphones, hydrophones) in terrestrial and aquatic habitats.
- Analyze and visualize bioacoustic data (soundscapes, animal vocalizations) using software commonly used by bioacoustics researchers.
- Conduct acoustic playback experiments in the field and measure animal (e.g., herring gull) behavioral responses to sound.
- Explain how animals across multiple taxa (e.g., mammals, birds, fishes) hear and produce sounds, and appreciate the diverse roles that sounds play in ecology.
- Apply fundamental physical acoustic, biological, and ecological concepts to interpret bioacoustic data and results.

Schedule of Classes (https://classes.cornell.edu/)

BIOSM 2500 - Coastal Habitat Field Research Methods (3 Credits)
Last Four Terms Offered: Summer 2021, Summer 2020, Summer 2019, Summer 2018
Schedule of Classes (https://classes.cornell.edu/)

BIOSM 2800 - Sustainable Fisheries (3 Credits)
Students will explore the theory and practice of fisheries sustainability through lectures, readings, laboratory exercises, and ground truthing in the real world (in the field) by interacting with local fishermen. This course will focus primarily on species harvested in the Gulf of Maine, with an emphasis on fin fish. Topics will include an overview of commercial fisheries in the Gulf of Maine: fish collection and dissections, fishing gear types and modifications, age and growth techniques, quantitative data collection and analysis, current, past and future directions in fisheries management strategies, collaborative research and 'conservation' fishing gear, environmental changes, perspectives from different stakeholders, hands-on demonstrations with commercial fishermen from different industries, sustainable seafood and the market-place, human dimensions of sustainable fishing (cultural and socio-economic issues).
Prerequisites: one semester of college-level biology.
Distribution Requirements: (BIO-AS), (OPHLS-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Summer 2024, Summer 2022, Summer 2021, Summer 2019
Learning Outcomes:

- Students will be able to: Provide their own definition of "sustainable fishery" and be able to discuss differing opinions regarding this term. Define and discuss how fisheries have moved from a volume-based operation to one that tries to support both fishermen and marine ecosystems. Describe challenges commercial fishermen face today. Identify Gulf of Maine (GOM) finfish and other commercially important species.
- Describe in detail the basic biology, distribution, and ecology of commercially important fishes in the GOM.
- Articulate a historical perspective of how the fishing industry and fish stocks have changed over the past 200 years in the GOM; be able to discuss important issues surrounding the future of New England fisheries.
- Demonstrate how fisheries data are collected and used to determine basic stock assessments.
- Describe the importance of "conservation gear" and "collaborative research" in today's fisheries.
- Collect fisheries-related data; analyze and interpreted data in small groups.
- Describe through research and a detailed report the changes incurred to fisheries species over time.
- Describe the impact of fishing on marine ecosystems and the potential influence of climate change on fisheries.
- Identify the wide range of stakeholders involved in fisheries.
- Identify market-based factors that influence sustainable fishing and mediate human impacts on marine ecosystems.

Schedule of Classes (https://classes.cornell.edu/)

BIOSM 3210 - Anatomy and Function of Marine Vertebrates (3 Credits)
Designed to introduce students to a comparative study of the principal organ systems of vertebrates (i.e., fishes, sea turtles, marine birds, marine mammals) that are specifically adapted to the marine environment. Rather than focusing only on description of anatomical structure, the anatomy of structures will be integrated with function, biological role, and evolutionary relationships. Laboratory exercises cover osteology, dissection, behavior and biomechanics.
Prerequisites: one semester of college-level biology or equivalent.
Distribution Requirements: (BIO-AS), (OPHLS-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Summer 2025, Summer 2024, Summer 2023, Summer 2022
Learning Outcomes:

- Students will be able to identify structural adaptations of marine vertebrates from the various anatomical systems.
- Explain how marine vertebrates cope with extreme environmental stresses with regard to diving, high pressure, and salinity.
- Identify and describe sensory modalities associated with the marine environment and depth, including vision, hearing, echolocation, pressure, and electroreception.
- Describe mechanisms of marine animal movement by integration of structural mechanics, muscle physiology, kinematics, and fluid mechanics.
- Demonstrate good dissection technique.
- Demonstrate independent thinking through development and presentation of a research project.
- Apply biomechanical analysis.
- Perform data gathering and analysis.
- Describe evolutionary pathways and selective pressures for the development of anatomical systems to function in the marine environment.
- Identify potential design elements from animals for transition to engineered systems using the biomimetic approach.

Schedule of Classes (https://classes.cornell.edu/)

BIOSM 3290 - Field Animal Behavior (3 Credits)
Last Four Terms Offered: Summer 2025, Summer 2023, Summer 2021, Summer 2018
Schedule of Classes (https://classes.cornell.edu/)

BIOSM 3330 - Marine Parasitology and Disease (3 Credits)
This course will focus on one of the most diverse and fascinating groups of marine organisms- parasites. We will explore marine parasites and pathogens at multiple levels, including: (1) the evolutionary perspective with an emphasis on co-evolutionary relationships; (2) parasitic diseases and life cycles (from simple to complex); (3) taxonomic and phylogenetic understanding of parasite and host groups (with a focus on metazoan parasites and hosts); (4) ecological implications of parasitism in marine systems-at the population, community, and ecosystem levels; and (5) the effects of human-induced global change on parasitism in marine communities.
Prerequisites: at least one college-level introductory course in evolutionary or ecological biology, e.g. BIOEE 1780/BIOSM 1780, or BIOEE 1610/BIOSM 1610 or similar.
Distribution Requirements: (BIO-AS), (OPHLS-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Summer 2025, Summer 2024, Summer 2023, Summer 2022
Learning Outcomes:

- Students will be able to apply working knowledge of fundamental facts, concepts, and theories about marine parasitology and disease.
- Explain the evolutionary and ecological importance of parasites/pathogens in marine systems.
- Identify taxa of marine parasites using scientific keys and descriptions.
- Identify and describe host and parasite diversity in the local marine environment.
- Use microscopes and other equipment used for observing and identifying parasites.
- Empirically test ideas using scientific evidence collected from surrounding ecosystems.
- Organize knowledge of marine parasitology and disease and effectively communicate concepts to peers.

Schedule of Classes (https://classes.cornell.edu/)

BIOSM 3340 - Marine Invasive Species: Ecology, Evolution and Management (3 Credits)
Last Four Terms Offered: Summer 2023, Summer 2022
Schedule of Classes (https://classes.cornell.edu/)

BIOSM 3450 - Marine Mammal Biology (3 Credits)
Introduction to the biology and conservation of the whales and seals, with a particular focus on species of the Gulf of Maine. Lectures will examine many facets of marine mammal science including: taxonomy and species diversity, morphological and physiological adaptations for life in the sea, foraging ecology and behavior, reproductive cycles, bioacoustics, anthropogenic interactions, and management of threatened species. Land and open-water observations of whale and seal behavior will give students hands-on opportunities to study marine mammals in the field.
Prerequisites: one semester of college-level biology, physiology and/or ecology or equivalent, e.g. BIOEE 1780/BIOSM 1780, BIOEE 1610/BIOSM 1610, BIOG 1440, or similar.
Distribution Requirements: (BIO-AS), (OPHLS-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Summer 2025, Summer 2024, Summer 2023, Summer 2022
Learning Outcomes:

- Students will be able to identify and explain morphological and physiological adaptations to life in seawater that are specific to marine mammals.
- Students will be able to discuss the evolutionary history of cetacean and pinniped marine mammals.
- Students will be able to describe the ecology of the Gulf of Maine based on seasonal patterns of productivity and resource availability.
- Students will be able to explain important aspects of the biology and ecology of marine mammals, including foraging habits and reproductive cycles of local species.
- Students will be able to identify the anthropogenic threats faced by marine mammals, including historic exploitation and current sources of mortality from human interactions.
- Students will be able to engage in dialogue about current conservation issues and management efforts for local marine mammal species.

Schedule of Classes (https://classes.cornell.edu/)

BIOSM 3500 - Applied Science Communication (3 Credits)
Last Four Terms Offered: Summer 2025, Summer 2023, Summer 2022, Summer 2019
Schedule of Classes (https://classes.cornell.edu/)

BIOSM 3650 - Underwater Research (3 Credits)
Last Four Terms Offered: Summer 2025, Summer 2023, Summer 2022, Summer 2019
Schedule of Classes (https://classes.cornell.edu/)

BIOSM 3740 - Field Ornithology (3 Credits)
The biology, ecology, and behavior of the avifauna of the Isles of Shoals. Focuses on fieldwork designed to observe and study territoriality, breeding biology, and survivorship. Students learn and apply numerous ornithological field methods including various census techniques, territory mapping, banding, behavioral observations and creating a field notebook.
Prerequisites: one semester of college-level biology or equivalent.
Enrollment Information: Please refer to the Shoals Marine Lab website for enrollment instructions.
Distribution Requirements: (BIO-AS), (OPHLS-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Summer 2025, Summer 2024, Summer 2022, Summer 2021
Learning Outcomes:

- Students will be able to identify the birds of the Isles of Shoals by sight and sound.
- Describe the diversity of life-history strategies pursued by these birds.
- Identify and describe evolutionary adaptations that allow birds to thrive in various environments.
- Engage in dialogue about conservation challenges facing bird populations and gain knowledge of approaches used to ensure the long-term persistence of seabird populations.
- Apply a variety of field techniques used for studying birds including banding, survey methods (point counts, transects, spot mapping), nest monitoring, and behavioral observations.
- Keep an appropriate and detailed field journal.
- Develop and test ecological hypotheses through an independent project, to summarize and analyze data, and to present scientific information appropriately in both written and oral form.

Schedule of Classes (https://classes.cornell.edu/)

BIOSM 3750 - Marine Ecosystem Research and Management (3 Credits)
The Gulf of Maine is experiencing rapid ecological change as a result of multiple stressors, including climate change, ocean acidification, non-native species, and changing fisheries dynamics. This course will challenge students with these real-world problems to engage in solutions that integrate the best available science into conservation and management goals. Students will learn about ecosystem-based management and integrated ecosystem assessments. They will learn integrated ecosystem research tools used in field and laboratory research, and apply these tools around the Isles of Shoals and the Gulf of Maine. Finally, students will be organized into pairs when conducting research and then collaborate to integrate their research and to make recommendations to an outside panel of experts on their answers for management.
Prerequisites: one semester of college-level biology and/or ecology, e.g. BIOEE 1780/BIOSM 1780; BIOEE 1610/BIOSM 1610, NTRES 2010, or similar.
Distribution Requirements: (BIO-AS), (OPHLS-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Summer 2025, Summer 2024, Summer 2023, Summer 2022
Learning Outcomes:

- Students will be able to apply core ecological concepts to marine ecosystem research.
- Address real-world conservation management problems and apply concepts of sustainability.
- Conduct field sampling techniques and analyze data from the ocean environment, plankton, fish, seabirds, and marine mammals.
- Use a multidisciplinary skill set to collaborate, design, conduct, and integrate student research projects.
- Effectively communicate research results and ecosystem-based conservation advice to an expert panel and public audience.

Schedule of Classes (https://classes.cornell.edu/)

BIOSM 4450 - Field Wildlife Forensics (1.5 Credits)
Last Four Terms Offered: Summer 2022, Summer 2019, Summer 2017, Summer 2016
Schedule of Classes (https://classes.cornell.edu/)

BIOSM 4650 - Shark Biology and Conservation (3 Credits)
The last 30 years have produced an explosion of new information on the biology of the approximately 1,000 living species of sharks, skates, rays, and chimaeras, which collectively make up the group Chondrichthyes. This course will cover advanced topics in the evolution, diversity, anatomy, functional morphology, neurobiology, sensory systems, behavior, reproduction, development, and conservation of cartilaginous fishes.
Prerequisites: at least one semester of major-level marine biology or vertebrate biology.
Distribution Requirements: (BIO-AS), (OPHLS-AG)
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Summer 2025, Summer 2024, Summer 2023, Summer 2022
Learning Outcomes:

- Students will be able to describe elasmobranch phylogeny and evolution.
- Students will be able to explain how evolution has resulted in a wide variety of elasmobranch anatomical, physiological and morphological specializations.
- Students will develop skills and research methods used to advance understanding of shark biology, ecology and conservation.
- Students will be able to cite current and past shark research, and study elasmobranch species in the Gulf of Maine.

Schedule of Classes (https://classes.cornell.edu/)

BIOSM 4990 - Research in Biology (1-6 Credits)
Introduction to independent research. We will build a scientific community to support one another in proposing a testable biological question and carrying out the field or lab work to answer the question. You will practice the full scientific process; generating hypotheses, designing methods, troubleshooting, collecting data, interpreting and communicating your findings. Field time will be primarily dedicated to independent research where you will be in charge of your own data collection. Classroom sessions include discussions of primary literature, data analysis, peer feedback, and lectures on statistics, programming, and presentation skills. At the end of the course, students will present their research in a symposium and submit a written report in the style of a brief scientific article.
Corequisites: BIOSM 1500 or, with permission from Shoals staff, another BIOSM course that covers subject matter conducive to a mentored follow-up project.
Exploratory Studies: (CU-SBY)

Last Four Terms Offered: Summer 2025, Summer 2024, Summer 2023, Summer 2022
Learning Outcomes:

- Pose a testable research question that is grounded in current scientific literature.
- Design and execute an independent data collection effort.
- Analyze, visualize, and interpret original data.
- Communicate to diverse audiences about research in both oral and written formats.

Schedule of Classes (https://classes.cornell.edu/)