University of the West of England
BRISTOL

CORPORATE AND ACADEMIC SERVICES

MODULE SPECIFICATION

Part 1: Basic Data						
Module Title	Energy Technologies					
Module Code	USSKCC-15-3		Level	3	Version	1
Owning Faculty	Health and Applied Sciences		Field	Biological, Biomedical and Analytical Sciences		
Contributes towards	BSc (Hons) Environmental Science					
UWE Credit Rating	15	ECTS Credit Rating	7.5	Module Type	Standard	
Pre-requisites	USSJFB-30-1 The Earth		Co- requisites	None		
Excluded Combinations	None		Module Entry requirements	None		
Valid From	September 2014		Valid to	September 2020		

CAP Approval Date	28 March 2014

Part 2: Learning and Teaching	
Learning Outcomes	On successful completion of this module students will be able to: 1. Understand energy transformations and the thermodynamic factors that influence, and constrain such transformations (assessed in component A). 2. Describe a range of energy technologies (assessed in component A, B). 3. Critically compare renewable and non-renewable energy and fuel sources (be assessed in component A, B). 4. Critically assess various energy technologies with respect to climate mitigation and life cycle analysis (assessed in component B). 5. Critically determine appropriate energy and fuel generation strategies for UK, European and worldwide situations (assessed in component B).
Syllabus Outline	The module will include an overview of fossil fuels, nuclear energy, renewable energy and renewable fuel sources; the principles of energy transformations and thermodynamics. UK fuel and energy production and use will be analysed together with an assessment of the UK's fuel/energy security. Fossil fuels will include: oil, gas and coal; the potential application of fracking for oil and gas production will be considered. Nuclear energy will include both fission and fusion sources. Renewable energy sources will include: tidal power, wave energy, geothermal, solar (solar-thermal and photovoltaic), wind generation, biomass for combined heat & power, biogas, biofuels and 'blue skies' power systems. The latter will include the 'hydrogen economy' and sub-space systems.

	The module will include calculation of energy budgets from individual energy sources and their potential contribution to carbon saving together with life cycle analysis of such systems. Energy storage systems, power supply and transmission, and conversion losses will be considered. Socioeconomic analysis of differing energy and fuel systems will be undertaken.
Contact Hours	The delivery of the module will include lectures, practical classes and workshops with the following contact hours (total 36 hours): 1. Lectures: 18 hours 2. Practical classes: 12 hours 3. Workshops: 6 hours
Teaching and Learning Methods	**A variety of teaching and learning methods will be adopted in the presentation of this module.** 1. Lectures will describe the underpinning principles of energy and fuel systems, thermodynamics and energy technologies (both non-renewable and renewable). 2. Practical classes will provide 'hands-on' experience in the production and analysis of biofuels, and practical assessment of the efficiency of different energy transformation systems. 3. Workshops will be undertaken in various forms and will include: demonstration of a variety of energy generation and utilization systems, energy utilization efficiency measurement, energy data acquisition and appraisal, and analysis of historical and current UK energy data. **Scheduled learning** (36 hours) includes lectures, practical classes and workshops. **Independent learning** (114 hours) includes hours engaged with essential reading, case study preparation, assignment preparation and completion. These sessions constitute an average time as indicated below: • Essential reading (28 hours i.e. 25%) • Case study research and completion (58 hours i.e. 50%) • Final revision and preparation for examinations (28 hours i.e. 25%)
Key Information Sets Information	Key Information Sets (KIS) are produced at programme level for all programmes that this module contributes to, which is a requirement set by HESA/HEFCE. KIS are comparable sets of standardised information about undergraduate courses allowing prospective students to compare and contrast between programmes they are interested in applying for. **Key Information Set - Module data** *Number of credits for this module* 15 Hours to be allocated: 150 Scheduled learning and teaching study hours: 36 Independent study hours: 114 Placement study hours: 0 Allocated Hours: 150 The table below indicates as a percentage the total assessment of the module which constitutes a -

	Written Exam: Unseen written exam. **Coursework**: Written assignment (case study). **Practical Exam**: Not applicable. Please note that this is the total of various types of assessment and will not necessarily reflect the component and module weightings in the Assessment section of this module description: Total assessment of the module: Written exam assessment percentage 60% Coursework assessment percentage 40% Practical exam assessment percentage 0% 100%
Reading Strategy	The reading strategy for this module requires students to access a variety of sources. The indicative reading list (see next section) includes texts available in the UWE library, free on-line ('Sustainable Energy: without the hot air' by David MacKay) or at modest cost ('The Revenge of the Gaia' by James Lovelock). Students will be expected to access additional information sources for both primary and secondary literature. The UWE library has access to a large number of electronic journals. Students will be given guidance on accessing primary and secondary scientific, economic and social literature sources on-line through search engines such as 'Springer-link', Science Direct and the UWE library on-line search facility as well as abstracting services. Additionally, it is expected that students will access national and international energy utilization and generation data. This is widely available on-line. In particular, students will be given guidance on accessing UK energy data from the Department for Energy and Climate Change (DECC) website which includes: • The current and historical UK energy flow charts • The 2050 pathway analysis • Spreadsheets and on-line models in support of the 2050 pathway analysis • The current Digest of UK Energy Statistics (DUKES)
Indicative Reading List	Indicative reading includes the latest editions of the following books: 1. Boyle, G. *Renewable Energy; power for a sustainable future.* Oxford. Oxford University Press and the Open University. 2. Boyle, G., Everett, B. & Ramage, J. *Energy Systems and Sustainability: power for a sustainable future.* Oxford. Oxford University Press and the Open University. 3. Lovelock, J. *The Revenge of the Gaia.* London. Penguin Books (also available as an on-line edition. 4. MacKay, D. *Sustainable Energy: without the hot air.* Cambridge. UIT Cambridge (available as a free on-line edition at www.withouthotair.com) Further guidance to additional reading, especially primary and secondary scientific, economic and social literature will be provided in the module.

Part 3: Assessment	
Assessment Strategy	**The basic assessment strategy with respect to learning outcomes is presented earlier in this document (see Part 2).** The assessment strategy includes an examination (unseen; 3 hours) and one

	written assignment (2500 words) based around a case study. The three hour examination is designed to test the student's understanding of the underpinning principles of energy generation and transformation, including thermodynamics, as well as the student's knowledge of energy utilization processes. The examination will also assess the student's ability to appraise, critically, energy and fuel generation scenarios and to relate these to technical, economic and social factors. The case study based written assignment is designed to assess the student's ability to: acquire energy utilization data and socioeconomic data; critically appraise and analyze such data; formulate future scenarios for energy & fuel usage and generation. The coursework assignment is also designed to assess the student's ability to present such information as a written report. Component A (the three hour examination) represents 60% of the module mark and component B (the 2500 word case study based report) represents 40% of the module mark. Thus the allocation of marks is as follows: Examination (3 hours): 60% Coursework (2500 words): 40% There is no specific formative feedback; workshops may include group analysis and non-summative presentations in which case feedback can be given. Summative feedback will be provided via the written coursework assignment.

Identify final assessment component and element	**EX3 Examination (3 hours) as part of Component A**	
% weighting between components A and B (Standard modules only)	**A:** **60%**	**B**: **40%**
First Sit		
Component A (controlled conditions) **Description of each element**		**Element weighting**
1. EX3 Examination (3 hours)		100%
Component B **Description of each element**		**Element weighting**
1. CW1 Case Study (2500 words)		100%

Resit (further attendance at taught classes is not required)	
Component A (controlled conditions) **Description of each element**	**Element weighting**
1. EX3 Examination (3 hours)	100%
Component B **Description of each element**	**Element weighting**
1. CW1 Case Study (2500 words)	100%
If a student is permitted an **EXCEPTIONAL RETAKE** of the module the assessment will be that indicated by the Module Description at the time that retake commences.	