

**Course:**  
**Oceanographic Cruise**  
**Following the Spring Transition to Stratification in the Eastern Mediterranean Sea**

**Credits: 3**  
Semester: 2<sup>nd</sup>, Year: 3<sup>rd</sup>  
Course number: 331

**Scope:**

A research project that combines guided hands-on experience at sea and in the lab, data processing, and scientific writing

**Course website:** <https://moodle.ruppin.ac.il/course/view.php?id=20440>

**1. Course Topics:**

Oceanography is a highly interdisciplinary science that encompasses physics, chemistry, earth and atmosphere science and biology. The sea is a relatively inaccessible, uncharted, and hostile environment for humans. Therefore, oceanographers are increasingly relying on sophisticated instruments and analytical techniques to understand the ocean. The main objective of this course is to introduce students to a broad range of classic and state-of-the-art oceanographic methods.

*Major methodologies* practiced throughout the course include:

- The scientific process
- Field work practices, documentation and logging methods
- Critical review of the scientific question and the suitability of the method to provide the required information
- Data handling, data basing and mining, analysis, and scientific presentation of oceanographic data.

*Specific topics* include:

- Physics of the water column
- Major nutrients dynamics and N/P ratios (Nitrate, Nitrite, Particulate N, Phosphate, Particulate P)
- Picoplankton analysis: flow cytometry, fluorescence microscopy, and image analysis
- Micro- and meso-plankton analysis
- Planktonic food web structure (biomass and composition)
- Enzymatic techniques (Alkaline Phosphatase Activity)
- Ocean Data Viewer, ImageJ

## 2. Learning Outcomes:

- Graduates will be able to critically evaluate simple quantitative research questions and select the most appropriate method to address it.
- Graduates will have a hand-on experience in basic oceanographic practices.
- Graduates will gain a systematic approach for the execution of an oceanographic cruise.
- Graduates will be able to assemble basic databases, properly analyze and present basic oceanographic data including time series and 3D data.

## 3. Learning Mode:

After joint opening lectures, each team (4-6 students) follows an independent schedule that includes:

- **Preparatory stage**
  - Writing a preliminary forecast for the cruise results, based on the course plan, protocols and relevant literature.
  - Passing an online exam that tests proficiency in cruise procedures and safety rules.
  - Preparatory lab where all sampling gear is packed and checked.
- **First cruise**
  - Oceanographic cast at 270 m, 22 km offshore and vertical plankton net tows
  - Analytical lab where water and plankton samples are analyzed
  - Data processing lab where analytical data are further analyzed, plotted, verified and entered into the course database
- **Mini project**

In this stage, each team chooses a topic for a mini project based on the course database, that can be complimented by a simple experiment in accordance with the framework (time and logistic constraints) of the cruise and labs.

  - An interactive and iterative online process of topic selection and experimental design
- **Second cruise (as above)**
  - Analytical lab where water and plankton samples are analyzed
  - Data processing lab where analytical data are further analyzed, plotted, verified and entered into the course database
- **Final data processing lab and summary lectures**
- **Final report**

Submission of a final report in the format of a scientific paper.

Depending on sea conditions, the program may change at a very short notice. A detailed and up-to-date timetable (google calendar) is available on the course website

The course website is the portal to the course and provides access to all the course material including additional reading material, relevant links, presentations, and full access to the

previous year course. The course website can be accessed as “guest” but a username and password are required to submit the assignments and exams.

#### 4. Course Requirements:

- **Active** participation in all course activities (lectures, cruise preps, labs, data processing and writing) is required from all students
- Due to the demanding logistics involved, **strict adherence to the timetable will be enforced with heavy penalties** for late appearances: (3% of total grade for 1<sup>st</sup> belated appearance, 10% for the 2<sup>nd</sup>, 20% for the 3<sup>rd</sup>).
- **Participation in course activities is mandatory.** Students who miss labs or a cruise (or were late more than 3 times) will be expelled from the course.
- Assignments are submitted electronically via the course website.
- All students are required to be highly proficient in all aspects of the day's activity.
- Students who arrive unprepared will not be allowed to go out to sea.

| Requirement                                                                                                                    | Weight | Notes    |
|--------------------------------------------------------------------------------------------------------------------------------|--------|----------|
| Preliminary forecast of cruise results (Online submission)                                                                     | 7%     | Teamwork |
| Safety and protocols proficiency (online exam)                                                                                 | 5%     | Personal |
| Mini project topic, work plan, and experimental design (Online iterative quiz)                                                 | 7%     | Teamwork |
| Active participation in labs and cruises                                                                                       | 15%    | Personal |
| Active participation in data processing and writing assignments (Online submission by the end of each data processing session) | 14%    | Personal |
| Final report                                                                                                                   | 52%    | Teamwork |

Access to the internet, to Ruppin Moodle system, and to a personal computer are mandatory.