

# **FACULTY OF ENGINEERING**

## **DEPARTMENT OF ELECTRONIC AND ELECTRICAL ENGINEERING**

### **MSC RENEWABLE ENERGY IN THE MARINE ENVIRONMENT**

**Master of Science in Renewable Energy in the Marine Environment with specialism in Offshore Renewables Energy Systems Engineering (Erasmus Mundus)**

**Master of Science in Renewable Energy in the Marine Environment with specialism in Power Electronics and Control for Offshore Renewable Energy Systems (Erasmus Mundus)**

#### **Postgraduate Certificate in Renewable Energy in the Marine Environment**

University of Strathclyde (UK), Universidad del Pais Vasco (Spain), Ecole Centrale de Nantes (France) and Norwegian University of Science and Technology (Norway)

*These regulations are to be read in conjunction with [General Academic Regulations - Postgraduate Taught Degree Programme Level](#).*

#### **Admission**

1. Notwithstanding the [General Academic Regulations - Postgraduate Taught Degree Programme Level](#), applicants shall possess:
  - i. a suitable higher education degree from European universities in the field of engineering, geosciences, oceanography, mathematics, physics or environmental sciences; or
  - ii. a qualification deemed by the Programme Director acting on behalf of Senate to be equivalent to (i) above; or
  - iii. have appropriate professional experience.
2. In all cases, applicants whose first language is not English, shall be required to demonstrate an appropriate level of English competency.

#### **Duration of Study**

3. The Programme is a two-year MSc consisting of 4 semesters of study (240 University of Strathclyde credits equivalent to 120 ECTS).

#### **Mode of study**

4. The programmes are available by full-time study only.

#### **Place of Study**

5. In accordance to Erasmus Mundus regulations on student mobility, each student must undertake the MSc by enrolling at three of the four Universities involved (including completion of the MSc Project). Hence, taught modules are delivered at the University of Strathclyde in Semester 1, Universidad del Pais Vasco in Semester 2, and Ecole Centrale de Nantes (Specialism A) or Norwegian University of Science and Technology (Specialism B) in Semester 3. The dissertation may be taken in any of the four Universities.

## Curriculum

### 6. Renewable Energy in the Marine Environment with specialism in Offshore Renewables Energy Systems Engineering

**First Year** - All students shall undertake an approved curriculum of no fewer than 120 credits (60 ECTS) as follows:

#### Compulsory Modules

Module Code	Module Title	Level	Credits (ECTS/UoS)
NM946	Inspection and Survey	5	5/10
NM833	Marine Renewable Energy Systems	5	5/10
NM978	Physical Testing of Offshore Renewable Energy Systems	5	5/10
NM960	Finite Element Analysis of Floating Structures	5	5/10
EC928	Energy Economics	5	5/10
EE816	Environmental Impact Assessment for Offshore Renewable Energy	5	5/10

#### Modules offered at Universidad Del Pais Vasco (Spain):

Module Code	Module Title	Level	Credits (ECTS/UoS)
UPV01	Ocean Wave Energy and Offshore Wind Energy	5	4.5/9
UPV02	Advanced Fluid Dynamics Modelling	5	4.5/9
UPV03	Theoretical Aspects in Fluid Dynamics	5	3/6
UPV04	Computational Fluid Dynamics for Turbulent Flow	5	3/6
UPV05	Integration of Renewable Energy	5	3/6
UPV06	Operation of Transmission and Distribution Grids	5	3/6
UPV07	Environmental Conditions for Marine Renewables	5	3/6
UPV08	Operations and Maintenance of Marine Arrays	5	3/6
UPV09	Basque Language and Culture	5	3/6

Exceptionally, one of the above modules can be replaced by a module from Renewable Energy in the Marine Environment with specialism in Power Electronics and Control for Offshore Renewable Energy Systems, as approved by the Programme Leader.

**Second Year** - All students shall undertake an approved curriculum of no fewer than 120 credits (60 ECTS) as follows:

**Compulsory Modules**

**Modules offered at Ecole Centrale De Nantes (France):**

Module Code	Module Title	Level	Credits (ECTS/UoS)
ECN01	Water Waves and Sea States Modelling	5	4/8
ECN02	General Concepts of Hydrodynamics	5	4/8
ECN03	Numerical Hydrodynamics	5	5/10
ECN04	Experimental Hydrodynamics	5	4/8
ECN05	Marine RE: Offshore Wind Turbines	5	1/2
ECN06	Marine RE: Tidal Turbines	5	2/4
ECN07	Marine RE: Wave Energy Converters	5	2/4
ECN08	Wave-Structure Interactions and Moorings	5	4/8
ECN09	French Language and Culture	5	4/8

In addition, students shall undertake one of the following:

Module Code	Module Title	Level	Credits (ECTS/UoS)
NM834	MSc Project	5	30/60
UPV13	MSc Project	5	30/60
ECN10	MSc Project	5	30/60

**Renewable Energy in the Marine Environment with specialism in Power Electronics and Control for Offshore Renewable Energy Systems**

**First Year** - All students shall undertake an approved curriculum of no fewer than 120 credits (60 ECTS) as follows:

**Compulsory Modules**

<b>Module Code</b>	<b>Module Title</b>	<b>Level</b>	<b>Credits (ECTS/UoS)</b>
EE872	Control Principles 1	5	5/10
EE877	Wind Energy and Distributed Energy Resources 1	5	5/10
NM833	Marine Renewable Energy Systems	5	5/10
EE866	Power Electronics Devices, Drives and Machines 1	5	5/10
EC928	Energy Economics	5	5/10
EE816	Environmental Impact Assessment for Offshore Renewable Energy	5	5/10

Modules offered at Universidad Del Pais Vasco (Spain):

<b>Module Code</b>	<b>Module Title</b>	<b>Level</b>	<b>Credits (ECTS/UoS)</b>
UPV01	Ocean Wave Energy and Offshore Wind Energy	5	4.5/9
UPV10	Modelling of Wind/Marine Current Generators	5	3/6
UPV11	Wave to Wire Control	5	4.5/9
UPV05	Integration of Renewable Energy	5	3/6
UPV06	Operation of Transmission and Distribution Grids	5	3/6
UPV12	Power Electronics in Offshore Power Systems	5	3/6
UPV07	Environmental Conditions for Marine Renewables	5	3/6
UPV08	Operations and Maintenance of Marine Arrays	5	3/6
UPV09	Basque Language and Culture	5	3/6

Exceptionally, one of the above modules can be replaced by a module from Renewable Energy in the Marine Environment with specialism in Offshore Renewables Energy Systems Engineering, as approved by the Programme Leader.

**Second Year** - All students shall undertake an approved curriculum of no fewer than 120 credits (60 ECTS) as follows:

All students shall undertake all compulsory modules and no fewer than two optional modules.

### **Compulsory Modules**

### Modules offered at Norwegian University of Science and Technology (Norway):

Module Code	Module Title	Level	Credits (ECTS/UoS)
NTNU01	Applied Electromagnetics in Power Engineering	5	7.5/15
NTNU04	Power Electronics	5	7.5/15
NTNU05	Power System Analysis	5	7.5/15

### Optional Modules

Module Code	Module Title	Level	Credits (ECTS/UoS)
NTNU02	Power Electronics in Future Power Systems	5	3.75/7.5
NTNU03	Wind Power in Electric Power Systems	5	3.75/7.5
NTNU06	Quality of Supply in Electrical Power Systems	5	3.75/7.5

In addition, students shall undertake one of the following projects:

Module Code	Module Title	Level	Credits (ECTS/UoS)
19900	MSc Project	5	30/60
UPV13	MSc Project	5	30/60
NTNU07	MSc Project	5	30/60

### Examination, Progress and Final Assessment

7. See [General Academic Regulations - Postgraduate Taught Degree Programme Level](#).
8. In order to progress to the second year of the programme, a student must have accumulated no fewer than 120 credits (60 ECTS) from the programme curriculum.
9. The final award will be based on performance in the examinations and coursework together with the MSc project.

### Award

10. **Degree of MSc:** In order to qualify for the degree of MSc in Renewable Energy in the Marine Environment with specialism in Offshore Renewables Energy Systems Engineering or the degree of MSc in Renewable Energy in the Marine Environment with specialism in Power Electronics and Control for Offshore Renewable Energy Systems, a candidate must have performed to the satisfaction of the Board of Examiners and must

have accumulated no fewer than 240 credits (120 ECTS), of which 60 (30 ECTS) must have been awarded in respect of the MSc project.

11. A student on the Offshore Renewables Energy Systems Engineering specialism will receive a Joint Award from the University of Strathclyde and Universidad del Pais Vasco (UPV/EHU) and a Double Award from Ecole Centrale de Nantes (ECN). A student studying the Power Electronics and Control for Offshore Renewable Energy Systems specialism will receive a Joint Award from the University of Strathclyde, UPV/EHU and Norwegian University of Science and Technology (NTNU).
12. Students who do not qualify for the Degree of MSc may qualify for Postgraduate Certificate from University of Strathclyde as follows:
13. **Postgraduate Certificate:** In order to qualify for the award of the Postgraduate Certificate in Renewable Energy in the Marine Environment a candidate must have accumulated no fewer than 60 credits (30 ECTS) from the University of Strathclyde taught curriculum.