

Bridgeport Regional Aquaculture Science & Technology Education Center

Program of Studies



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Course Descriptions

The Bridgeport Regional Aquaculture Science & Technology Education Center (BRASTEC) is a specialized education program which focuses on science & technology related to the marine environment. Students who participate in this program apply and are chosen based on their interest in, and aptitude for, science and technology. We are a very competitive program and focus on cultivating critical thinking and problem-solving skills throughout all our course offerings. Students who attend “AQUA” are provided opportunities in both science & technology education which are unprecedented in comprehensive high school programs.

Classes meet on a semester schedule, for 90 minutes per day, and are each 1 credit.

AQUACULTURE BIOLOGY

SC110YAQGE

1 Credit – STEM

Grade 9

This course is designed to introduce the student to the study of life with emphasis on cell biology, energy relationships, physiology, genetics, development, ecology, and evolution. Through classroom, laboratory and boat activities, students will utilize scientific inquiry, literacy, and numeracy to explore and communicate these concepts. Students will have the opportunity to apply their understanding of biology as they evaluate current social issues. This course fulfills the high school biology requirement for graduation and is considered a laboratory course for college preparation.

AQUACULTURE CHEMISTRY- HONORS

SC201YAQHO

1 Credit – STEM

Grades 10-11

Honors Aquaculture chemistry fulfills classroom and laboratory requirements by providing an advanced understanding of general chemistry and leads the student into specialized fields of aquatic chemistry and instrumental analysis. This will include classroom and laboratory activities as well as a focus on the relationship between chemistry and aquaculture. Extra focus is placed on higher level problem solving and questioning to prepare students for earlier placement into our advanced sciences courses. ***Pending placement test results**

AQUACULTURE CHEMISTRY 1

SC201YAQGE

1 Credit – STEM

Grades 10-11

Aquaculture chemistry fulfills classroom and laboratory requirements by providing a basic understanding of general chemistry and leads the student into specialized fields of aquatic chemistry. This will include classroom and laboratory activities as well as a focus on the relationship between chemistry and aquaculture.

AQUACULTURE ENGINEERING HONORS*

TE405YAQHO

1 Credit - STEM

Grade 12

This course develops student competencies in the production of an aquaculture crop. It examines the various techniques used for the selection, grow-out, harvesting, processing, and marketing of selected species. Students will study the types of fish and shellfish grow-out methods used in the aquaculture industry today. A special emphasis will be placed on the design, construction, and maintenance of recirculating systems in our aquaculture laboratory. *BACA only

AQUACULTURE ENVIRONMENTAL SCIENCE

SC102YAQGE

1 Credit - STEM

Grades 10-12

Environmental Science is a study of the influences that can alter ecosystems with particular attention given to ocean and freshwater environments. Sources and effects of natural and man-made pollutants will be explored through case studies and field research. Students will culminate units on the various issues by exploring available means to solve problems.

AQUACULTURE SURVEY & ANALYSIS - HONORS*

MA301YAQHO

1 Credit - STEM

Grade 12

In this course students' study and apply concepts of probability and statistics that are required to support research in aquaculture. Students work with computer spreadsheets to process data; analyze data; and develop computer simulations that address the fundamental principles underlying the use of statistics. Measurement of central tendency, measures of dispersion, characteristics of frequency and probability distributions are used to summarize, display, and analyze data. Students develop a working knowledge of the rules of probability and explore topics in inferential statistics including confidence intervals, hypothesis testing, and correlation and regression analysis. *BACA only

BIOLOGY I – 1107 UCONN ECE

SC510YTDCL

1 Credit - STEM

Grades 11-12

This course is designed to provide a foundation for more advanced courses in Biology and related sciences. Topics covered include molecular and cell biology, animal anatomy and physiology. Laboratory exercises include dissection of preserved animals. *PRE-REQ: Biology and Chemistry

BIOTECHNOLOGY - HONORS

SC210YAQHO

1 Credit – STEM

Grade 11-12

The Methods in Biotechnology course is designed to develop student communication, scientific inquiry and familiarize students with laboratory techniques and procedures used in the biotechnology laboratory. Students will investigate the diverse technologies that constitute biotechnology and the broad array of products created through the biosciences as they engage in an in-depth study of the structure and function of nucleic acids and proteins. Investigations will include the bioscience of the human body, the environment, aquaculture, and agriculture. Throughout the course activities, students will address how the applications of bioscience affect our quality of life, as well as examine the ethical and social implications of these cutting-edge technologies.

* PRE-REQ: Chemistry

CHEMISTRY II- INSTRUMENTAL ANALYSIS HONORS

SC202YAQHO

1 Credit – STEM

Grades 10-12

This advanced course focuses on using advanced scientific instruments to analyze the chemical composition of a variety of environmental and clinical samples. This course emulates the working environment of a scientific research laboratory with a particular focus on developing the scientific writing, data analysis, and hands-on laboratory skills of the student. Students will learn the theory underlying each instrument's operation, perform experiments using the instruments, maintain an accurate record of experiments in their laboratory notebooks, and interpret and communicate their findings in formal laboratory reports. Instruments students will use in this course include: scanning ultraviolet/visible light spectrophotometers, dispersive infrared spectrometers, Fourier transform infrared spectrometers, gas chromatographs, and high pressure liquid chromatographs. **PRE-REQ: Chemistry**

CULTURE OF AQUATIC SPECIES - HONORS

SC212YAQHO

1 Credit – STEM

Grades 10-12

Students are introduced to the history of aquaculture as a way of life and an industry in this course. They examine proper nutrition and, prevention and control of diseases, parasites, and pathogens. Students learn proper protocols for examining and evaluating water quality. Students gain hands-on experience maintaining finfish recirculating systems in our on-site hatchery, and study commonly cultured species firsthand. Proper use of equipment and supplies are practiced; importance of good record keeping in aquaculture is emphasized. **PRE-REQ: Aquaculture Biology**

EARTH & AQUACULTURE - HONORS

SC219YTDHO

1 credit – STEM

Grades 9-11

In this course, students will study the Long Island Sound to represent Earth's formation and changing topography. We will strive to answer the following questions: How was Long Island Sound was formed? How do the Earth's systems sustain life in Long Island Sound? How has human activity influenced Earth's systems? How can we determine if a non-earth planet can sustain life and how would we modify that planet to do so?

ENVIRONMENTAL SCIENCE NRE 1000 UCONN ECE

SC102YTDCL

1 Credit - STEM

Grade 11-12

This course is an introduction to concepts of environmental concern and how these problems can be effectively addressed. Topics include: human population, ecological principles, biodiversity, as well as soil, water, and fish and wildlife conservation. (college credit awarded through the University of Connecticut Early College Experience program)

INTRO TO OCEANOGRAPHY 1003 UCONN ECE

SC501YTDCL

1 Credit - STEM

Grade 11-12

This general education course covers the processes governing the geology, circulation, chemistry, and biological productivity of the world's oceans. Emphasis is placed on the interactions and interrelationships between physical, chemical, biological, and geological processes that contribute to both the stability and the variability of the marine environment. Topics include geological changes that have occurred in the oceans and seafloor, the physical and chemical characteristics of seawater, the processes driving currents, tides, and waves, and how oceans modify climate and heat distribution on Earth. A background in secondary school physics, chemistry or biology is recommended. (college credit awarded through the University of Connecticut Early College Experience program)

HYDROSCIENCE PE

PE130YAQGE

1 Credit – Phys Ed

Grades 10-12

This course bridges the gap between physical health and the practical demands of the aquaculture industry through a range of functional fitness activities. We utilize rowing machines to simulate life on the water and weight room sessions to build the core strength necessary for handling marine equipment. To emphasize that wellness is a lifelong journey, we regularly visit community partners for activities like bowling and rock climbing. When on campus, students engage in outdoor activities such as pickleball and basketball to foster teamwork and coordination. The curriculum is adaptive, scaling based on class size and seasonal opportunities to ensure every student remains physically active and engaged. These diverse experiences prepare students for the physical rigors of maritime work while promoting healthy habits for the future.

MARINE CAD

TBD

1 Credit – STEM

Grades 9-12

This course introduces students to computer-aided design and digital manufacturing used in marine engineering and modern fabrication. Students learn to read and create technical drawings including projections, line conventions, and engineering plans. Boat design concepts are explored through the study of boat terminology, design trade-offs, and interpretation of lines plans to create wireframe and 3D boat models using specialized boat design software and Mastercam. Students gain hands-on experience with additive manufacturing and digital fabrication through 3D printing and laser engraving projects while learning machine setup, safety procedures, and post-processing techniques. The course culminates in an innovation challenge where students apply the engineering design process to design, prototype, and present a new or improved product using 3D printing or laser fabrication technologies.

MARINE CAM - HONORS

TBD

1 Credit – STEM

Grades 9-12

This course builds upon Marine CAD and focuses on computer-aided manufacturing and CNC machining processes used in modern engineering and production. Students learn to read and write G-code using the Cartesian coordinate system to program designs that incorporate linear and arc interpolation, subprograms, and geometric transformations. Students then apply these skills in Mastercam to create contour, pocket, and introductory 3D toolpaths while learning CNC safety, machine simulation, job setup, and safe operating procedures. Marine manufacturing concepts are emphasized as students interpret boat lines plans and tables of offsets to recreate real boat components and generate CNC toolpaths for cutting the parts. The course concludes with hands-on CNC machining, post-processing techniques, and an introduction to stitch-and-glue boat construction. ***PRE-REQ: Marine CAD**

MARINE CONSTRUCTION I

TE401YAQGE

1 Credit – STEM

Grades 9-12

This is an introductory course for the development of the foundational wood-working skills necessary to construct marine-related projects. These skills include project planning, safe and proper hand and power tool use, accurate project construction techniques, and appropriate finishing techniques. The primary projects constructed are a half-hull model and a nautical knick-knack shelf. The course also introduces CNC routing and laser engraving techniques.

MARINE CONSTRUCTION II - HONORS

TE115YAQHO

1 Credit – STEM

Grades 10-12

Students will build upon the skills developed in the introductory course. They will be expected to have a plan chosen prior to the start of this class for an advanced project. Past projects have included small skiffs, kayaks and paddleboards. Advanced construction and finishing methodologies such as boat plan reading, stitch-and-glue construction, fiber-glassing, and marine finishing techniques will be emphasized. ***PRE-REQ: Marine Con. I**

MARINE CONSTRUCTION III - HONORS

TE115YAQHO

1 Credit – STEM

Grades 11-12

An advanced independent-study class for those students who require additional laboratory time to complete a project started in Marine Construction II. Students often need extra lab time in this class, so special transportation plans may be needed to accommodate this necessity. **PRE-REQ: Marine Con. II**

MIND, BODY, AND MARINE

HE130YAQGE

1 Credit – Health

Grades 10-12

This Health course provides an overview of wellness with an emphasis on maintaining safety in and around the water. We explore the foundations of health by focusing on healthy relationships, mental health awareness, and digital safety in an increasingly connected world. Students tackle contemporary issues, including prescription drug and vaping awareness, to promote informed decision-making and long-term well-being. To align with our maritime mission, the curriculum includes training in paddle sports rules and regulations and safety in and around the water. We prioritize life-saving skills through a CPR review. The class will ensure that students are prepared for their future roles as responsible and healthy individuals.

ORIGINS OF AQUACULTURE – HONORS*

SC600YAQHO

1 Credit - STEM

Grade 12

This course examines the critical issues that have affected the growth and development of world aquaculture throughout global history. Topics explored will include the effects of over-fishing, the development of various types of fish farming techniques, the effects that pollution and governmental regulations have on the aquaculture industry. Each topic will entail readings and discussions with several student presentations on selected topics throughout the year will be required. ***BACA only**

PHYSICS IN THE MARINE ENVIRONMENT - HONORS

SC303YAQHO

1 Credit – STEM

Grades 9-11

This course is a science, technology, engineering, and math (STEM) course that utilizes engineering design process to teach basic engineering and physics concepts with a marine engineering theme. It is taught with a conceptual physics approach, that is, it will emphasize learning critical physics concepts including mechanics, pneumatics, conservation of energy, electricity and magnetism, and fluid mechanics, in direct application to hands-on projects. Students will work on projects that encompass the topics learned and apply the engineering design process to build, test and redesign their projects. Students will also construct an underwater remotely operated vehicle (ROV) and its dynamics under stress will be evaluated. This course also includes a variety of labs that help students investigate and allows them to apply their understanding to study the relationship between physical quantities.

SEAFOOD SCIENCE - HONORS

SC112YAQHO

1 Credit - STEM

Grades 10-12

This course is designed to train students in seafood safety and handling. In understanding the chemistry of food and microbiology, students will be prepared for implementation of, and certification in, ServSafe and HACCP principles. The practical knowledge gained will support their participation in the operation of a retail seafood market, as well as assisting guest chefs in demonstrating their culinary prowess at special events to be held at the Aquaculture Center.

SCIENCE OF COASTAL NAVIGATION & PILOTING

SC400YAQGE

1 Credit – STEM

Grade 12

This nautical science course is designed for students to delve into the fundamental principles of navigation, grounded in physical science concepts. These skills are essential for confidently addressing various coastal navigation scenarios. This course utilizes real-life navigational problems to reinforce the critical concepts of chart reading, position finding, course plotting, basic rules of the road and the understanding of aids to navigation.

Successful graduates will complete their Certificate of Personal Watercraft Operation (CPWO) coursework and test, allowing them to apply for their CT CPWO license through CT DEEP.

UB MLS 315 FUNDAMENTALS OF MED. LAB SCIENCES

SC136YDECL

1 Credit – STEM

Grade 11-12

This college-level course is designed to introduce the concepts and practices of clinical laboratory science and to prepare students for careers in the biological, chemical, medical, or veterinary sciences. The course encompasses the full array of diagnostic protocols performed in the modern clinical laboratory. Students will perform a wide variety of biochemical, immunological, and molecular procedures that aid in the diagnosis, treatment, and prevention of disease. There will be an emphasis on analytical techniques for the detection and quantification of complex metabolites or other compounds of interest to contemporary medicine. **PRE-REQ: Chemistry**

UB PHYSICS 201

SC301YDECL

1 Credit – STEM

Grades 11-12

A college-level advanced course in physics for those students interested in the biological, chemical, environmental, and medical sciences. This course combines theory, applications, and laboratory activities in developing physical concepts and in demonstrating their relevance. This course is an advanced course which serves as an algebra-based survey of the major topics in Physics. Students will use Vernier software and technology equipment and classical Physics apparatus to engage in comprehensive lab activities to better comprehend the concepts and their application.

UB SCI C201: THE OCEANS

TE507YDECL

1 Credit – STEM

Grades 10-12

This college-level course is a comprehensive examination of species which are central to fisheries and aquaculture. Laboratory and field work will provide students with techniques to identify species, describe functionality of specialized anatomical structures, and understand environmental parameters essential to the management of cultured species. Our research vessel will be utilized throughout the course for collection, identification, and observation of Long Island Sound species. Students will discuss conservation and fisheries management techniques. The course will conclude with an investigation of competitive interactions for food between humans, marine mammals, and other members of the food web. Laboratory work will include the culture of finfish, shellfish, and algae.

Bridgeport Aquaculture College Alliance (BACA)

The BACA program is designed for 12th grade students who have expressed a desire for a concentrated, interdisciplinary approach to science & aquaculture education. Students are responsible for the practical application of principles and concepts of biology, chemistry, physics, math, history, earth science and astronomy as it relates to aquaculture.

Students enrolled in the BACA Program are awarded up to 5 (five) credits. The integrated course of studies offers an in-depth study of aquaculture to include the origins of aquaculture (history), aquatic ecosystems, (math and science), aquaculture engineering (math, science, and technology) and survey and analysis (math and science). In addition to course work, students develop an original research project to present at state, national and international science competitions, and conferences.

Students enrolled in the BACA Program take the following courses over their senior year:

AQUACULTURE ENGINEERING - HONORS
AQUACULTURE SURVEY & ANALYSIS - HONORS
ENVIRONMENTAL SCIENCE NRE 1000 UCONN
INTRO TO OCEANOGRAPHY - 1003 UCONN ECE
ORIGINS OF AQUACULTURE HONORS

Supervised Aquaculture Experience (SAE)

Each student enrolled in our program is expected to complete **380 hours** of additional educational experience outside of the classroom over the course of their career at Aqua. This experience is designed by the student, based on their interests and aptitudes, to expand their learning experience. This experience is discussed in each class, each semester for every student. The breakdown of how to complete these hours is also discussed in the student's current class.