



For additional information:  
<http://marsci.haifa.ac.il/margeo/intprog>

E-mail: [graduate@mail.uhaifa.org](mailto:graduate@mail.uhaifa.org)  
Phone: +972-4-824-0766  
Fax: +972-4-824-0391  
Skype: haifainternationalschool



Mailing Address:  
University of Haifa  
International School  
Haifa 31905, Israel

explore

## M.Sc. in Marine Geosciences

Dr. Moses Strauss Department of  
Marine Geosciences  
Leon H. Charney School of Marine Sciences  
Faculty of Natural Sciences

excel

expand





## Welcome to the University of Haifa



Situated at the top of the Carmel Mountain, amidst the Carmel National Forest, with breathtaking views of the Mediterranean Sea and the Galilee, the University of Haifa provides the perfect setting for your international graduate studies.

The University of Haifa is a microcosm of Israeli society dedicated to academic excellence and social responsibility. An exciting and inspiring cultural mosaic, the university has a diverse population of 18,000 students made up of secular and religious Jews, Christian and Muslim Arabs, Druze and Bedouin, new immigrants and native Israelis and a growing number of students from around the world. We invite you to join us.

One of Israel's leading research universities, the University of Haifa is home to the foremost, and only sea-going marine research department in Israel. Established in 2007 as part of the multidisciplinary Leon H. Charney School of Marine Sciences, the Department of Marine Geosciences (DMG) combines research and graduate studies of the marine environment in the following main disciplines: exploration geophysics, seafloor mapping, remote sensing, geodynamics, tectonics, marine and coastal sedimentology, geochemistry, chemical and physical oceanography.

## Program Objectives

- To provide students with practical knowledge and experience in geological and geophysical survey planning and data collection at sea and onshore, using state-of-the-art equipment;
- To offer students the unique opportunity of processing and interpreting seismic data using the most advanced industrial geophysical software;
- To expose students to the best quantitative tools and knowledge needed to succeed in the current highly competitive global geosciences arena;
- To offer a challenging academic program that combines classroom study with hands-on scientific exploration at sea and onshore, and laboratory research in a multidisciplinary environment;
- To assist students in developing unique expertise in a specialization within the field of geosciences, while expanding their understanding of interacting earth systems;
- To develop teamwork and leadership skills and original thinking, as we view our students as our future professional colleagues.

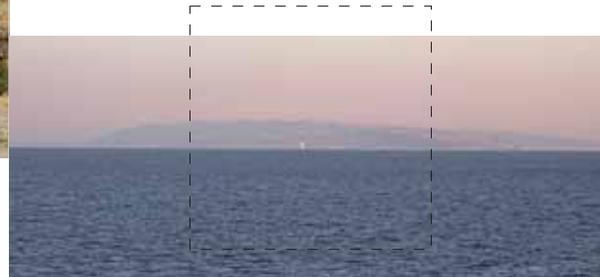


## The Program

Recent significant deep-sea gas findings offshore Israel have prompted a period of unprecedented development and pose world-class scientific, technical and environmental challenges. These significant developments provide students with a wide range of career opportunities in disciplines such as exploration geophysics and environmental geology.

Using the Eastern Mediterranean as a natural marine laboratory, the International M.Sc. Program in Marine Geosciences provides students with a unique opportunity to develop practical scientific experience at sea, together with a rigorous academic curriculum.

Studies conducted in the DMG utilize state-of-the-art methods of data acquisition, processing and analysis to decipher trends and phenomena that occur in the marine geosphere. Over the last decade, geomarine studies have been brought to the focus of global interest as a result of growing concerns, such as changes in sea level and climate, the search for conventional and new energy sources and the emergence of unprecedented developments that offer new avenues of research. Research topics in this field are numerous, encompassing disciplines that interact in a way that demands a holistic research approach.



# The Program

Topics to be covered include: the structure of the seafloor; the Earth's crust below it and the search for energy sources (oil, gas, hydrates); dynamics of the water body above it; sea level variations and their relation to tectonic and climate changes; coastline developments in present and past times (tsunami record, collapse of cliffs); and, finally, present and past influences on human evolution.

Students will have the opportunity to interface with central research institutions in Israel including the Israel Oceanographic and Limnological Research Institute, the Geological Survey of Israel, the Geophysical Institute of Israel and other industrial institutes.

Taught in English, the program can be completed in two years and begins every October. Coursework, field trips and an educational cruise are held during the first two semesters, the summer semester is dedicated to establishing a research proposal, while the second year is dedicated to conducting research. Students will be required to submit a research thesis at the end of the second year of the program.

Upon completion of the program, students will be awarded a Master of Science in Marine Geosciences.



## Field Work

Students will gain practical experience in marine geophysical survey work through hands-on field activities. The program includes educational research cruises to the deep sea, coastal and underwater field excursions, as well as geological field trips to marine structures currently exposed onshore. The research and educational cruises are carried out in water bodies in and surrounding Israel – the Mediterranean, the Dead Sea, the Red Sea and the Sea of Galilee. The geological field trips cover a wide variety of environments, from the Mediterranean coast to the Judean and Negev deserts.

## Program Structure and Scope

The program consists of 32 credits, including eight core courses, eight elective courses, marine coastal and inland field trips and two seminars. The elective courses expose students to a host of potential fields as well as encouraging international student exchanges. Students will be required to choose a research topic upon registration, together with a faculty mentor, and submit their proposal at the end of the first year. The summer and second year will be dedicated to carrying out the research and submission of the final thesis is expected at the end of the second year of the program.

Exceptional students may want to take advantage of the International School's Hebrew and/or Arabic courses, although it is not required and is not included in the tuition. Please see the International School's website for more details ([www.uhaifa.org](http://www.uhaifa.org)).



# Curriculum\*

The following table lists core and elective courses offered in the Marine Geosciences program. Students may register for additional courses from the accompanying multidisciplinary courses, according to their program of studies and with the approval of their mentor and the M.Sc. educational committee.

Core Courses	Credits
Geophysical Investigation of the Marine Environment	2
Signals Analysis – Fundamentals and Application	2
Geology of Marine Sediments	2
Physical Oceanography	2
Geochemical Oceanography	2
Hydrography	2
Educational Cruise	2
Scientific Writing and Research Presentation	2
Interdisciplinary School Seminar	0
DMG Colloquium	0



Elective Courses	Credits
Introduction to Geology	2
Introduction to Geophysics	2
Seismic Processing and Imaging	2
Processes in Marine Geology	2
Numerical Methods in Physics of Continuum	2
Processing and Analysis of Seismic Data: Workshop	2
Seismic Data Interpretation	2
Two-Phase Flow	2
Tectonics of the Oceans	2
Geology of the Eastern Mediterranean	2
Seafloor Morphology	2
Topics in Coastal Geomorphology	2
New Frontiers in Marine Research	2
Micropaleontology	2
Paleoceanography	2
Natural Energy	2
Underwater Geoarchaeology in Caesarea	2
Paleolimnology of the Dead Sea Region: Field Trip	1
Marine Geology of Mt. Carmel, Exploring the Cretaceous Seafloor: Field Trip	0.5
Coastal Geomorphology: Field Trip	0.5

\*The curriculum is subject to change without notice. Please see program website for the most up-to-date curriculum.

## Course Descriptions\*

### Geophysical Investigation of the Marine Environment

This course aims to provide basic familiarity with the potential uses of geophysical mapping and imaging methods in various fields of marine investigation. Particular emphasis will be given to applications relating to the oil and gas industry.



### Signals Analysis – Fundamentals and Application

This course will focus on subjects within signals analysis such as the Fourier trigonometric series, Gibbs phenomenon, complex variables, complex plane, Cauchy's theorem, Cauchy's integral formula, Taylor and Laurent series, MATLAB tools, among others.

### Geology of Marine Sediments

This course focuses on the classification of marine sediments, their mineralogical and biogenic composition and deposition environments and processes as well as introducing basic concepts in seawater composition and biogeochemical cycles.

### Physical Oceanography

Physical oceanography describes the properties of liquid medium, such as salinity and temperature, and their dynamic behavior including the study of currents, waves and tides. Water physics is the basis for understanding oceans and the behavior of other bodies of water in geological, chemical and biological systems. This course will focus on subjects within physical oceanography.

### Geochemical Oceanography

This course will focus on two major aspects: chemical cycles in seawater and geochemical processes in marine sediments, especially the interaction between seawater and sediments. Main concepts of interactions and processes, fluxes and reservoirs, sources and sinks in the marine environment will be discussed.

### Hydrography

This course will summarize hydrographic methods and their implementation in Israel and abroad, principles of marine mapping and navigation, coordinate systems and international regulations. Prerequisites: Geophysical Investigation of the Marine Environment and Signals Analysis – Fundamentals and Application.

### Educational Cruise

Students, under the guidance of faculty, will spend six days at sea collecting geologic and geophysical data. This course will function as a workshop on data acquisition for other courses in the program. Students will learn how to operate sampling equipment during the cruise and will be taught how to process data, read diagrams and maps, and form sections.

### Scientific Writing and Research Presentation

This course simplifies and demystifies the writing process. Fundamentals of effective scientific writing will be examined in order to reach an effective, concise and clear presentation of scientific research.

### Interdisciplinary School Seminar

The purpose of this seminar is to expose students and faculty of the Charney School of Marine Sciences to interdisciplinary topics at the forefront of scientific research. This is a year-long seminar; each topic will be discussed for the duration of one semester.

### DMG Colloquium

The DMG colloquium brings lecturers from around Israel and distinguished guests from abroad to present their current line of research. This allows students and faculty to be updated on the latest research related to the different fields taught in the department.

\*For detailed descriptions please visit our website: <http://marsci.haifa.ac.il/margeo/intprog>

## Course Descriptions

### Introduction to Geology

The aim of this course is to provide the student lacking an undergraduate course in geology with a basic background in the subject.

### Introduction to Geophysics

The aim of this course is to provide the student lacking an undergraduate course in geophysics with a basic background in the subject.

### Seismic Processing and Imaging

Active source seismic imaging is the primary geophysical technique utilized in the oil and gas exploration and development industry, as well as in many marine research fields. The aim of this course is to provide a basic understanding of seismic waves and their use in various imaging techniques.



### Processes in Marine Geology

This course focuses on morphological and tectonic processes that have shaped the seafloor and subsurface throughout geological history. Data acquisition methods in the marine realm will be discussed, as well as interrelations between biological, chemical and physical processes.

### Numerical Methods in Physics of Continuum

Physics of continuum is the basis for energy and matter motion, from seismic waves and ocean currents to compaction of marine sediments. The objective of the course is to gain experience in numerical solutions of scientific problems in the area of marine sciences.

### Processing and Analysis of Seismic Data: Workshop

A series of concentrated workshops will deal with various topics of seismic processing and analysis. The aim is to provide practical tools for research or commercial work in the field of active source seismology.

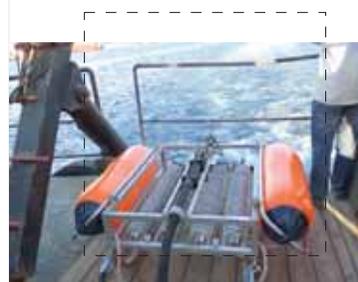
### Seismic Data Interpretation

This course provides practical methodologies for seismic reflection data interpretation for unraveling subsurface structure and stratigraphy. Students will practice interpretation and mapping of paper sections, and computerized interpretation skills in 2D and 3D.

**Prerequisites:** Processes in Marine Geology and Geology of Marine Sediments (can be taken simultaneously with this course).

### Two-Phase Flow

The main objective of this course is to gain experience of two- and three-phase flow of gas, oil and water within porous aquifers and wells, and to define the coupling between them.



### Tectonics of the Oceans

This course will methodically describe the basics of tectonics, highlighting the formation of the present-day global oceans. Earth's inner and surface processes and their interactions will be discussed as well as the major processes that characterize oceanic and continental plates. Special attention will be given to diverse methods based on geophysics, geochemistry and paleomagnetism.

## Course Descriptions

### Geology of the Eastern Mediterranean

This course will discuss the geologic processes that have shaped the Mediterranean including the formation and present structure of the Mediterranean, tectonics, Levant continental margins, the Nile and its deposits, the Hellenic arc and Aegean sea, among other topics.

### Seafloor Morphology

The goal of this course is to expose students to different processes occurring on the seafloor and the way in which they are created, operate and shape the topography of the seafloor. This course covers the entire oceanic realm from the continental shelf to the deep ocean.

### Topics in Coastal Geomorphology

This course will focus on understanding processes occurring in the coastal environment and their connection to its development and to shallow geology.



### New Frontiers in Marine Research

An interdisciplinary seminar on marine sciences focusing on leading research topics in the field. Each semester, a different topic will be chosen and discussed from scientific, legal and economic aspects.

### Micropaleontology

This course will cover the history of micropaleontology within the realm of marine sciences and its many applications today. In addition to the theoretical aspect, the course will include a hands-on project in which students will learn how to process, isolate, identify and analyze micropaleontological samples.

### Paleoceanography

This course will focus on the ocean's development during the geologic past, emphasizing ocean chemistry and physics, climatology and tectonic activity.

### Natural Energy

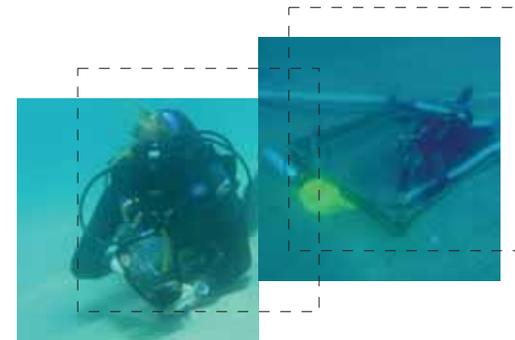
This course is designed for students specializing in the ocean, earth and environmental sciences who want to understand global exchange of energy and principles, methods and construction of a power station using renewable energy as well as climate dynamics.

### Underwater Geoarchaeology in Caesarea

During this course, students will have the opportunity to excavate Caesarea's harbor, learn important excavation and recording skills, and analyze findings and sedimentological features. Lectures will address the broad history of Caesarea and its excavations, the geoarchaeology of harbors, paleotsunamis and marine archaeology.

### Paleolimnology of the Dead Sea Region: Field Trip

This two-day field trip is dedicated to the present and ancient lakes that developed along the Dead Sea fault since its formation. The history of these water bodies will be studied through the fault's tectonic and geomorphological development.



## Course Descriptions

### Marine Geology of Mt. Carmel, Exploring the Cretaceous Seafloor: Field Trip

The exposed structure of Mt. Carmel was formed in the ocean. This field trip covers a wide range of topics in marine geology and how they are expressed on the present-day Mt. Carmel from formation processes to the nature and reasons for uplift.

### Coastal Geomorphology: Field Trip

This field trip in coastal geomorphology is aimed at providing hands-on information on processes that occur along the Israeli coast. The construction of hotels, holiday apartments and boardwalks add to the effect of ongoing erosion. However, attempts to protect the beach or the coastal cliff often cause more damage than good. The field trip will focus on the beaches in the Haifa area southwards until Michmoret. Examples of coastal construction and anthropogenic interference will be examined in the field.



## Admission Requirements & Prerequisites

- Accredited science degree (B.Sc.) in geology, geophysics, marine science or other related sciences, diploma and transcript
- A minimum of 3.0 GPA, 80% or equivalent
- TOEFL scores (if native language is not English or candidates have not previously studied at an institution of higher education where the language of instruction is English). A minimum of 550 (paper-based test), 213 (computer-based test) or 80 (internet-based test)
- Two letters of recommendation from relevant academic faculty members
- Curriculum Vitae/Résumé
- Copy of valid passport & six passport-sized photos
- Statement of research intent including research interests, goals and aims (500-750 words)
- Medical forms
- Suitable applicants will be interviewed

### Academic Prerequisites

Students who do not have basic knowledge in mathematics, physics, chemistry, geology, atmosphere and computing will be required to successfully complete courses in these areas before being accepted into the program.



## General Information

### Tuition and Financial Aid

Please see program website for current tuition and fees. There are numerous sources of financial aid available to students who choose to study at the University of Haifa. For a list of scholarship options please see the International School website.

### Application Procedure

Application forms can be found on the International School website or by contacting the International School directly. Applications are processed on a rolling admissions basis; we review and accept applications as the complete application file is received.



### Housing

All international students who are enrolled in a full-time program of study are eligible to live in the campus dormitories alongside other international and Israeli students. The University of Haifa offers apartments of three or six single rooms, each with its own bathroom, and a shared kitchen and living space. The dormitories provide many facilities for student's use. Refer to the International School website for more details.

### Campus Life

The manageable size of the campus exposes international students to the events and activities taking place throughout the semesters. Students at the International School are strongly encouraged to participate in the variety of activities including concerts, fitness classes, salsa and Israeli folk dancing, lectures and conferences on various topics and sports competitions. In the International School, we promote the diverse religious and ethnic self-expression of all of our students and help them find their own unique connection to Israel. The campus is a mix of secular and religious Jewish native Israelis, new immigrants from the former Soviet Union, Ethiopia, North and South America and Europe, and Israelis whose religious and ethnic backgrounds are Muslim, Christian, Druze and Bedouin.

### Social Activities

The University of Haifa International School offers a range of optional co-curricular activities for students participating in the various international programs. An experienced staff of student activity coordinators prepares an extensive itinerary of trips and tours, which offers students an enlightening view of Israel, its people, natural beauty and cultural sites. Visiting lecturers come to speak on various aspects of life in Israel, including politics, security, religion, culture and other topics of interest to the students. Some activities may require additional fees.

### Cultural Immersion

The International School makes every effort possible for students to become part of Israeli society. Israeli students will be enrolled in the program with international students, and international students will live alongside Israeli students in the campus dormitories. Students can take advantage of the volunteer opportunities both on and off campus. Students may request to join a local family for a festive meal on holidays and the Sabbath, which is rewarding for both the student and the families involved.

### Security

The safety and security of all students are a primary concern of the University of Haifa. All campus and dormitory entrances are guarded and all off-campus activities are organized and run in consultation with the relevant security authorities. While enrolled in a program at the International School, all full-time students are required to rent a cell phone through a recognized supplier. It is important that we will be able to reach each and every student both with practical information and in case of emergency. Health insurance for all international students under the age of 65 and with no pre-existing conditions is included in the cost of the program. The University of Haifa has a crisis management and evacuation plan in place.

