Module specification

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Module Code	ENG4B7
Module Title	Future Energy Systems & Sustainability
Level	4
Credit value	20
Faculty	Engineering
HECoS Code	100175
Cost Code	GAME

Programmes in which module to be offered

Programme title	Is the module core or option for this programme
BEng (Hons) Renewable and Sustainable Engineering	Core
MEng Renewable and Sustainable Engineering	Core
BEng(Hons) Low Carbon Energy, Efficiency, and Sustainability	Core

Pre-requisites

N/A

Breakdown of module hours

Learning and teaching hours	24hrs
Placement tutor support	0 hrs
Supervised learning e.g., practical classes, workshops	16 hrs
Project supervision (level 6 projects and dissertation modules only)	0 hrs
Total active learning and teaching hours	40 hrs
Placement / work-based learning	0 hrs
Guided independent study	160 hrs
Module duration (total hours)	200 hrs

Module aims

- To equip the student with the capability to apply theory of energy systems with the overarching aim to analyse solutions in real world scenarios of decarbonising all energy systems.
- To develop students a depth of understanding relating to the causes and consequences of climate change and analyse how that applies to a modern society's energy usage, together with the alternatives to carbon-based energy systems.

Module Learning Outcomes - at the end of this module, students will be able to:

1	Analyse the causes and reasons our energy system urgently needs to decarbonise, particularly the science of climate change.
2	Evaluate a variety of modern energy production and transportation systems that make up the electrical grid, transport systems, and heating energy requirements.
3	Contrast the case for different energy production technologies in terms of their sustainability, environmental impacts, and financial viability.
4	Appraise an appropriate scheme to end carbon dioxide emissions involved in the deployment of energy technologies.
5	Propose governmental policy drivers relating to climate change, renewable energy, and sustainability

In addition to the module learning outcomes, students will also cover the following accreditation of higher education programme (AHEP) fourth edition learning outcomes: C1, C2, C4, C7, C8, C13, C17, M1, M2, M4, M7, M8, M13 and M17

Assessment

Indicative Assessment Tasks:

50% Exam (duration of 2 hours)

50% coursework: Modern software (e.g., 2050 pathways calculator) with be used to develop a solution to the minimization of greenhouse gasses in a future UK energy system, and to

propose governmental policies to ensure success.

Assessment number	Learning Outcomes to be met	Type of assessment	Weighting (%)
1	1,2,3,	Examination	50%
2	4,5	Coursework	50%

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%.

Learning and Teaching Strategies

A series of lectures with student-led tutorials either online or on campus (Depending on Covid restrictions). Directed learning using library and online/ internet resources will be facilitated using Moodle.

The module is taught through a combination of lectures and workshops. An active and inclusive approach is used to engage learners in the topics and will involve individual, group work and flipped learning experiences aligned to the university's Active Learning Framework (ALF). The approach offers students a flexible and adaptive learning experience that can accommodate a range of options that includes both on campus learning and remote learning where appropriate.

The Moodle VLE and other on-line materials and resources will be available to support learning. ALF offers a balance between the classroom elements and digitally enabled activity incorporating flexible and accessible resources and flexible and accessible feedback to support learning.

Indicative Syllabus Outline

- Climate change, its causes, consequences, and solutions.
- Introduction to fossil fuels.
- Introduction to wind energy systems.
- Introduction to solar energy systems.
- Introduction to hydro energy systems
- Introduction to nuclear energy systems.
- How the energy grid and smart grids work.
- The role of energy reduction.
- Low carbon electricity production, heating, and transport solutions
- Life cycle analysis
- UN sustainable development goals

Indicative Bibliography:

Please note the essential reads and other indicative reading are subject to annual review and update.

Essential Reads

B. Everett. et al., *Energy Systems and Sustainability: Power for a Sustainable Future*. UK: Open University, 2021.

Other indicative reading

Lecture notes

Online calculators

Employability skills – the Glyndŵr Graduate

Each module and programme are designed to cover core Glyndŵr Graduate Attributes with the aim that each Graduate will leave Glyndŵr having achieved key employability skills as part of their study. The following attributes will be covered within this module either through the content or as part of the assessment. The programme is designed to cover all attributes and each module may cover different areas.

Core Attributes
Engaged
Enterprising
Creative
Ethical

Key Attitudes
Commitment
Curiosity
Resilience
Confidence
Adaptability

Practical Skillsets
Digital Fluency
Organisation
Leadership and Team working
Critical Thinking
Emotional Intelligence
Communication