Leon H. Charney School of Marine Sciences
UNIVERSITY OF HAIFA

Biogeochemical oceanography – 2 credits

Course Number: 227.4041

Lecturers: Prof. Daniel Sher, Prof. Mike Krom, Prof. Nadya Teutsch

Office Hours: By appointment with the course teachers (email)

Course Type: Lecture

Course Level: MSc/ PhD

Prerequisites: Students should be acquainted with the general patterns of oceanographic flow, and the concepts of mixing and upwelling (Chapters 6 and 9 in Mark Denny "How the Ocean Works" and view the recorded lecture: https://drive.google.com/file/d/1zGyW2HhYWLAgxtc5TSjLJswHCzYfSKFq/view?usp=sharing.

Course Overview: Biogeochemical oceanography is the branch of oceanography that studies how chemical elements and compounds move through the ocean and how their cycles are driven by interactions among biological, chemical, geological, and physical processes. Life in the oceans is intricately linked with the physics and chemistry of the water and the seasons and climate of Earth. Understanding the dynamics of life in the oceans, and how they affect global biogeochemical cycles, requires an interdisciplinary approach, quantitative thinking, and access to appropriate data. During the course on biogeochemical oceanography, we will gain insight into chemical cycles in seawater and marine sediments, and their interactions, acquire quantitative understanding of some of the major physical and chemical factors that shape life in the oceans, and ask how these processes manifest in the Eastern Mediterranean Sea. We will also learn how to obtain, critically analyze and interpret oceanographic data. The course will include lectures, discussions and hands-on work using various ocean sensor datasets.

The course includes the topics:

- Human-ocean interactions on an oceanographic scale
- Ocean water origin, early history and chemical composition
- Geochemistry of N, P, and Si
- Nutrient limitation in various ocean areas
- Physical, chemical or biological control on primary production?
- Predation by zooplankton and energy transfer to higher trophic levels
- Inorganic carbon and ocean acidification

- Particulate matter in the Sea
- Mathematical models in biological oceanography
- Isotopes in biogeochemical oceanography
- Temporal and spatial heterogeneity at various scales
- Ocean pollution

Grading: Quantitative assignment (20%), a mid-course presentation (30%) and a final project, which includes a written assignment and an oral presentation (50%). Assignments can be done in pairs.

Reading List: Reading matter will be presented along the course.