DO*MAR

PHD PROGRAM IN MARINE SCIENCE, TECHNOLOGY AND MANAGEMENT

2021 2030 Década das Nações Unidas da Ciência Oceânica para o Desenvolvimento Sustentável

SUMMER SCHOOL ON OBSERVATIONAL OCEANOGRAPHY

2022 EDITION

UNIVERSITY OF AVEIRO, JULY 10 TO 19, 2022

APPLICATION

Application to the Do*Mar Summer School is open until the 26th of June. Applications must be made using the following link: https://forms.gle/8JrBByagyHfrGnRy6

VENUE AND DATES

University of Aveiro, July 10 to 19, 2022

WHO CAN PARTICIPATE

Any student enrolled in the Do*Mar doctoral programme. Preference will be given to students enrolled in the Universities of Aveiro, Minho and Trás-os-Montes e Alto Douro holding a Do*Mar-FCT grant. Vacancies permitting, any doctoral or master student enrolled in any national or international institution. The maximum number of students admitted to the summer school is 20.

FEES AND ACCOMMODATION

Participation in the summer school is free of registration fees. However, each student must pay for their own transport, accommodation and food costs.
Additional information on accommodation and catering options will be published in due course.

COORDINATION

Henrique Queiroga (DBio / CESAM, UA), Jesus Dúbert (DFis / CESAM, UA), Ana Hilário (DBio / CESAM, UA), Pedro Gomes (DBio / CBMA, UM), Edna Cabecinha (DeBA / CITAB, UTAD), Natividade Vieira (DBio / CIIMAR, UP)

ORGANIZING COMMITTEE

Ana Hilário (DBio / CESAM, UA), Clara Rodrigues (DBio / CESAM, UA), Diego Flores (DBio / CBMA, UM), Edna Cabecinha (DeBA / CITAB, UTAD), Henrique Queiroga (DBio / CESAM, UA), Jesus Dúbert (DFis / CESAM, UA), Pedro Gomes (DBio / CBMA, UM), Sandra Mariza Monteiro (CITAB, UTAD), Sofia Ramalho (DBio / CESAM, UA)

OBJECTIVES

To provide basic training on state-of-the-art observational methodologies and fieldwork planning for the study of marine processes, using a project-based approach. Students will be divided into 2 parallel groups / projects:

- **PROJECT 1 - BIOGEOCHEMICAL TRANSECT:** sampling of physical, chemical and biological parameters along an onshore-offshore transect in the Aveiro region.
- **PROJECT 2 - BENTHIC MAPPING AND MICROPLASTICS SURVEY:** use of side-scan sonar to map sea bottom and sediment sampler to detect microplastics contamination off Viana do Castelo.

SUMMER SCHOOL STRUCTURE

- 3 days of introductory lectures and cruise preparation,
- 3 days of field work (depending on sea conditions),
- 3 days of sample and data management and analysis.

During field work students will be organized into 3-4 groups of 5 students each. Two small research vessels will be available for field work.

TEACHING SUBJECTS

PLANNING OF OCEANOGRAPHIC CAMPAIGNS:
Inês Martins (IH)
Gathering information on bathymetry, oceanography, climatology and weather forecast of the study area. Sampling grid, spatial-temporal coverage and backup plan. Basic on-board operations and safety procedures. Data acquisition, recording, metadata and sample storage.

STATISTICAL METHODS:
Sébastien Lefébvre (UL, SMW)
Multivariate techniques used to analyse long term series in oceanography, including PCA, RDA and niche OMI. Application of the techniques to oceanographic datasets using R codes.

METHODS IN CHEMICAL OCEANOGRAPHY:
Fiz Fernandez (IIM-CSIC), Jose Antonio Padín Alvarez (IIM - CSIC), Ana Lillebø (UA, CESAM)
Water sampling and preservation. Analytical equipment: types, installation and reagents. Introduction to analytical procedures for the determination of pH, alkalinity, oxygen, total inorganic carbon, total organic carbon and nutrients.

METHODS IN PHYSICAL OCEANOGRAPHY:
Jesus Dúbert (UA)
Sampling equipment for *in situ* physical profiling of the water column, including the use of CTDs and Doppler current meters.

TEACHING SUBJECTS (CONT.)

- **METHODS IN ZOOPLANKTON SAMPLING:**

Henrique Queiroga (UA)

Categories and sizes of zooplanktonic organisms. Plankton samplers: neuston nets, plankton nets, pumps, plankton recorders. Types of hauls. Accessories: flowmeters, cable depressors, clinometers, opening-closing mechanisms. Sample preservation and labelling. Basic steps in sample processing.

- **METHODS IN MICROBIAL PLANKTON:**

Isabel Teixeira (IIM-CSIC)

Categories and sizes of microbial plankton organisms. Types of samplers: oceanographic bottles, nets, pumps, plankton recorders. Sample preparation and preservation: water samples, filters, reagents, temperature. Analytical procedures: fluorometry, flow cytometry, microscopy, molecular techniques, radioisotopes.

- **METHODS IN SIDE-SCAN SONAR AND VIDEO OPERATION:**

Pedro Gomes (UM), Ana Hilário (UA)

Habitat mapping using consumer grade direct and side-scan sonar. Seabed survey using imagery collected with video cameras and mini-ROVs. Quantification of benthic epifauna on video footage using open-source image annotation software (e.g. Biiggle, PAPARA(ZZ)I).

- **METHODS IN MICROPLASTICS MONITORING:**

Edna Cabecinha (UTAD, CITAB), Sandra Monteiro (UTAD, CITAB)

Categories and sizes of microplastics. Understand the impact of microplastics on aquatic wildlife. Methods for microplastics isolation, classification, and assessing its concentrations in marine environmental samples.

TIMETABLE

Groups / Projects

Students will be divided into 2 parallel groups / projects:

- 1. Biogeochemical transect
- 2. Benthic mapping and litter survey

JULY	10	11	12	13	14	15	16	17	18	19	20
	SUN	MON	TUE	WED	THU	FRI	SAT	SUN	MON	TUE	WED
		Introdutory lectures common to the 2 Projects.	Introductory lectures to Project 1 and Project 2. Lab 1 classes.		"2 days for cruises / fieldwork are predicted, depending on sea conditions. Sea conditions allowing a quick completion of cruises / fieldwork, Lab 2 classes can be antecipated.			Lab 2 classes.			
05:00					CRUISE / FIELDWORK PROJECT 1 CRUISE / FIELDWORK PROJECT 2						
05:30											
06:00											
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07:00											
07:30											
08:00											
08:30											
09:00		Welcome session	Lecture	Lecture				Lab 2	Lab 2	Lab 2	
09:30		Opening Lecture									
10:00											
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11:00		Lecture	Lecture	Lecture				Lab 2	Lab 2	Lab 2	
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Get-together party | Coffe-break | Lunch | Farewell dinner | Departure | Lectures

Cruise / Fieldwork | Lab 1: Preparation of cruise / fieldwork | Lab 2: sample processing, lab analysis, data analysis

FULL PROGRAMME AND TIMETABLE

The full programme, final timetable and additional information will be published in the Do*Mar webpage: https://domar.campusdomar.gal/en/

ACRONYMS

Do*Mar: Doctoral Programme on Marine Science, Technology and Management. UA: Universidade de Aveiro. UM: Universidade do Minho. UTAD: Universidade de Trás-os-Montes e Alto Douro. UP: Universidade do Porto. UL: Université de Lille. IH: Instituto Hidrográfico. CESAM: Centro de Estudos do Ambiente e do Mar. CBMA: Centro de Biologia Molecular e Ambiental. CITAB: Centro de Investigação de Tecnologias Agro-ambientais e Biológicas. CIIMAR: Centro Interdisciplinar de Investigação Marinha e Ambiental. IIM-CSIC: Instituto de Investigaciones Marinas - Consejo Superior de Investigaciones Cientificas. SMW: Station Marine de Wimereux. DFis: Departamento de Física. DBio: Departamento de Biologia. DeBA: Departamento de Biologia e Ambiente.

CONSORTIUM

RESEARCH CENTRES

COLLABORATING INSTITUTIONS

FUNDING