

OPEN CALL

Ayudas para la formación de profesorado universitario
(FPU 2020)

Until
December 11th

Looking for a...
Buscando un...

PhD?

Join the IIM | We are offering 13 research topics to apply with us for a pre-doctoral contract in Marine Sciences with implications for the environment, aquaculture, industry, health & food science.



The Institute of Marine Research ([IIM-CSIC](#)) offers 13 Research Topics to apply with us for a pre-doctoral contract within the [Spanish Ministry of Universities financial aid programme](#) (FPUs).

These are four-year contracts for graduates in possession of a MSc degree or close to finishing.

Why the IIM?

The Institute belongs to the [Spanish National Research Council \(CSIC\)](#), the main research organization in Spain, the third in Europe and the seventh in the world.

The IIM-CSIC is one of the top marine research institutes in Spain, with a truly diverse research activity and its own transversal support services of Internationalization and Public Engagement. We offer a lively research environment to foster researchers' careers, widening their collaborative networks & increasing their impact on society.

CSIC | A framework for excellent research



120 Institutes (6 in Marine Science)
research projects | >12.5 M€



4 Research Vessels
1 Antarctic Base



> 10.000 Researchers +
Support Staff

The Institute of Marine Research (IIM-CSIC) | [Numbers for 2019](#)



87 Research Projects
>12M€ Funds
(57% International)



> 30 R&D Contracts
with Industry



148 Research Articles
> 200 Scientific Communications
>100 Outreach Activities



> 200 Researchers
+ Support Staff

The research you want, with a global perspective

AT THE IIM, WE GENERATE KNOWLEDGE...

OCEAN AND
COASTAL SYSTEMS

MARINE LIFE AND ECOSYSTEMS

BIOLOGICAL PROCESSES
AND SYSTEMS

CO₂ and acidification
Ocean currents
Nutrient cycles
Phytoplankton and pigments
Metals and rare earth elements

Sustainable fishing
Sustainable aquaculture
New aquaculture species
Vulnerable species
Fish and shellfish diseases

Food safety
Quality and traceability
Bioactive compounds
Bioprocess engineering
Systems biology

...TO ACHIEVE OUR GOALS

The IIM-CSIC is a multidisciplinary research centre which aims to contribute to the UN Sustainable Development Goals through 3 Core Research Lines which structure our work, responding to global challenges and to local concerns:

1. Oceans and Climate to predict climate change and develop actions to combat or mitigate its impacts.
2. Marine biodiversity and conservation to sustainably use the ocean and marine resources.
3. Food, bioproducts and health to achieve food security, improved nutrition, healthy lives, and well-being.

These 3 Core Research Lines contribute to other transversal goals of the IIM related to talent development, knowledge, and technology transfer, as well as engagement with society for sustainable development and ethical values.



Application process & project themes

Application forms must be sent by Friday, 11th December at 2pm (UTC+1)

Contact the supervisors of each PhD topic with your CV and academic records for more details. Electronic applications must be registered [here](#), by Friday, 11th December at 2 pm (UTC +1) following the instructions detailed in the [Call](#).

Check the project contract theme summaries below & the full details in [our website](#) 

Investigating drivers and changes of the marine N₂O cycle

Nitrous oxide (N₂O) and methane (CH₄) are biologically produced trace gases that exerts a strong climate influence as powerful greenhouse gases which also affect stratospheric ozone depletion and the oxidative capacity of the atmosphere. Nonetheless, little is known about the ocean capacity to uptake those gases or how are transferred into the deep ocean.

The PhD candidate will deep on the understanding of the mechanisms taking part of the N₂O cycle and its distribution in the North Atlantic, using an interdisciplinary approach which will combine the participation in oceanographic cruises, advanced training in biogeochemistry and water masses analysis (i.e. high precision gas chromatography and other biogeochemical parameters).

Supervisors

[Fiz Pérez](mailto:fiz.perez@iim.csic.es)  fiz.perez@iim.csic.es

[Mercedes de la Paz](mailto:mercedes.delapaz@iim.csic.es)  mercedes.delapaz@iim.csic.es

 [Group Webpage](#)

Structure and functioning of the microbial plankton community in the western Iberian coastal upwelling system

The structure and composition of the microbial plankton community modulate the fluxes of biogenic matter and energy, and consequently determine the trophic structure of the marine ecosystems and the role of the Ocean as climate regulator.

In this PhD Thesis, the structure, composition and functioning of the microbial plankton community will be studied in the western Iberian coastal upwelling system, tackling different time scales, from seasonal to short-term variability. Microbial plankton composition and biomass, size-fractionated primary production, net community production and respiration will be studied all together for the first time in this coastal upwelling system, and to our knowledge in any coastal upwelling system.

Supervisors

[Carmen G. Castro](mailto:cgcastro@iim.csic.es)  cgcastro@iim.csic.es

[Francisco G. Figueiras](mailto:paco@iim.csic.es)  paco@iim.csic.es

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Anthropocene evidences in the estuarine boundary of the Galician Rias

The Anthropocene has been proposed as a new geo-stratigraphic epoch where humans have become a global factor affecting the ecosystems. Estuaries constitute a biogeochemical reservoir where natural sources mix with human pressures.

The proposed thesis will assess the imprint of anthropogenic changes in the estuarine zone of Galician Rias focusing in three subjects: (i) hydropower dams and drinking water reservoirs; (ii) emergent contaminant loads, as Rare Earth Elements; and (iii) disused mining impact.

Supervisor

[Ricardo Prego](mailto:prego@iim.csic.es)  prego@iim.csic.es

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Ecotoxicological Implications of Emerging Metallic Contaminants in Coastal Systems

The anthropogenic use of a new range of trace elements whose inherent properties are required for use in new technologies (Technology-Critical Elements; TCEs) is rapidly increasing, inducing significant changes in the processes associated with their natural environmental cycle. Despite the current widespread use of these TCEs, current knowledge does not support the application of robust risk assessment processes and, as a consequence, they are not included in regulations.

We therefore propose here the development of a PhD Thesis based on a holistic approach to assess the concentrations, bioaccumulation and trophic transfer of TCEs in the marine environment, covering: (i) their determination and speciation in water and sediments, (ii) a study on their bioaccumulation potential, (iii) their trophic transfer in the food web, and (iv) a risk assessment based on their concentrations and bioaccumulation/biomagnification.

Supervisors

[Antonio Cobelo](mailto:acobelo@iim.csic.es)  acobelo@iim.csic.es

[Jose MF. Babarro](mailto:jbabarro@iim.csic.es)  jbabarro@iim.csic.es

 [Marine Biochemistry Group](#)  [EsMaBa Group](#)

Spatial ecology and behaviour of coastal elasmobranchs

A holistic understanding of the spatial ecology of marine populations is essential to inform marine conservation initiatives. This is especially true for elasmobranch species which have life-history features that make them more vulnerable to multiple impacts.

A PhD project is offered to investigate how the interaction between natural and anthropogenic factors affect the spatial ecology of coastal populations of *Raja undulata* and *Scyliorhinus canicula* and their impact on conservation around the National Parks of Illas Atlánticas de Galicia (NPIAG). Using acoustic telemetry observations, the candidate will (i) depict temporal patterns of occurrence of these species within the studied marine protected area (NPIAG) and identify main drivers; (ii) study behaviour patterns and its relationship with fate of individuals and (iii) analyse eco-evolutionary implications of individual variability of behaviour.

Supervisor

[Alexandre Alonso](#)  alex@iim.csic.es

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Microbial interactions in macroalgae with implications in aquaculture

Bacterial communities associated with *Ulva* spp. play an important functional role both in morphogenesis and reproduction, considering *Ulva* and its associated microbiota a singular functional entity or holobiont. Moreover, *Ulva* spp. host antibiotic-producing bacteria (APB, i.e. *Phaeobacter* sp.) with known antagonism against fish pathogens.

Using a multi-disciplinary approach, including -omic techniques, the research will contribute to the understanding of the role of those APB, and the conditions that favour their predominance in *Ulva* spp., which would have implications in disease control in fish-algae IMTA-RAS (Integrated Multi-Trophic Aquaculture-Recirculating Aquaculture Systems).

Supervisor

[Xosé Pintado](#)  pintado@iim.csic.es

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Metabolism and immunity interaction in the response against virus

The implications of metabolic genes not generally associated to immune response in the priming of the antiviral response are still unclear.

The aim of this PhD will be to analyse the interphase between metabolism and immunity to improve our understanding of the potential innate immunity memory using the zebrafish as a model species. We will apply transcriptomic and next generation sequencing approaches to identify the molecular basis of the immune response against viruses.

Supervisors

[Beatriz Novoa](#)  beatriznovoa@iim.csic.es

[Antonio Figueras](#)  antoniofigueras@iim.csic.es

 [Group Webpage](#)

Proteomics and structural-based systems biology of fish allergy in raw and processed seafood

The development of fish allergies are not fully understood yet. The aim of this PhD project will be to study the intracellular mechanism of T-cell activation in response to different forms of fish allergens to (i) set valid peptides for their use as vaccines & (ii) develop a fish product as a potential hypoallergenic seafood product. It will involve Proteomics & Mass Spectrometry analysis of fish & mice samples.

Supervisors

[Mónica Carrera](#)  mcarrera@iim.csic.es

[Manuel Pazos](#)  mpazos@iim.csic.es

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Beneficial effect of diets rich in algae and seafood during aging: Lipid mediators for the resolution of inflammation

Current research on the role of marine origin foods in mental health focuses on the intake of marine lipids, especially omega-3 polyunsaturated fatty acids (PUFA n-3), for improving inflammation, oxidative stress and aging of immune cells. This PhD Project aims to understand the beneficial effect that diets rich in seafood can have during aging, with a particular emphasis on the effect on neuroinflammation. Liquid Chromatography applications coupled to Mass Spectrometry will be developed to address the epilipidoma resulting from lipid oxidative modifications.

Supervisors

[Isabel Medina](#)  medina@iim.csic.es

[Santiago Aubourg](#)  saubourg@iim.csic.es

 [Group Webpage](#)


Dynamic optimization methods and tools to model dynamic bioprocesses

Biotechnology industry uses biological systems, for example, yeasts, bacteria or algae, to obtain different products such as food ingredients, pharmaceuticals, etc. Biological systems are complex systems that make optimization and control of bioprocesses a challenging task. Mathematical models can help to decipher such complexity and to guide bioprocess operation design.

This PhD project will explore the use of multi-phase and multi-objective optimization as the underlying hypothesis to explain cellular metabolism in a changing environment. Furthermore, we will develop numerical methods and software tools to automatize the development of optimization-based dynamic genome-scale models. The modelling framework and software tools will be tested and used to describe yeast fermentation processes of interest for the food industry).

Supervisors

[Eva Balsa](#)  ebalsa@iim.csic.es

[David Henriques](#)  davidh@iim.csic.es

 [Group Webpage](#)

Dynamic modelling and performance optimisation of fermentation processes

Fermentation processes play a relevant role in the advance towards circularity in many industrial processes, for example for food waste valorisation.

This PhD project aims at the model-based dynamic optimisation of industrially relevant fermentation processes based on the growth of bacteria from different origins using substrates recovered from food waste. Three different types of bacterial groups will be considered: 1) lactic acid bacteria, 2) probiotic marine bacteria and 3) bacteria producing biopolymers and metabolites of interest. Experiments will be performed to account for factors controlling bacterial growth and the concomitant production of metabolites. Those results will be also employed for modelling, prediction and optimisation of various fermentation processes to maximise efficiency and productivity in batch and fed-batch conditions.

Supervisors

[Eva Balsa](#)  ebalsa@iim.csic.es

[Xosé Antón Vázquez Álvarez](#)  jvazquez@iim.csic.es

 [Bio-process Engineering Group](#);  [ReVal Group](#)

Polymicrobial biofilms as a key on the risk of listeriosis attributed to foods of animal origin

Contamination by *Listeria monocytogenes* during industrial food processing is still a concerning safety issue, especially on Ready-To-Eat (RTE) products.

The main objective of this PhD thesis will be to assess quantitatively the risk resulting from the consumption of RTE foods contaminated by *L. monocytogenes* following an integrated value chain approach. The study will cover the identification and characterization of current high-risk scenarios; the characterization of bacterial communities in polymicrobial biofilms, as well as the evaluation of cross-contamination risk and its implications for food safety following a food chain approach.

Supervisors

[Marta López Cabo](#)  marta@iim.csic.es

[Juan Rodríguez Herrera](#)  juanherrera@iim.csic.es

 [Group Webpage](#)

Integration of software sensors and advanced control strategies for the optimization of thermal processes in the food industry

Thermal processes in the food industry are mainly used to extend shelf-life of the products either by inactivating or reducing the growth rate of potentially harmful microorganisms. Accurate control and supervision of the thermal treatment is compulsory to avoid potential microbiological outbreaks or the loss of the whole batch. Therefore, real-time indicators (such as microbial lethality, product color/texture, nutrient content, etc.) are needed. Mathematical models describing the process can be used in combination with non-invasive process measurements to keep track of the indicators that cannot be directly measured. Such combination of mathematical models and process measurements is usually referred to as software sensors.

The general objective of this PhD thesis is the integration of software sensors into advanced real-time controllers to optimize (maximize quality, minimize process duration and energy consumption) thermal processes of the food industry where product variability is relevant.

Supervisors

[Luís Taboada Antelo](#)  ltaboada@iim.csic.es

[Carlos Vilas](#)  carlosvf@iim.csic.es

 [Group Webpage](#)