

MARINE BIOLOGICAL LABORATORY HIGH SCHOOL SCIENCE DISCOVERY PROGRAM



The Marine Biological Laboratory (MBL) in Woods Hole, Massachusetts has expanded its world-renowned education program to offer intensive, hands-on science courses for high school students.

The week-long residential experience mirrors the institution's unique research-based tradition of training, allowing students to understand and directly experience the cutting-edge experiments of today's research laboratories.

Based on conversations with teachers from across the United States, MBL has designed the courses to meet a need for hands-on laboratory experiences for an extended period of time.

COURSE OFFERINGS

ANATOMY AND DEVELOPMENT OF MARINE VERTEBRATES AND INVERTEBRATES

The course focuses on anatomy, development, and physiology of marine species. Lab work incorporates advanced microscopy and imaging techniques, including the opportunity to create time-lapse videos and 3D reconstructions, and explores animal husbandry and research. Students learn how major organ systems develop during embryogenesis, how scientists understand organ formation during normal development, and how errors in this process lead to birth defects.

EXPLORING MICROBIOMES OF MARINE ORGANISMS WITH DNA SEQUENCING

Microbiome research is a new and significant aspect of biology and medicine. This course focuses on the microbial communities associated with marine model organisms. Students will be introduced to the fundamentals of microbiome science through a combination of lectures, group discussion, laboratory work—including state-of-the-art molecular techniques—and computer exercises. By the end of the course, students gain an understanding of how an organism's microbiome develops and how the host and microbiome interact.

CORAL REEFS IN A CHANGING WORLD

This course explores coral reef ecosystems—from cell to reef. Students learn about the symbiotic relationship between coral and dinoflagellates, as well as life on a Woods Hole “coral reef,” through hands-on experiences with micro and macroscopic imaging techniques. Key principles of the biology and ecology of corals are covered. By course end, students can describe key Cnidarian characteristics, identify key threats to coral reef systems, and utilize different tools—from imaging to mapping—used in coral research.

CRISPR/CAS9 GENOME EDITING: A HANDS-ON EXPERIENCE

In this course students will learn how the revolutionary genome editing technology CRISPR/Cas9 works and will apply it in the lab to explore basic biological questions as well as the implications it has for improving human health. Genome editing will be used to understand zebrafish development, a key biomedical research species. Students will manipulate development genes to understand embryogenesis and organ formation and their connection to understanding human health and birth defects. The course will expose students to modern methods in microscopy. The ethical implications of genome editing will also be discussed.

“As much as I learned about the biology, the real take-away from this program for me was what it’s like to work as a scientist in a lab and seeing such a large range of work that I could end up doing.”



In the “Coral Reefs in a Changing World” course, students learn about life on a Woods Hole reef.



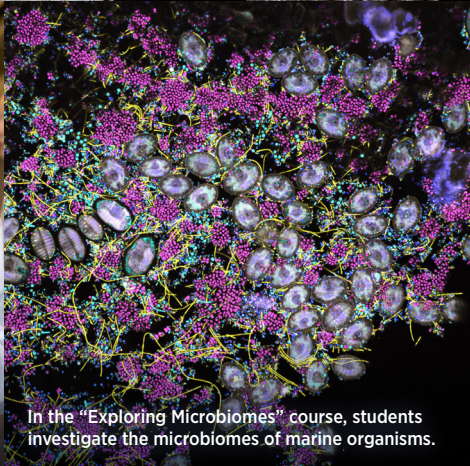
A student collects specimens from Eel Pond, Woods Hole.



All MBL high school courses incorporate cutting-edge microscopy and computer image analysis.



Marine and aquatic species serve as living windows through which students can view basic processes common to all forms of life, including humans.



In the “Exploring Microbiomes” course, students investigate the microbiomes of marine organisms.



Students apply the latest genome editing tool, CRISPR-Cas9, to learn how animal research directly translates into improvements in human health.

\$2,500 tuition per student (includes room and board)
mbl.edu/education/secondary-school-programs

ABOUT THE MARINE BIOLOGICAL LABORATORY

Since its founding in 1888, the MBL has drawn the world’s greatest minds in science to Cape Cod to carry out some of their most creative and far-reaching work. Fifty-eight scientists affiliated with the MBL have been recognized with Nobel Prizes.

The laboratory, affiliated with the University of Chicago, is dedicated to scientific discovery—exploring fundamental biology, understanding biodiversity and the environment, and informing the human condition through research and education.

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