MODULE SPECIFICATION

Module Title:	**Advanced Renewable Technology**	**Level**:	6	**Credit Value**:	20

Module code:	ENG60H	**Is this a new module?**	YES	**Code of module being replaced**:	ENG694

Cost Centre:	GAME	JACS3 **code** HECoS **code**	J910/100175

Trimester(s) in which to be offered:	1, 2	**With effect from:**	September 18

School:	Faculty of Arts, Science and Technology	**Module Leader:**	David Sprake

Scheduled learning and teaching hours	60 hrs
Guided independent study	140 hrs
Placement	0 hrs
Module duration (total hours)	200 hrs

Programme(s) in which to be offered	Core	Option
BEng (Hons) Renewable and Sustainable Engineering	✓	☐
BEng (Hons) Low Carbon Energy, Efficiency and Sustainability	✓	☐

Pre-requisites
None

Office use only

Initial approval February 17

APSC approval of modification Sept 18

Approved on 21/09/20 for addition of BEng Low Carbon Energy, Efficiency and Sustainability programme — Version 2

Have any derogations received Academic Board approval? — Yes ✓ No ☐

Module Aims
• Developing a comprehensive depth of knowledge and clear understanding of major and complex theories, principles and concepts in a specific field of renewable energy. • Develop a critical insightful evaluation of engineering feasibility, economics, environment, equipment availability and specification, grid tie feed in, transport and possible local resistance. • Develop an in depth understanding of how renewable energy can be stored and the efficiencies of doing this. • Develop techniques to allow a student to apply renewable energy knowledge in real world situations. • To critically analyse the long-term problems, socio-economic and political issues surrounding energy supply and demand.

Intended Learning Outcomes

Key skills for employability

KS1	Written, oral and media communication skills
KS2	Leadership, team working and networking skills
KS3	Opportunity, creativity and problem solving skills
KS4	Information technology skills and digital literacy
KS5	Information management skills
KS6	Research skills
KS7	Intercultural and sustainability skills
KS8	Career management skills
KS9	Learning to learn (managing personal and professional development, self-management)
KS10	Numeracy

At the end of this module, students will be able to		Key Skills	
1	Identify and model more complex problems within renewable energy.	KS4	KS6
		KS10	
2	Exercise critical insightful evaluation of issues which includes an original and reflective approach; evaluate an energy project with professional rigor, engineering ethical conduct and engineering codes of conduct.	KS4	KS6
		KS10	
3	Display extensive evidence of relevant and perceptive application of theory.	KS3	KS6
		KS9	
4	Display techniques that are appropriately and effectively used demonstrating innovation and creativity in formulating credible solutions to real world renewable energy challenges.	KS3	KS5
		KS6	KS7
5	Through analysis and reasoning be able to justify and defend solutions under critical questioning.	KS1	KS3
		KS5	KS8

Derogations
A derogation from regulations has been approved for this programme which means that whilst the pass mark is 40% overall, each element of assessment (where there is more than one assessment) requires a minimum mark of 30%.

Assessment:

Examination 100%.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)	Duration (if exam)	Word count (or equivalent if appropriate)
1	1,2,3, 4, 5	Examination	100	3 Hours	

Learning and Teaching Strategies:

The student will be guided through the syllabus with the support of:

- Lectures,
- Specialist software identification and access (where possible),
- Site visits,
- Guest lectures,
- Meetings with industry.

Syllabus outline:

- Wind Energy: Advanced. Wind variation statistical analyses. Prediction of potential energy. Development of wind farms, case studies, environmental and community issues

- Hydro power:

  a) Hydroelectric power. Advanced. Prediction of potential energy, Development of case studies, environmental and community issues.
  b) Wave energy. Advanced. Prediction of energy production. Theoretical and practical design considerations. Development of case studies, environmental and community issues.
  c) Tidal power. Advanced. Prediction of energy production. Development of case studies, environmental and community issues.

- Solar:

  a) Thermal. Advanced Principles. Prediction of energy production. Development of case studies, environmental and community issues.
  b) Photovoltaic Advanced Principles. Science behind PV. Prediction of energy production. Development of case studies, environmental and community issues.

- Bioenergy: Advanced Principles. Prediction of energy production. Development of case studies, environmental and community issues. Primary/ secondary, processing. Theoretical and practical design considerations.

- Geothermal: Advanced Principles. Prediction of energy production. Development of case studies, environmental and community issues.

- Grid connections/ integration: Advanced Understanding of engineering.

- Energy Storage: Advanced Principles. Prediction of energy production. Development of case studies, environmental and community issues.

- Case studies, evaluate energy project with professional rigour, engineering ethical conduct and engineering codes of conduct.

Bibliography:

Essential reading

Boyle G et al (2012) *Renewable Energy: Power for a Sustainable Future* (Oxford University Press)

Everett, B. et al., (eds.) (2012), *Energy Systems and Sustainability: Power for a Sustainable Future*. 2nd ed. Oxford: Oxford University Press

Other indicative reading

Depending on which renewable source the student desires to use for their portfolio the tutor will recommend specialist reading.