

**Course: Underwater Research Methods**

**Credits: 3**

Semester: 1st, Year: 3rd

(course takes place before the beginning of the fall semester)

Course number: 421

**Scope:**

An eight-day intensive course that combines lectures, underwater work, and data processing

**Course website:** <https://moodle.ruppin.ac.il/course/view.php?id=19740>

**1. Time and Place of the course:**

This is an intensive eight-day course that takes place before the fall semester at the Faculty of Marine Sciences in Michmoret. The activities are at sea (mostly underwater), at the faculty's Scientific Diving Center, and in the computer class.

**2. Prerequisites:**

- Certificates:
  - i. Scientific diver level I certificate from American Academy of Underwater Science (AAUS) (the scientific diver course is available ex curriculum to all students of the Faculty of Marine Sciences who meet the course's prerequisites)
  - ii. Navigation license (level 12 – fast boat)
- Courses:
  - i. Excel
  - ii. Statistics and Probability
  - iii. Physical Oceanography
  - iv. Chemical Oceanography

**3. Course type: Field camp**

**4. Course Topics:**

For humans, the sea is relatively inaccessible, uncharted, and hostile environment. Marine scientists are therefore faced with special challenges that are sometimes equated with the study of deep space. The course aims to equip new marine scientists with an extensive toolbox of underwater research methods. The course provides theoretical background and hands-on experience in a wide range of modern underwater research methods (see list below). Special emphasis is given to the adaptation of methods and approaches to the unique conditions of the Israeli

Mediterranean Sea, and to safety, thorough planning, and risk and sensitivity analysis. Course graduates are awarded an internationally recognized Scientific Diver certificate (AAUS level II).

Major themes taught and practiced throughout the course include:

- Basic seamanship and boat operation
- Proper safety and planning practices for underwater scientific missions
- Documentation and logging methods
- Navigation and orientation above and below the water
- Critical review of the scientific question and the suitability of the method to provide the required information
- Data handling, data basing, analysis, and scientific presentation methods

Special topics are reviewed and practiced on designated days. These include:

- Sediment and fauna sampling and analysis
- Survey methods for mobile fauna (fish) and an introduction to statistical data analysis and presentation
- Survey methods for sessile organisms including a review of more advanced quantitative and statistical methods for the proper handling of survey data
- Mooring deployment and retrieval including a review of flotation techniques and proper materials selection
- Planning and deployment of basic and state of the art oceanographic sensors, data loggers, additional instruments, and the analysis of time series data
- Underwater mapping techniques

#### **5. Learning Outcomes:**

- Graduates will be able to critically evaluate simple quantitative research questions and select the most appropriate method to address it.
- Graduates will be able to plan simple underwater tasks with maximum efficiency and safety.
- Graduates will gain a systematic approach to the execution of an underwater scientific mission
- Graduates will be able to put together basic databases and to properly analyze and present scientific data

#### **6. Learning Mode:**

- The course is given as a field camp that requires full commitment and considerable physical and mental efforts.
- Activities include underwater work, lectures, labs, data analysis, and the submission of reports and presentations by the end of each workday.
- **Safety first!** Strict adherence to safety rules is mandatory and there will be zero tolerance for negligence or breaches of seamanship and diving rules.
- The unique and demanding nature of the course, that blends hard work at sea and underwater, long hours of preparation, and challenging academic content requires

special commitment from instructors and students alike to insure a positive learning atmosphere, mutual respect, and strict adherence to the timetable.

- Students will be assigned to teams of five that will work together throughout the course.
- An underwater experimental plot (the “playground”) located at 11 m depth, about 800 m west of the marina is allotted to each team and most of the course activities (marking, mapping, benthic and fish surveys, instrumentation, and sampling) will be carried out at the plot.
- Each day, one student will be assigned as the chief scientist and will be responsible for their team’s planning, debriefing, execution, summary, and presentation of the day’s assignment.
- Another student will be assigned as the safety officer. Safety officers are not allowed to work at sea and their sole job is to watch the other divers.
- Other students will be assigned as the boat’s skipper and as the pilot.
- The daily duties will be rotated so that each student will experience all tasks.

Course plan contains a preparation day, 6 full days of underwater + class work, and a final day devoted solely to data analysis and presentations.

Typical day consists of:

06:30-08:30	Final preparations and briefings for the day’s underwater assignment
08:30-11:30	Practice at sea and underneath it + debriefing
12:30-14:30	Sample handling and data processing
14:30-16:30	Theoretical lecture + presentation of the next assignment
16:30-17:30	Preliminary experimental design
17:30-19:30	Detailed experimental design and preps
20:30-21:30	Wrap-up meeting and presentations of the day’s findings

Pending on sea conditions, the program may change at very short notice. A detailed and up-to-date time table is available in this link: [URM google calendar](#).

The course website (<http://moodle.ruppin.ac.il/course/view.php?id=19740>) 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 last year's course. One can access the course website as “guest” but a username and password are required to submit the daily work plans and summary presentations

## 7. Course Requirements:

Requirement	Weight	Notes
Preparation, summary and data analysis for daily assignment	30%	<ul style="list-style-type: none"> <li>● All students are required to be highly proficient in all aspects of the day's activity.</li> <li>● <b>Students who arrive unprepared will not be allowed to go out to sea</b></li> <li>● Special attention will be given to safety</li> <li>● Personal and team gear should be well organized and prepared</li> <li>● Chief scientist is responsible to debrief the team on all aspects of the work plan. <b>The written protocol must be submitted at the course website</b></li> <li>● Safety officer is responsible for the safety plan</li> <li>● By the end of each day, the team will present a field report that includes the main findings as well as practical insights and highlights from the day's activities.</li> <li>● <b>The presentation must be submitted on the course website</b></li> </ul>
Participation and performance	30%	Instructor evaluation of student's level of readiness, resourcefulness, and performance
Final report	40%	<p>The report will be submitted as set of checklists and protocols for each of the topics learned in the course (see list above).</p> <p>50% of the grade is given for the draft and 50% for the corrected version + rebuttal letter and revised report</p>

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