

WM9RI-15 Wind and Water Energy Generation

26/27

Department

WMG

Level

Taught Postgraduate Level

Module leader

Mohammadali Abbasian

Credit value

15

Module duration

4 weeks

Assessment

100% coursework

Study location

University of Warwick main campus, Coventry

Description

Introductory description

The aim of this module is to enable students to design and evaluate wind, hydro wave and tidal power systems. Students will assess wind, hydro wave and tidal power systems as a source of renewable energy, and determine their performance characteristics and social, financial and environmental impacts. Using aerodynamics, hydrodynamics and blade/turbine design principles, students will appraise the design and application of different wind, hydro, wave and tidal turbine technologies. Moreover, students will gain a comprehensive understanding of the main challenges facing the wind, hydro, wave and tidal energy industries.

Module aims

The principal aim of this module is to provide students with sufficient knowledge, understanding and analytical skills to underpin their professional development as they progress towards becoming an expert engineer in the current core technology disciplines of renewable energy and in this module specifically Wind, Hydro, Wave and Tidal energy engineering. This module will typically focus on the current technologies available but will also explore emerging technologies under development specifically within wave and tidal energy

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be covered. Actual sessions held may differ.

Design of alternative wind turbine, hydro power, wave energy or tidal power technologies

Fluid dynamics of turbines, including flow over aerofoils and the analysis of three-dimensional effects

Momentum theory and the Betz limit, and use of blade element theory for performance analysis

Structural design, materials and blade manufacture

Gearbox design and consideration of noise, flicker and vibration

Management and planning of wind farms

Resource assessment and evaluation of annual power generation characteristics

Fundamentals of electric generators , their operating principles, applications and suitability

Societal, environmental, impact of the environment and economic challenges for the wind and hydro power industries

Wind and hydro power station cost analysis

Learning outcomes

By the end of the module, students should be able to:

- Critically analyse the technologies and applications of Wave and Tidal Energy for efficient and effective energy generation both on a micro and macro scale.
- Critically analyse the opportunities and threats associated with both technical and socioeconomic impacts of using wind and hydro energy
- Evaluate the principles of fluid mechanics to design wind and hydro turbines solution in a specific scenario
- Critically evaluate the performance of wind power systems in different locations in both micro and macro applications
- Examine and evaluate the planning, manufacturing and management of wind power infrastructures

Indicative reading list

[Reading lists can be found in Talis](#)

[Specific reading list for the module](#)

Subject specific skills

Interpretation of energy engineering data

Energy performance calculations

Undertake engineering activities associated with Wind, Hydro, Wave and Tidal energy systems, safety and reliability

Renewable energy engineering technology selection

Fluid mechanics principles and theory

Wind, Hydro, Wave and Tidal energy technologies performance and efficiency calculations

Wind and Hydro engineering design

Transferable skills

Evaluation and judgement

Communication

Critical thinking

Decision making

Systems thinking

Evaluation and judgement

Problem solving

Presentation of highly complex technical data.

Study

Study time

Type	Required
Lectures	15 sessions of 1 hour (10%)
Seminars	15 sessions of 1 hour (10%)
Tutorials	(0%)
Online learning (independent)	15 sessions of 1 hour (10%)
Private study	45 hours (30%)
Assessment	60 hours (40%)
Total	150 hours

Private study description

Students receive additional readings and workbooks to support their learning in the module. This enables students to build their foundational knowledge or go deeper into the application and evaluation of knowledge presented in the module.

Costs

No further costs have been identified for this module.

Assessment

You must pass all assessment components to pass the module.

Assessment group A

	Weighting	Study time	Eligible for self-certification
Assessment component			
Assessment One - Presentation	30%	18 hours	Yes (extension)
A Presentation focused on wave and Tidal power and its potential within the transition to renewable Energy			
Reassessment component			
Assessment One - Resit			No
The students will create a 12 minute video recording focused on wave and Tidal power and its potential within the transition to renewable Energy			
Assessment component			
Assessment Two - Individual Report	70%	42 hours	Yes (extension)
Students will design both a wind and a hydro power system. The design will consider the impact on the environment and analysis of the performance of the facility under various conditions.			
Reassessment component			
Assessment Two - Individual Report			No

Weighting**Study time****Eligible for self-
certification**

Students will design both a wind and a hydro power system. The design will consider the impact on the environment and analysis of the performance of the facility under various conditions.

Feedback on assessment

Students will be provided individual and class feedback and feed-forward on their assessments.

Availability

There is currently no information about the courses for which this module is core or optional.