



Politecnico
di Torino

PH.D. IN MECHANICAL ENGINEERING COURSE III LEVEL

MODELING OFFSHORE RENEWABLE ENERGY SYSTEMS WITH HIGH- FIDELITY MODELS

SPEAKER



Dr. Bonaventura Tagliafierro

Marie Skłodowska-Curie
Action Postdoctoral
Fellowship
Uppsala University,
Sweden



UPPSALA
UNIVERSITET

Visiting Scholar
Queen's University
Belfast, UK



QUEEN'S
UNIVERSITY
BELFAST



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27 – 30 May 2025



Politecnico di Torino

PROGRAM

CONTENT

This course introduces floating structures for offshore renewable energy and coastal protection, emphasizing the modeling approaches used for their design and performance assessment. It covers environmental loads, functional requirements, and technology typologies for offshore wind and wave energy devices. A key focus is the comparison between low- and high-fidelity modeling strategies. Participants will explore how low-fidelity models are useful for early-stage design and system evaluation, while high-fidelity models—based on Smoothed Particle Hydrodynamics (SPH) using DualSPHysics—can be employed to refine, calibrate, and validate low-fidelity results. Through hands-on case studies, participants will gain practical experience in applying both approaches and understanding their interplay in the context of offshore engineering.

COURSE PLAN

Tuesday 27 May 2025

13:00 – 16:00 – Aula 19

- Course introduction and overview of floating structures
- Offshore renewable energy technologies (wind & wave)

16:00 – 18:00 – Aula 17

- Coastal protection structures
- Environmental loads

Wednesday 28 May 2025

08:30 – 11:30 – Aula 17

- Functional requirements and techno-economic considerations
- Low- and high-fidelity numerical modeling

13:00 – 16:00 – Aula 6I

- Introduction to CFD and SPH methods
- Case study: Application to Oscillating Water Column devices

Thursday 29 May 2025

10:30 – 13:00 – Aula 17

- Introduction to hands-on activities
- Design parameter definition and case studies
- Group work and feedback

14:00 – 17:30 – Aula 6C

- Continuation of hands-on work

Friday 30 May 2025

09:00 – 12:00 – Aula 6C

- Finalization of group work

13:30 – 15:30 – Aula 2C

- Group presentations and closing discussion