



## **Master of Science in Applied Oceanography**

### **Course overview:**

The Master of Science in Applied Oceanography builds on the core principles of oceanography in coastal and open sea domains, with a focus on operational oceanography and the versatile and broad spectrum of disciplines and offshoot applications related to it. The main target of the course is to match the human resource needs in the evolving marine sector at local, European and global scales, providing professionals with wide ranging skills to exploit the outcomes of marine research and technology in favour of the competitiveness of the industry and service sectors. It is also set against a background of the rising industrialisation of seas and oceans with increasing human impact (such as from renewable energy provision, aggregate extraction, fishing and leisure industries) and the extended quest for achieving sustainable development by protecting the marine ecosystem, minimising the impacts of climate change, natural hazards and anthropogenic influences, whilst maximising benefits to society. This is naturally also fitting to maritime Malta with its 266Km long shoreline, a marine territory up to the 25 nautical mile limit amounting to 20 times the extent of the land area, and the economic, social and scientific dimensions of human activity that are inextricably linked to the sea.

If you are a postgraduate student or professional, the course will equip you with state-of-the-art methodologies and tools to measure, understand and predict the marine environment, and derive sustained benefits from the sea, to accomplish the human resource backbone to sustain a range of marine-related activities and economic endeavours. It empowers you to comprehend the methods and tools of operational oceanography, and provide a wide view on how this is relayed into services relying on marine data acquisition and forecasting systems, on applications to sustain the management of marine space around our islands, and to improve marine-related activities of economic, social and scientific value in general.

The course programme features the following key elements:

- (i) an overview of supporting sciences covering the essentials in physical, chemical, biological and geological oceanography, as well as other baseline topics such as satellite oceanography, marine GIS and spatial planning, etc.;
- (ii) the adoption of specialized methods and tools used in marine studies and assessments; and
- (iii) a focus on dedicated applications and services deriving from operational oceanography such as in relation to marine environmental management and monitoring, policy development and decision making, planning, marine research, marine security, and a range of other marine-related services.

This specialized course spans and merges the legal, socio-economic, scientific and environmental elements into one whole to offer students a wide-ranging vision to marine affairs, linking science to

management, putting technology at the service of users and stakeholders, and providing tools for more efficient service-oriented applications. Targeted areas of such applications include environmental monitoring and surveillance, assessment and mitigation of risks, marine science-based policy development and strategic planning, climate change, sustainable resource exploitation, ocean governance, marine industries and service provision and the overall empowerment of human resources to face current and emerging challenges in the marine domain. While retaining the necessary elements related to the acquisition of knowledge, the course targets to put an emphasis on achievement of skills, and empower students to excel in performance on applications and operational practices.

**The University of Malta is offering scholarships to support qualified students to follow the course. Further information can be found [here](#).**

## **Learning outcomes:**

The main expected benefits that you will gain by successfully completing the Master of Science in Applied Oceanography are:

### **Subject Knowledge and Understanding**

- Comprehend the basic scientific concepts of oceanography in a holistic view embracing the physical, chemical, biological and geological aspects, and on how they relate to the underlying processes and functioning of the marine environment;
- Comprehend the concept and practice of operational oceanography for the systematic and long-term routine measurements of the seas and oceans and atmosphere, and the rapid interpretation and dissemination of information;
- Gain full understanding on ocean and coastal observing and forecasting systems in operational oceanography, technical and theoretical aspects related to metocean observations, operational monitoring platforms, state-of-the-art instrumentation and sensor technology, understanding their performance (including limitations and configurations) and understanding their basic functions and use to the benefit of specific applications;
- Demonstrate an understanding of the process of acquisition and the nature of the information in remote sensing for the comprehensive study of the sea and the applications to oceanographic studies;
- Acquire interests and informed opinions in a range of areas in applied mathematical methods relevant to oceanography;
- Understand the concepts and terminology for maritime spatial planning (MSP), especially within the European perspective, including benefits and relation to other existing management approaches, primarily integrated coastal zone management (ICZM) and ecosystem-based management (EBM);
- Acquire a grounding in Geographic Information Systems (GIS) as a tool for mapping and analysis of spatial data with special reference to the marine domain;
- Recognise and understand how specialized technologies in operational oceanography, especially computer-based modelling, are contributing to enhance applications in a wide range of marine activities through specific European experiences and examples.

### **Intellectual Development**

- Acquire knowledge on the national, regional and international frameworks and programmes for coordinating and implementing efforts in operational oceanography with a focus on Europe;
- Learn, follow and apply common methods and practices to make best use of marine equipment to obtain high quality oceanographic data at the appropriate spatial and temporal scales and resolution;
- Acquire a practical background on the investigative techniques that are used to study the physical, biological, geological, and chemical parameters of the marine environment;
- Appreciate the scope of field studies through active participation in group projects and individual research efforts;

- Interpret concepts of advanced computer-based modelling and techniques in operational oceanography.

### **Key Transferable Skills**

- Apply the fundamentals of ocean science to describe and explain processes pertaining to the marine environment in coastal and open sea domains, and the interactions between the atmosphere and the oceans;
- Understand scientific literature on related topics and have sufficient insight to follow and apprehend past and current research efforts, as well as critically evaluate the validity of existing literature on oceanography against accepted benchmarks and standards;
- Make judicious assessments on the response of the marine ecosystem to natural and anthropogenic forcings;
- Apply the scientific method in the design of studies and assessments, in establishing feasible sampling and surveying protocols, in the sound interpretation of data, and in deriving meaningful conclusions;
- Apply knowledge, understanding and problem-solving abilities in new or unfamiliar contexts involving broader (or multidisciplinary) factors that link science to management issues and across legal and socio-economic aspects;
- Comprehend the scope of Environmental Impact Assessments, and the process of formulating and submitting such assessments on the basis of informed and multi-disciplinary inputs.