

# Masterclass Prospectus

Supergen



Offshore  
Renewable  
Energy

## Elevate Your Career with an Expert-Led Masterclass

Highly specialised, short courses led by world-leading researchers at the UK's most innovative offshore renewable energy universities.



Engineering and  
Physical Sciences  
Research Council

### World-class Expertise

Funded by the Engineering and Physical Sciences Research Council, the Supergen Offshore Renewable Energy (ORE) Hub offers research leadership to accelerate the development of offshore wind, wave, and tidal energy. We are a collaboration of 10 leading UK Universities that are pioneering innovative offshore renewable energy research. Drawing on this expertise, our Masterclass programme is a unique opportunity to learn directly from the UK's foremost specialists in offshore renewable energy.

### Unique and Specialist

Enhance your career by engaging with specialist offshore renewable energy researchers and access cutting-edge facilities not found in standard commercial training. Study post-graduate content in highly specialised 1 or 2-day courses. Gain a unique advantage by learning innovative solutions from researchers working at the forefront of ORE. This is a unique and limited opportunity to join the best UK-based specialists at world-leading testing sites.



The COAST Laboratory, University of Plymouth

### Hands-on Learning

Immerse yourself in a dynamic learning environment with a blend of lectures, live demonstrations, and engaging hands-on activities at specialist testing facilities. Benefit from the knowledge and experience of industry-leading professionals.



# TOPICS & LOCATIONS

## Modelling

### **Advanced Experimental Fluid Mechanics for ORE**

University of Plymouth | 22 April 2024

Specialist introduction to the Coast Lab and the new UK Floating Offshore Wind Turbine Test Facility

### **Real-Time Hardware-in-the-Loop Experiments for Grid Integration of ORE Systems**

University of Warwick | September 2024

Specialist access to renewable Integration & Smart Grid Lab.

### **Flow Modelling for Offshore Wind Turbine Loading & Farm Yield**

University of Manchester (in collaboration with University of Oxford) | October 2024

Specialist access to the Manchester Computing Facility

### **Virtual Prototyping of ORE Technologies**

National Decommissioning Centre (in collaboration with the University of Aberdeen)  
November 2024

Unique access to the Marine Simulator at the National Decommissioning Centre.

## Survivability, Reliability and Design

### **Offshore Structural Integrity**

University of Strathclyde | June 2024

Specialist access to the Inspection and Structural Health Monitoring Laboratory.

## Sensing

### **Sensing for ORE Structures**

University of Hull | 21 & 22 May 2024

Specialist access to laboratory-scale composite manufacturing facilities, Fibre Bragg grating and optical time domain reflectometer analysis equipment.

## Resource & Environment

### **Offshore Geotechnics**

University of Southampton (in collaboration with University of Oxford)  
March 2025

Specialist access to the Geotechnical Centrifuge

### **Environmental Contours & Extreme Value Analysis**

University of Exeter | April 2025

Specialist access to statistical modelling tools in the Penryn Campus software lab.

### **Optimising ORE Array Design and Locations for Safety, Fisheries Co-Location and Environmental Aspects**

National Decommissioning Centre (in collaboration with the University of Aberdeen)  
June 2025

Specialist access to the National Decommissioning Centre's Marine Simulator and Smart Energy Basin.

## Policy and Economics

### **Economic and Policy Analysis for Offshore Renewables**

University of Edinburgh | January 2025

Includes a tour of the Flowave facility.

## Advanced Experimental Fluid Mechanics for ORE University of Plymouth | 22 April 2024

This 1-day Masterclass is designed to give a detailed introduction to the research and development support that physical modelling can provide for ORE. We focus on teaching the techniques needed to carry out experiments on scaled ORE systems. Participants will leave with a deeper understanding of the advantages of physical modelling, the limitations, and what needs to be considered when planning a physical modelling campaign. The programme will combine lectures - covering topics including an introduction to physical modelling and scaling, experiment design and numerical model validation, instrumentation and testing protocols - with hands-on activities exploring laboratory scale hydrodynamic testing of floating offshore wind, tidal and wave energy systems.

The course provides unique access to the world-class COAST Laboratory with the capability to generate short and long-crested waves combined with currents at any relative direction, sediment, and participants will be introduced to the newly-installed UK Floating Offshore Wind Turbine Test (UKFOWWT) facility.

£500 for 1-day Masterclass

[Find out more.](#)

Course design - Dr Martyn Hann and Professor Deborah Greaves OBE



## Real-Time Hardware-in-the-Loop Experiments for Grid Integration of ORE Systems University of Warwick | September 2024

This Masterclass will equip participants with a thorough understanding and hands-on experience in conducting real-time Hardware-in-the-Loop (HIL) experiments for the grid integration of ORE systems. Through lectures, demonstrations, and hands-on activities, participants will develop their expertise in the fundamental concepts and techniques involved in designing, modelling, and executing real-time simulations using a range of cutting-edge devices, including real-time simulator, grid emulator, wind turbine emulator, energy storage emulator, electronic load emulator.

This knowledge will empower participants to seamlessly transition their simulation models into real-time environments, enabling effective HIL testing for control systems and prototyping in the field of offshore renewable energy. Participants will also gain valuable insights into the dynamic fast-frequency response of OREs, ancillary service provision, and the integration of hardware into simulation models.

The Masterclass provides unique access to a state-of-the-art real-time simulator to test smart power grids with the integration of distributed renewable power generation.

£500 for 1-day Masterclass

[Find out more.](#)

Course design - Professor Xiaowei Zhao



[See Details Section](#)

## Flow Modelling for Offshore Wind Turbine Loading & Farm Yield University of Manchester (in collaboration with University of Oxford) October 2024

This specialised course is tailored for PhD students, researchers and industry professionals with an interest in advanced techniques for modelling flow conditions at offshore wind turbine sites. The course will focus on fluid mechanics-based models, in contrast to low computational cost tools typically used for engineering design and includes specialist access to the Manchester Computing Facility.

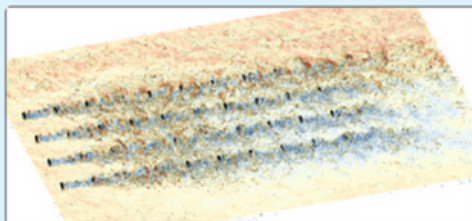
An introduction will be provided to key features of the interaction of wind turbines with atmospheric flows, complemented by an overview of the essential data sources and fluid mechanics models used for the analysis of unperturbed flow conditions at offshore sites and the analysis of turbine and farm wakes. This covers a range of data sources such as ERA5, and modelling of atmospheric flows at the mesoscale using codes, such as Weather Research & Forecasting (WRF) and at a finer scale using Computational Fluid Dynamics (CFD). Participants will also gain insight into the approaches for wake and farm modelling.

£1000 for a 2-day Masterclass

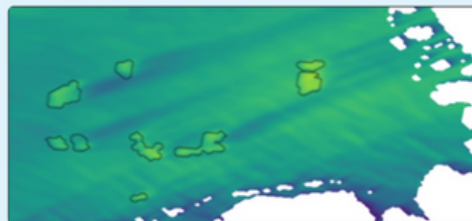
 [See Details Section](#)

[Find out more.](#)

Course design - Professor Richard Willden and Professor Tim Stallard



Weather research forecasting model



Large-eddy simulation model

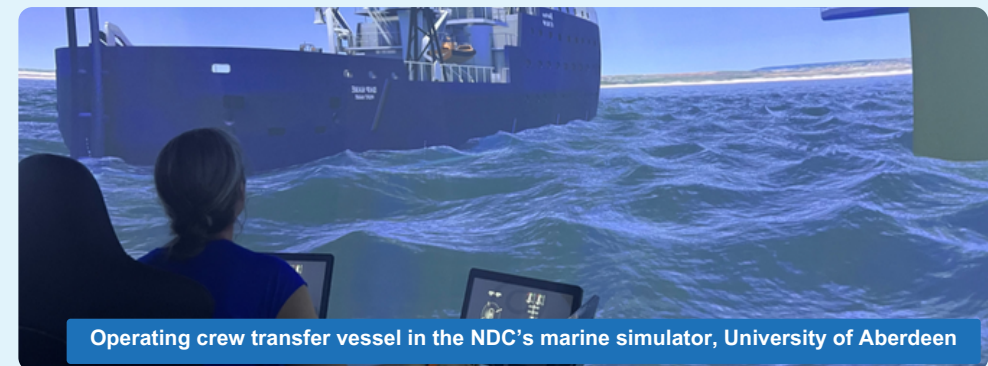
## Virtual Prototyping of ORE Technologies National Decommissioning Centre (in collaboration with the University of Aberdeen | November 2024

This Masterclass introduces the concept of full-scale virtual prototyping and simulation of offshore renewable energy technologies. The course provides participants with unique access to the marine [simulator](#) at the state-of-the-art National Decommissioning Centre, a 300-degree immersive dome, equipped with 4 real-time control stations, that allows simulations to be conducted under varying climatic and physical conditions to verify feasibility, establish safe weather windows and de-risk offshore operations.

Participants will learn the techniques used for calibrating and developing full-scale models based on scaled wave tank tests, Computational Fluid Dynamics (CFD) simulations or offshore data. These will be introduced via a range of case studies and practical activities in the marine simulator for technologies such as variable buoyancy anchors, novel concepts of low draft floating wind turbines, and offshore recharging systems for crew transfer vessels, demonstrating the complexity of offshore deployment.

£1000 for 2-day Masterclass. [Find out more.](#)

Course design – Dr Marcin Kapitaniak, Professor Richard Neilson, Professor Beth Scott



Operating crew transfer vessel in the NDC's marine simulator, University of Aberdeen

## Offshore Structural Integrity

University of Strathclyde | June 2024

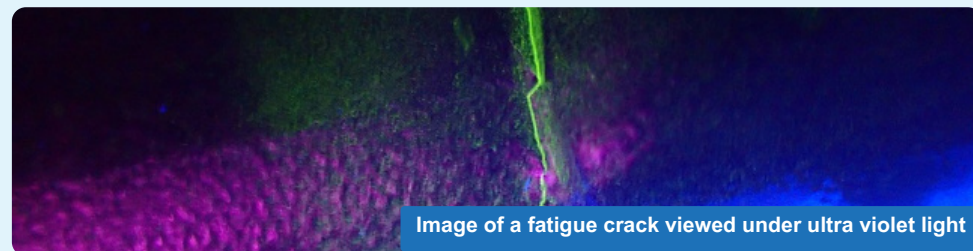
Over the course of this Masterclass, participants will gain an in-depth understanding of offshore structural integrity design philosophies and methodologies, covering materials and design considerations. The course offers hands-on experience with analytical, experimental, and numerical tools, fostering an enhanced understanding of progressive damage of offshore and marine structures, alongside strategies for corrosion and fatigue alleviation. Lectures will be complemented by a series of case studies providing the opportunity for the practical application of methods and tools across a range of typical offshore renewable energy structures and components.

Upon completion, participants will be equipped with the knowledge and skills needed to apply structural integrity tools appropriately with a good understanding of their characteristics, attributes and limitations. In addition, participants will be familiar with inspection and integrity monitoring technologies and equipped to quantify their limitations with a comprehensive understanding of how to plan for through-life Structural Integrity. The Masterclass offers practical experience with common progressive damage models and how to use common progressive damage models and relate these to relevant standards as well as understand how to incorporate inspection and monitoring information into a risk and reliability framework for a Quantitative Risk Assessment.

£1000 for a 2-day Masterclass. [Find out more.](#)

 [See Details Section](#)

Course design - Professor Feargal Brennan



## Sensing for ORE structures

University of Hull | 21 & 22 May 2024

This 2-day Masterclass will explore the latest advancements in sensing systems and associated signal processing techniques to monitor the manufacture and operation of offshore renewable energy systems including turbine blades, static and dynamic cables. Participants will gain a comprehensive understanding of a range of sensors, associated infrastructure and the signal processing techniques required to extract load data and detect defects. Particular emphasis will be placed on fibre optic sensors for wind and tidal blade structures and monitoring of both manufacturing processes and operational behaviour.

Participants will gain hands-on experience in applying fibre optic sensors to scaled structures and deriving load measurements. The Masterclass includes specialist access to laboratory-scale composite manufacturing facilities, Fibre Bragg grating and distributed fibre sensors with optical spectrum analysis and optical time domain reflectometer analysis equipment.

Upon completion, participants will understand the underlying principles of discrete and distributed fibre optic sensors and associated interrogation techniques as well as have valuable insight into the approaches, trade-offs and challenges of interrogating large arrays of fibre optic sensors using time and wavelength multiplexing methods.

£1000 for a 2-day Masterclass. [Find out more.](#)

Course design - Professor James Gilbert



## Offshore Geotechnics

### University of Southampton (in collaboration with University of Oxford) | March 2025

Over the course of this Masterclass, participants will gain an appreciation of geotechnical engineering applied to offshore renewable energy problems. The course will start with the background to soil mechanics, with a simplified overview of the strength and stiffness of seabed sediments, and how that is captured in mathematical and computational models. Particular emphasis will be placed on the range of structural and foundation designs for different offshore renewable energy applications, and their relative suitability in different contexts. Participants will benefit from hands-on demonstrations as well as observation of a live scale-model experiment on a geotechnical centrifuge.

The course will accommodate both geotechnical specialists and attendees with other disciplinary expertise, who wish to develop a working understanding of offshore geotechnical engineering. The Masterclass provides practical experience in a Geotechnical Laboratory and a Geotechnical Centrifuge Facility, where failure mechanisms and soil-structure interactions are studied using real soil samples at a small scale.

£1000 for a 2-day Masterclass. [Register your interest](#) and receive further details when available.

Course design - Professor David White and Professor Byron Byrne



## Environmental Contours and Extreme Value Analysis

### University of Exeter (Penryn Campus) | April 2025

This 2-day Masterclass offers participants a comprehensive introduction to the methods used for estimating extreme environmental conditions and extreme responses of ORE structures. The course will cover a range of topics from the basics of statistical modelling, to recent developments in multivariate extreme value theory. Participants will be trained in the use of open-source software for modelling univariate and multivariate extremes, supported by a range of real-world case studies. Upon completion, participants will understand the theory underpinning the methods used, together with their assumptions, limitations, and associated uncertainties. The Masterclass will provide the knowledge and tools to apply extreme value models in a range of applications in offshore renewable energy.

The course includes practical exercises conducted in the Penryn Campus Software Lab such as statistical modelling of extreme winds and waves and estimation of environmental contours for joint extreme of winds and waves. Participants will also have the opportunity to visit the Dynamic Marine Component Test Facility, a cutting-edge testing site which replicates the forces experienced by marine components, providing valuable insight into their responses.

£1000 for a 2-day Masterclass. [Register your interest](#) and receive further details when available.

Course design - Professor Philipp Thies and Dr Ed Mackay.



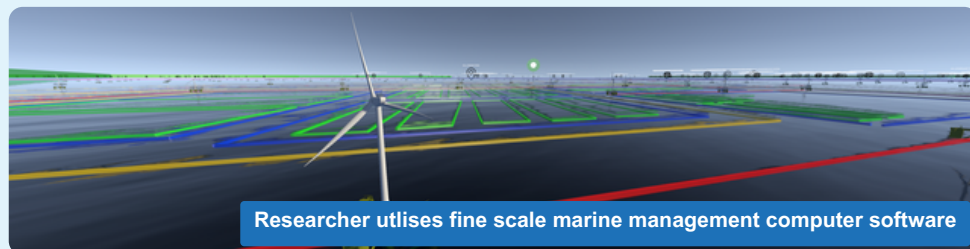
## Optimising Offshore Renewable Energy Array Design and Locations for Safety, Fisheries Co-location and Environmental Aspects National Decommissioning Centre (in collaboration with the University of Aberdeen | June 2025

This 2-day Masterclass focuses on revealing the complexity of optimising wind farm locations and array layout design with many competing interests to consider. It will cover broad spatial marine management challenges, including environmental safeguards, marine protected areas, fishing interactions and offshore energy production, as well as the challenging trade-offs.

This course offers unique access to [interactive visualisation tools](#) that allow data sets to be represented in a spatial framework for analysis of fine-scale logistical issues concerning area optimisation. Participants will engage in practical activities in the National Decommissioning Centre's marine simulator, and through real-world case studies, such as manoeuvring vessels around wind farms, mooring line inspections and fishing operations within wind farm constraints, participants will gain valuable insight into the related complexities that in turn will allow better understanding of the decision making and visualisation of such offshore operations.

£1000 for a 2-day Masterclass. [Register your interest](#) and receive further details when available.

Course design - Professor Beth Scott, Dr Marcin Kapitaniak, Professor Richard Neilson, Malcolm Stone



## Economic and Policy Analysis for Offshore Renewables University of Edinburgh | January 2025

This Masterclass offers a comprehensive understanding of the economic and policy drivers that shape the offshore renewable energy sector. Gain valuable insight into private and public attitudes and the big-picture issues that shape offshore renewable energy, with relevance across various fields. Topics covered include energy objectives and the appropriate policies, levelised costs, and the interplay between offshore renewable policies and national and regional economic, environmental and social objectives.

The course also features a tour of the renowned [FloWave Facilities](#); a wave and current simulation tank used for testing and development of novel ocean energy technologies. To conclude, participants engage in a practical exercise where they assume the role of a consultant presenting to an energy ministry, receiving constructive feedback from a panel of experts. This Masterclass is open to all, requiring no specific prior experience.

£750 for 2-day Masterclass

 [See Details Section](#)

[Register your interest](#) and receive further details when available.

Course design - Professor Henry Jeffrey





# DETAILS

## Pricing

- **Industry participant: £500/day** - Course materials and lunch included. Participants are responsible for their travel and accommodation.
- **Early Career Researchers (ECRs): Free** - In line with EPSRC funding policy, the course cost is covered for academic researchers who meet the definition of an Early Career Researcher (Post Doctoral Researchers, early career academic staff within three years of their first academic appointment, or PhD students within 12 months of completion who are exploring a future career in ORE), and are part of our network. There will be no charge for Early Career Researchers to attend a Masterclass, but they will be responsible for covering expenses such as travel and accommodation.

## Company Membership

For Industry participants, membership can be arranged which gives the opportunity to invest in an annual cost providing employees with access to multiple places on the ongoing Masterclass Programme. Please [email us](#) for further information.

## Industry Participants - Early Career Industrialists

The Supergen ORE Hub plans to develop a network of Early Career Industrialists (ECIs) to connect and support individuals who have recently entered the professional field (within the last 6 years) and are actively engaged in the development, management, or application of technologies related to offshore renewable energy. Whilst our ECI activities are open to all, typically an ECI will hold a Masters, PhD or equivalent advanced degree, and be equipped with a strong academic background, or level of experience, and specialised knowledge in fields such as marine engineering, renewable energy systems, or related disciplines. During the Masterclass registration, you'll be invited to stay in touch with us about future ECI opportunities or you can [email us](#) for further information.

## Included in your day

- Unparalleled access to the most up-to-date knowledge in a session created by academics at the forefront of offshore renewable energy research
- Access to world-class facilities and hands-on demonstrations
- Electronic access to course material and presentations after the masterclass
- Networking opportunities
- Q&A session with Course Director(s)
- Morning, lunch and afternoon refreshments
- Electronic certificate of attendance

## Details

- The Masterclasses are most suitable for professionals holding a Masters or Doctoral degree. We welcome any questions about suitability and can assess on a case by case basis, based on an individual's experience and prior knowledge.
- The Masterclasses are hosted by the Supergen ORE Hub partner institutions adhering to their processes and procedures.
- For practical reasons, each Masterclasses has limited capacity. Places will be allocated on a first-come, first-serve basis.
- The specifics of each Masterclass are published in good faith; however, they are subject to change in the event of circumstances beyond our control.

 Find out more

[supergenorehub@plymouth.ac.uk](mailto:supergenorehub@plymouth.ac.uk)

[supergen-ore.net](http://supergen-ore.net)