

**Ruppin Academic Center
School of Marine Sciences**

Title: Marine Biotechnology

Meeting Times: Sunday May 18th to Sunday, May 25th, 2025

Instructor: Professor Yonathan Zohar
Institute of Marine and Environmental Technology
Chair, Department of Marine Biotechnology
University of Maryland Baltimore County
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Course Description:

This course covers the application of advanced molecular and biotechnological platforms to studying the marine environment and obtaining useful resources and natural products from marine systems. Students study recent progress in marine genomics and post-genomics, discovery of drugs and enzymes from marine microbes and macro-organisms, mapping oceans' biodiversity, the role of marine microbes in global carbon cycling, life in extreme environments, molecular and biotechnological approaches in fisheries and aquaculture, aquaculture genomics, transgenic, genetic engineering and surrogate technologies and applications, algal biotechnology and marine-based bioenergy, and environmentally sustainable aquaculture. **Course's language is English.**

Required Texts: There are no suitable text-books for this class. A list of references to articles in the primary literature will be e-mailed to students two weeks before the first class.

Course Outcomes:

Students will become familiar with the multidisciplinary, rapidly-emerging field of Marine Biotechnology. Students' existing skills and backgrounds in molecular platforms will be enhanced by exposure to a wide range of molecular techniques applied to the study of marine ecosystems and resources, and their application to industrial uses. Students will be exposed to leading scientists and key companies in the field of Marine Biotechnology, thus will gain a broad understanding of fundamental research and its translation to addressing societal needs. Since the course is based entirely on recent papers in the scientific literature, skills in scientific literacy will be developed. Students will emerge from this class well-equipped to assess developments in Marine and Environmental Biotechnology and Genomics and to participate in this exciting emerging field of research, development and industry.

Examination: A three-hour examination will be held on the final day of the course. The examination will include 30 multiple choice questions.

Examination answers must be given in English.

Grading:

Scale:

>97%	A+
94-97%	A
90-93%	A-
87-89%	B+
84-87%	B
80-83%	B-
70-79%	C
<70%	F

Date	Topic	Instructor
Sunday 18/5/25 (9 to 13:00)	Course overview and introduction to Marine Biotechnology Marine genomics-metagenomics-rhodopsins and ocean nutrient cycles	Prof. Y. Zohar (2 h) Prof. Oded Beja (Technion, 2h)
Sunday 18/5/25 (14:00 to 17:00)	Marine genomics-metagenomics-rhodopsins and... (continuation) Marine Extremophiles	Prof. Oded Beja (Technion, 1h) Prof. F. Robb (IMET, 2h, via zoom)
Monday 19/5/25 (9 to 13:00)	From marine rhodopsins to optogenetics to alleviating blindness Aquaculture Biotechnology-general overview	Dr. Alina Pushkarev (Technion 2h) Prof. Y. Zohar (2h)
Monday 19/5/25 (14:00 to 18:00)	Marine nano-biotechnology- sea anemone to human health Marine Symbiosis	Prof. Tamar Lotan (Haifa U., 2h) Prof. Russell Hill (IMET, 2h, via zoom)
Tuesday, 20/5/25 (9 to 13:00)	Micro-Algal Biotechnology Macro-Algal Biotechnology	Dr. I. Berzin (Vaxa Life, 2h, via zoom) Dr. Y. Tal (Seakura, 2h)
Tuesday, 20/5/25 (14:00 to 18:00)	Aquaculture Genomics Marine Natural Products	Dr. Yossi Aizen, (2h) Prof. Russell Hill (IMET, 2h, via zoom)
Wednesday 21/5/25 (9 to 13:00)	Zebrafish Molecular Biology and biotechnology applications Transgenic technology	Dr. Alon Daya (RAC, 2h) Prof. Y. Zohar (2h)
Wednesday 21/5/25 (14:00 to 18:00)	Surrogate Technology Marine Bioremediation	Prof. Y. Zohar (2h) Prof. Kevin Sowers (IMET, 2h, via zoom)
Thursday 22/5/25 (9 to 13:30)	Aquaculture: Reproduction Recirculating Mariculture: Microbes, Genes to Production (12:00-14:30)	Dr. Yossi Aizen (2h) Prof. Y. Zohar (2.5h)
	Weekend to study	
Sunday 25/5/25 (9:00-12:00)	Examination	YZ/YA (3h)