Programme Specification

MSc Sustainable Energy Technologies 2018-19

This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if he / she takes full advantage of the learning opportunities that are provided.

Awarding institution	University of Southampton
Teaching institution	University of Southampton
Mode of Study	Full time
Duration	1 year
Accreditation details	Accredited as a Technical MSc, by the Engineering Council as meeting the requirements for Further Learning for registration as a Chartered Engineer
Final award	Master of Science
Name of Award	Sustainable Energy Technologies
Interim Exit awards	Postgraduate Certificate Postgraduate Diploma
FHEQ level of final award	Level 7
UCAS code	Not Applicable
QAA subject benchmark Or other external reference	QAA Benchmark Statement for Engineering Studied at Master's Level (2010) Engineering Council UK Standard for Professional Engineering competence (UK-SPEC), Joint Board of Moderators
Programme lead	Dr. Carlos Ponce de Leon
Date specification was written	November 2005 (K.H. Luo) (Latest revision 2014)
Date programme was validated	July 2014
Date specification last updated	July 2018

Programme Overview

The spectrum of programmes within the Faculty of Engineering and the Environment are scientifically exciting and challenging, as well as highly relevant to the modern world. Within this particular programme of study, we aim to develop and enhance your knowledge of and enthusiasm for Sustainable Energy Technologies.

The Faculty of Engineering and the Environment is committed to providing the very best learning experience to all our students in a supportive and stimulating environment. We are known nationally and internationally for our excellence in teaching, and are continually improving the scope and delivery of our activities.

The Faculty was ranked number 1 for General Engineering Research Power in the 2014 Research Excellence Framework (REF). The Faculty has strengths in a broad range of areas in energy research, including photovoltaics, fuel cells, energy storage and batteries, combustion, electrical power systems, wind, wave and tidal energy. Research carried out by academic staff provides direct input into a challenging and stimulating teaching programme and student research projects.

This programme aims to provide science or engineering graduates from a diversity of backgrounds with an academically challenging exposure to modern energy technologies for sustainable developments.

The programme may only be taken in a full-time (one-year) mode.

As a research-led University, we undertake a continuous review of our programmes to ensure quality enhancement and to manage our resources. As a result, this programme may be revised during a student's period of registration; however, any revision will be balanced against the requirement that the student should receive the educational service expected. Please read our Disclaimer to see why, when and how changes may be made to a student's programme.

Programmes and major changes to programmes are approved through the University's programme validation process which is described in the University's quality handbook.

Educational Aims of the Programme

The aims of this programme are to:

- enable you to acquire advanced knowledge and practical skills needed for a professional career in the energy industry, renewable energy industry, local and national governments setting energy and environmental strategies, research and development in energy technologies and investment houses targeting the energy sector.
- provide you with a sound understanding of the fundamental principles, operation requirements, design criteria and engineering applications of sustainable energy systems such as photovoltaic devices, wind power, hydropower, nuclear power, fuel cells, energy storage and hybrid propulsion systems.
- enable you to gain appreciation of the social, economic, environmental and policy implications of energy technologies.
- enable you to apply the principles of energy conservation and sustainable development to energy systems.
- provide you with a range of transferable skills, including critical analysis, problem solving, project management, decision-making, leadership and communication by oral, visual and/or written means.
- equip you with specialist knowledge, technical expertise and research skills for further research in energy systems and technologies.

Programme Learning Outcomes

Knowledge and Understanding

Having successfully completed this programme you will acquire:

1. A thorough understanding of the fundamental scientific and technical aspects of sustainable energy technologies and the interrelationships between them.
2. Awareness of the social, economic, environmental and regulatory impact of energy technologies.
3. Critical ability, as demonstrated by a research project/dissertation which advances a specific area of research.
4. Sufficient breadth of technical background to permit study of the current literature, identification of gaps in information, and engagement in discussion with peers and a wide ranging audience.
5. Awareness of limitations of current knowledge and the changing nature of technologies and society.
6. Understanding of the need to gain new knowledge through further study and teamwork in your professional field.

For a PG Diploma you are expected to reach equivalent levels under items 1, 2, 4 and 5.

For a PG Certificate you are expected to acquire a broad knowledge under items 1, 2, 4 and 5, but with less rigour and depth.

Teaching and Learning Methods

Acquisition of 1 and 2 is through a combination of lectures, tutorials (small group teaching), example classes, laboratory experiments, industrial visits, coursework, and projects.

Acquisition of 3 is through carrying out and reporting on a major individual research project.

Acquisition of 4 and 5 is through essays, coursework, group discussions, industrial visits and projects.

Assessment Methods

Assessment is through a combination of written examinations (1, 2) and assessed coursework in the form of problem solving exercises (1,2,4), laboratory reports (1,4,5), essays (2,4,5), presentations (2, 4, 5) and an individual research project with a dissertation (1,2,3,4,5).

Subject Specific Intellectual and Research Skills

Having successfully completed this programme you will be able to:

1. Approach problem solving by identifying information needs and assembling information from different sources, in order to build a clear overall picture of a complex problem and potential solutions.
2. Evaluate different types of information critically in a variety of formats (including published research, technical manuals, and standards).
3. Make use of existing theories and concepts and be able to apply them independently to new problems and situations.
4. Synthesise and analyse information and ideas, and apply creative and original thought in order to propose appropriate new solutions to complex problems.

For a PG Diploma you are expected to reach a broadly equivalent level under items 1, 2 and 3.

For a PG Certificate you are expected to develop skills 1 and 3 within the limited range of subjects studied.

Teaching and Learning Methods

- Intellectual skills are developed through the learning and teaching activities (1 – 4).
- Analysis and problem solving skills are further developed through problem sheets issued by module lecturers and through small group teaching (1, 3).
- Experimental and research skills are developed through coursework exercises, laboratory work, design projects and research projects (3). Individual feedback is provided on all work submitted.

Assessment Methods

- Analysis and problem solving skills are assessed through unseen written examinations and problem based exercises.
- Experimental, research and design skills are assessed through laboratory reports, coursework exercises, project reports, dissertation and oral / poster presentations.

Transferable and Generic Skills

Having successfully completed this programme you acquire the following skills:

1. Learning: independent study and skills development.
2. Problem solving: recognition, definition, analysis and solution.
3. Awareness of your present knowledge limitations, and readiness to gain new knowledge through further study and teamwork in your professional field.
4. Information processing (including IT skills): literature searching, abstracting documents and collating information for the purposes of technical writing.
5. Data manipulation (including IT skills): analysis of data, application of statistical methods and interpretation of results.

6. Communication: oral and written presentation of information, technical writing.
7. Individual: decision-making, initiative taking, self-motivation and direction, personal responsibility.
8. Management: safe and effective project planning and execution, time management (more highly developed for MSc through research project).
9. Teamwork.

The levels attained by MSc/PG Diploma/PG Certificate students will reflect the differing lengths of study.

Teaching and Learning Methods

Transferable skills are developed through the learning and teaching activities. Skills 1 and 2 are taught and developed throughout the course.
Skills 4 and 5 are taught and developed in specific modules.
Skill 6 is developed through coursework and presentations.
Skill 8 is developed through an individual research project and group projects.
Skill 9 is developed through joint laboratory sessions, group projects, and discussion groups.

Although not explicitly taught, other skills (including skill 3) are nurtured and developed throughout the course, which is structured and delivered in such a way as to promote these.

Assessment Methods

Skills 1, 2 and 4-6 are assessed through coursework exercises, laboratory reports and presentations.
Skills 1, 2, 4 and 5 are assessed through unseen written examinations and coursework exercises.
Skills 1, 2 and 4-8 are assessed in individual research projects.
The other skills are essential for success on the course but are not formally assessed.

Subject Specific Practical Skills

During this programme, you will learn:

1. Scientific computing skills in using computational tools and packages for the solution of engineering problems.
2. Skills in technical writing, research planning and execution through full-time work on a research project.
3. Skills in searching and using scientific and technical literature effectively.

PG Diploma and PG Certificate students have the same opportunities for items 1, 2 and 3, but do not do a research project.

Teaching and Learning Methods

Practical skills are developed through the entire learning and teaching programme.
Experimental skills are developed through laboratory work where this is a part of the dissertation.

Skills 1 and 2 are developed through, coursework exercises, reports, individual research projects and presentations throughout the course.

Skills 3 are acquired through essays, directed reading and an individual research project.

Assessment Methods

Practical skills are assessed through laboratory experiment reports, coursework exercises, project reports, dissertation and presentations.

Taught Modules

The different subject matter of the modules lends themselves to different teaching and learning techniques. These include lectures, tutorials, presentations, individual and group planning exercises and practical exercises. You are encouraged throughout to contribute your own professional experiences and thoughts to the learning of the whole class through a free exchange of ideas. One-to-one tutorials are arranged to compensate for individual learning differences, when required.

Many modules include assessed coursework assignments which require you to carry out a substantial study of selected topics, either as individuals or in groups, leading to considerable depth of understanding and

specialist knowledge. Assessment is designed to show that you can rationally use taught material and have a fundamental understanding of the subject matter. Feedback on progress is given to students on all submitted work.

Teaching and learning outcomes of the taught modules are described above.

Research Project

Candidates wishing to obtain an MSc carry out a research project finishing with a dissertation. Research projects may concern any of the areas covered by the programme. The research project is intended to bring together the full range of skills in the programme and to provide you with an opportunity to build on all of the learning outcomes described above, while demonstrating in-depth knowledge and understanding of one or more of the areas covered by the programme. It involves information gathering and handling, critical analysis and evaluation, and presentation skills. The key requirement, however, is that the project must contain your own ideas and proposals: it should not simply be a technical design carried out to existing standards, but a problem with an element of novelty requiring the application of new information and concepts.

Programme Structure

The full-time MSc programme lasts for 12 months. The first 8 months are normally spent mainly on the taught component, with lectures divided into two 12-week periods (Semesters 1 and 2), and with exams at the end of each semester. The modules are listed at the end of this section. The final 4 months are spent full-time on a research project, for which some preparation is done in Semester 2. You are encouraged to commence project work before the Semester 2 exams to allow yourself maximum time, especially where practical work is involved.

The MSc award depends on passing the examinations and on successful completion of a dissertation on the project. The diagram below shows the overall structure and common exit points.

Full-time programme structure and common exit points:

Semester 1	-----	October	**Exit Points**
Exams	-----	End January	PG Certifcate (30 ECTS/60 CATS)
Semester 2			
Exams	-----	End May	PG Diploma (60 ECTS/120 CATS)
Project (full-time)	-----	Mid June	
Dissertation	-----	End September	MSc (90 ECTS/180 CATS)

Semester 1

You normally take four modules worth 30 ECTS/60 CATS points in Semester 1, consisting of 4 compulsory 15 credit point modules.

An introductory module (SESG6041 Introduction to Energy Technologies, Environment and Sustainability) is run intensively in week 0 and over then over the following five weeks of semester 1.This introductory module is taken in conjunction with the Energy and Sustainability MSc students and gives an overview of sustainable energy technology from both technical and policy perspectives. The module includes industrial visits to provide real-world sites and hands-on demonstrations.

Semester 2

You normally take four modules worth 30 ECTS/60 CATS points in Semester 2. There are three compulsory modules scheduled for Semester 2, so you can take one option module. Delivery is either via conventional

weekly lectures, or with a significant laboratory component as in the case of FEEG6008 Fuel Cells, Batteries and Photovoltaic Systems II.

Introduction Module

(SESG6041 Introduction to Energy Technologies, Environment and Sustainability) provides an overall background to the MSc course. It is followed by an in-depth group assignment and presentation to consolidate and assess your learning.

Project Development

In Semester 1, instruction on the use of the library facilities and training in technical writing are provided. More specific training in research planning is provided at the second semester. This is followed by individual directed study.

Full-Time Project Work

You work individually on a research project, under the direction of your project supervisor. Progress reviews are held at various stages (e.g. mid-point) in the project, followed by a formal assessment of the dissertation by at least two examiners. The project is rated at 30 ECTS/60 CATS points.

Taught Component

The taught component of the MSc programme is assessed independently of the research project component. The taught component comprises of 8 modules totalling 60 ECTS/120 CATS points. Among these, sixmodules (45 ECTS/105 CATS) are compulsory. There is a single option in both Semester 1 and 2 (7.5 ECTS/15 CATS) that can be selected – See Appendix 1.

For your single module choice in Semester 2, the available list of modules will include those where the Semester 1 modules of the MSc cover any prerequisites.

The remaining MSc modules are taught and assessed in Semester 2 (via written examinations and/or assignments).

Research Project

Your project work is independently assessed by at least two individuals: the supervisor and another internal examiner. In addition, the External Examiner may read and comment on any dissertation.

In order to pass the dissertation element, you must achieve a mark of 50% or above. If you do not do so, you are allowed to resubmit your dissertation on one further occasion. The Faculty will inform you of the deadline for resubmission.

Additional Costs

Students are responsible for meeting the cost of essential textbooks, and of producing such essays, assignments, laboratory reports and dissertations as are required to fulfil the academic requirements for each programme of study. Costs that students registered for this programme typically also have to pay for are included in Appendix 3.

In some cases, coursework and/or projects may be submitted electronically. Where it is not possible to submit electronically students will be liable for printing costs, which are detailed in the individual Module Profile and can be found in Appendix 2.

Progression Requirements

The programme follows the University's regulations for Progression, Determination and Classification of Results : Standalone Masters Programmes as set out in the University Calendar (http://www.calendar.soton.ac.uk/sectionIV/sectIV-index.html) and in particular at http://www.calendar.soton.ac.uk/sectionIV/progression-regs-standalonemasters.html and http://www.calendar.soton.ac.uk/sectionIV/credit-bearing-progs.html

Faculty specific regulations for Standalone Masters can be found here http://www.calendar.soton.ac.uk/sectionVIII/fee-sam.html

Intermediate exit points

You will be eligible for an interim exit award if you complete part of the programme but not all of it, as follows:

Qualification	Minimum overall credit in ECTS/CATS credits	Minimum ECTS/CATS credits required at level of award
Postgraduate Diploma	at least 60/120	45/90
Postgraduate Certificate	at least 30/60	20/40

Programme outcomes for different exit points

Level 7

You will have shown originality in the application of knowledge, and you will understand how the boundaries of knowledge are advanced through research. You will be able to deal with complex issues both systematically and creatively, and show originality in tackling and solving problems individually and as part of a team. You will have the qualities needed for employment in circumstances requiring sound judgement, personal responsibility and initiative, in complex and unpredictable professional environments.

Support for Student Learning

There are facilities and services to support your learning some of which are accessible to students across the University and some of which will be geared more particularly to students in your Faculty or discipline area.

The University provides:

- library resources, including e-books, on-line journals and databases, which are comprehensive and up-to-date; together with assistance from Library staff to enable you to make the best use of these resources.
- high speed access to online electronic learning resources on the Internet from dedicated PC Workstations onsite and from your own devices; laptops, smartphones and tablet PCs via the Eduroam wireless network. There is a wide range of application software available from the Student Public Workstations.
- computer accounts which will connect you to a number of learning technologies for example, the Blackboard virtual learning environment (which facilitates online learning and access to specific learning resources).
- standard ICT tools such as Email, secure filestore and calendars.
- access to key information through the MySouthampton Student Mobile Portal which delivers timetables, Module information, Locations, Tutor details, Library account, bus timetables etc. while you are on the move.
- IT support through a comprehensive website, telephone and online ticketed support and a dedicated helpdesk in the Student Services Centre.
- Enabling Services offering assessment and support facilities (including specialist IT support) if you have a disability, dyslexia, mental health issue or specific learning difficulties.
- the Student Services Centre (SSC) to assist you with a range of general enquiries including financial matters, accommodation, exams, graduation, student visas, ID cards.
- Career Destinations, advising on job search, applications, interviews, paid work, volunteering and internship opportunities and getting the most out of your extra-curricular activities alongside your degree programme when writing your CV.
- a range of personal support services : mentoring, counselling, residence support service, chaplaincy, health service.
- a Centre for Language Study, providing assistance in the development of English language and study skills for non-native speakers.

The Students' Union provides:

- an academic student representation system, consisting of Course Representatives, Academic Presidents, Faculty Officers and the Vice-President Education; SUSU provides training and support for all these representatives, whose role is to represent students' views to the University
- opportunities for extracurricular activities and volunteering
- an Advice Centre offering free and confidential advice including support if you need to make an academic appeal

- support for student peer-to-peer groups, such as Nightline.

In the Faculty and your Discipline you will be able to access:

- Induction programme for orientation, introduction of the programme and staff and dissemination of materials.
- Student Handbook, including guidance on selection of study programmes.
- Access to all administrative and academic material on the Faculty, Programme and individual module web sites and/or Blackboard.
- Allocation of personal tutor to assist with organisational and personal matters. This role is taken over by the project supervisor when the research project starts.
- Careers advisor and dissemination of available job advertisements.
- Personal e-mail account and e-mail access to staff via University system.
- Faculty library and study resources.
- Access to Faculty cluster of computers with relevant specialist software.
- Formal progress monitoring during research project.
- Out of hours access to facilities including weekends.
- Support for international students.

Methods for Evaluating the Quality of Teaching and Learning

You will have the opportunity to have your say on the quality of the programme in the following ways:

- Completing student evaluation questionnaires for each module of the programme
- Acting as a student representative on various committees, e.g. Staff:Student Liaison Committees, Faculty Programmes Committee OR providing comments to your student representative to feed back on your behalf.
- Serving as a student representative on Faculty Scrutiny Groups for programme validation
- Taking part in programme validation meetings by joining a panel of students to meet with the Faculty Scrutiny Group

The ways in which the quality of your programme is checked, both inside and outside the University, are:

- Regular module and programme reports which are monitored by the Faculty
- Programme validation, normally every five years
- External examiners, who produce an annual report
- Professional body accreditation/inspection
- A national Research Assessment Exercise (our research activity contributes directly to the quality of your learning experience)
- Higher Education Review by the Quality Assurance Agency

Faculty specific:

Feedback from Student:

- There is a Staff-Student Liaison Committee for PGT Energy in the Faculty. At these meetings student concerns may be raised via the student representative for the Energy and Sustainability MSc.
- A SUSU-elected student representative of the UG and PGT programmes attends the Faculty Programme Committee meetings and brings comments and suggestions.
- The MSc Coordinator meets regularly with students during the taught component in order to deal informally with problems as they arise.
- Students are encouraged to contact the Programme Director directly if they feel this is an appropriate route.

In addition to continuous monitoring of their own modules by individual lecturers, the following processes operate within the Faculty:

- Discipline Annual Review.
- Informal subject panel (Energy) meetings twice per year take note of student feedback. In addition, a subject area is identified each year for detailed review by a working group.
- Examination question papers are all moderated by a second academic staff member before being sent to the External Examiner.

The External Examiner:

- Monitors the standard and assessment of the taught component and the research project.
- Attends the relevant Examiners' Board.
- Checks marking standards by examining a sample of scripts, assignments and dissertations.

The objective is to evaluate the standard of the programme and the achievement of students, against nationally and internationally recognised standards of excellence in the field.

Career Opportunities

The energy sector requires engineers and scientists with solid technical knowledge on different energy generation and storage technologies. Graduates from this MSc are well prepared to integrate these sustainable energy technologies into our energy infrastructure and have find jobs in industries such automotive, electrical, renewable energies, government agencies and think tanks. Alternatively, having explored the area of sustainable energy, the students of this MSc programme have excellent opportunities to expand their knowledge in a specific area of research by continuing their education into a PhD programme.

External Examiners(s) for the programme

Name Dr Dan Brett
Institution UCL

Students must not contact External Examiner(s) directly, and external examiners have been advised to refer any such communications back to the University. Students should raise any general queries about the assessment and examination process for the programme with their Course Representative, for consideration through Staff: Student Liaison Committee in the first instance, and Student representatives on Staff: Student Liaison Committees will have the opportunity to consider external examiners' reports as part of the University's quality assurance process. External examiners do not have a direct role in determining results for individual students, and students wishing to discuss their own performance in assessment should contact their personal tutor in the first instance.

Please note: This specification provides a concise summary of the main features of the programme and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if s/he takes full advantage of the learning opportunities that are provided. More detailed information can be found in the programme handbook (or other appropriate guide) or online at http://www.southampton.ac.uk/studentservices/academic-life/faculty-handbooks.page and at (http://www.southampton.ac.uk/engineering/postgraduate/taught_courses/engineering.page) .

Revision History

1.	April 2008	J.S. Shrimpton)
2.	August 2012	(P.A.B. James)
3.	March 2013	Regulations updated (D Mead)
4.	July 2013	Revised module structure follows move from 10 to 15 CATS (P.A.B. James)
5.	Nov. 2013	CQA_251113
6.	March 2014	CQA_250314CQA_130614
7.	Update to Programme Overview (CMA Changes) – September 2015	
8.	CQA textual updates August 2016, August 2017, August 2018	

Appendix 1

Learning outcomes and Assessment Mapping document template

Output Standards Matric for	MSc Sustainable Energy Technologies																																
					GENERAL				UNDER-PINNING			ENGINEERING ANALYSIS			DESIGN	ECON., SOCIAL...		ENGINEERING PRACTICE			METHODS OF ASSESSMENT												
	core : compulsory: C Optional: O	Code	Level	CATS points	Development Monitor and Update a Plan	Programme of work learn independently	Initiative and personal responsibility	New theories - unfamilar situations	Scientific Principles	Current problems - at forefront	Concepts, some outside Eng - evaluate and apply	New and Emerging Technologies	Models for solving problems - asess limitations	Analysie data - use Engineering tools - unfamiliar problems	Original thought - practical solutions	Management and business practices	Evaluation of risks	Current practice and its limitations - new developments	Engineering materials and components	Apply techniques - commercial/indust constraints	EXAM	TEAMWORK	ESSAY	LABORATORY	REPORT	PRESENTATION	ASSESSED PROBLEMS AND CASE STUDIES	PROJECT	CAA	IN-CLASS TEST	OTHER
Adcanced Electrical Systems	O	SESM6034	7	15				√	√	√		√	√								100%										
Bioenergy	O	CENV6141	7	15				√	√	√	√	√				√		√	√		60%	√					40%				
Fuel Cells and Photovovoltaic Systems 1	O	FEEG6007	7	15	√	√		√	√	√	√	√		√			√	√	√		80%						20%				
Fuel Cells and Photovovoltaic Systems 2	C	FEEG6008	7	15	√	√		√	√	√	√	√		√			√	√	√		80%						20%				
Intro to Energy Tech, Environ & Sustain	C	SESG6041	7	15				√	√	√	√	√	√					√				50%	20%			15%			15%		
Nucler Energy Technology	C	SESG6043	7	15	√	√		√	√	√	√	√		√			√	√	√		70%	√					30%				
Offshore Engineering & Analysis	O	SESS6070	7	15		√	√	√	√	√	√				√	√		√		√	60%			10%			30%				
Renewable Energy from Environ. Flows	C	SESS6067	7	15				√	√	√	√	√	√	√	√			√		√	70%			10%			20%				
Research Poject MSc	C	FEEG6012	7	60	√	√	√	√	√	√	√	√	√	√	√		√	√	√	√						10%		90%			
Sustainable Energy Systems, Resources & Usage	C	SESM6032	7	15				√			√	√	√	√			√	√		√	70%						30%				
Thermofluid Eng for low-carbon Energy	O	SESM6040	7	15				√	√	√	√	√	√								65%	√						35%			
Waste Resource Management	O	CENV6085	7	15	√	√	√		√		√		√	√	√		√	√	√	√	80%						20%				
Energy Perf'nce Ass'nt of Bldg	O	CENV6148	7	15		√	√		√	√	√	√	√	√	√		√	√	√	√	60%						40%				

Output Standards Matrix for MSc Sustainable Energy Technologies

					GENERAL				UNDER-PINNING ...			ENGINEERING ANALYSIS			DES-IGN	ECON., SOCIAL ...		ENGINEERING PRACTICE			METHODS OF ASSESSMENT									
`	core (C) compulsory (C) optional (O)	CODE	Level	CATS points	...DEVELOP, MONITOR AND UPDATE A PLAN ...	... PROGRAMME OF WORK ... LEARN INDEPENDENTLY	... INITIATIVE AND PERSONAL RESPONSIBILITY ...	... NEW THEORIES ... UNFAMILIAR SITUATIONS	... SCIENTIFIC PRINCIPLES ...	...CURRENT PROBLEMS ... AT FOREFRONT ...	... CONCEPTS, SOME OUTSIDE ENG. ... EVALUATE AND APPLY ...	... NEW AND EMERGING TECHNOLOGIES	... MODELS FOR SOLVING PROBLEMS ... ASSESS LIMITATIONS	... ANALYSE DATA ... USE ENGINEERING TOOLS ... UNFAMILIAR PROBLEMS	...ORIGINAL THOUGHT ... PRACTICAL SOLUTIONS ...	... MANAGEMENT AND BUSINESS PRACTICES ...	... EVALUATION OF RISKS ...	...CURRENT PRACTICE AND ITS LIMITATIONS ... NEW DEVELOPMENTS	... ENGINEERING MATERIALS AND COMPONENTS	...APPLY TECHNIQUES ... COMMERCIAL / INDUST. CONSTRAINTS	EXAM	TEAMWORK	ESSAY	LABORATORY	REPORT	PRESENT'N	ASSESSED PROBLEMS & CASE STUDIES	PROJECT	CAA	IN-CLASS TEST	OTHER
Advanced Electrical Systems	O	SESM6034	7	15				✓	✓	✓		✓	✓								70%						30%				
Bioenergy	O	CENV6141	7	15				✓	✓	✓	✓	✓				✓		✓	✓		60%	✓					40%				
Fuel Cells and Photovoltaic Systems 1	C	FEEG6007	7	15	✓	✓		✓	✓	✓	✓	✓		✓			✓	✓	✓		80%						20%				
Fuel Cells and Photovoltaic Systems 2	C	FEEG6008	7	15	✓	✓		✓	✓	✓	✓	✓		✓			✓	✓	✓		80%						20%				
Intro. to Energy Tech., Environ. & Sustain.	C	SESG6041	7	15				✓	✓	✓	✓	✓	✓					✓				50%	20%			15%			15%		
Marine Engineering	O	SESS3025	6	15	✓	✓		✓	✓	✓		✓	✓					✓		✓	50%			20%			30%				
Nuclear Energy Technology	C	SESG6043	7	15	✓	✓		✓	✓	✓	✓	✓		✓			✓	✓	✓		50%	✓					50%				
Offshore Engineering & Analysis	O	SESS6070	7	15		✓	✓	✓	✓	✓	✓				✓	✓		✓		✓	75%			25%							
Powered Systems Engineering	O	ELEC3XXX	6	15				✓	✓				✓								100%										
Power Transmission and Vibration	O	ELEC3XXX	6	15	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		✓	✓		✓	100%										
Renewable Energy from Environ. Flows	C	SESS6067	7	15				✓	✓	✓	✓	✓	✓	✓	✓			✓		✓	70%			10%			20%				
Research Project MSc	CC	FEEG6012	7	60	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓						10%		90%			
Sustainable Energy Systems, Resources & Usage	C	SESM6032	6	15				✓			✓	✓	✓	✓			✓	✓		✓	100%										
Thermofluid Eng. for Low-carbon Energy	C	SESM6040	7	15				✓	✓	✓	✓	✓	✓								80%	✓						20%			

Programme Structure and Content

MSc Sustainable Energy Technology

The list below reflects the modules that are to be offered in 2018-19 and is subject to minor alteration from year to year.

This Programme consists of the following seven **COMPULSORY modules**:

Module code	Title	Semester	ECTS/CATS
FEEG6007	Fuel Cells and Photovoltaic Systems 1	SEM 1	7.5/15
FEEG6008	Fuel Cells and Photovoltaic Systems 2	SEM 2	7.5/15
FEEG6012	MSc PROJECT (core)	Full Academic Year	30/60
SESG6041	Introduction to Energy Technologies, Environment and Sustainability	Non-Standard SEM 1	7.5/15
SESG6043	Nuclear Energy Technologies	SEM 2	7.5/15
SESM6032	Sustainable Energy Systems, Resource and Usage	SEM 1	7.5/15
SESS6067	Renewable Energy from Environmental Flows	SEM 2	7.5/15

This Programme consists of the following **OPTION modules**:
You must select one module (7.5 ECTS/15 CATS) from the following (Semester 1modules):

Module code	Title	Semester	ECTS/CATS
SESM6040	Thermo-fluid Energy for Low Carbon Energy	SEM 1	7.5/15
SESS6070	Offshore Engineering Analysis	SEM 1	7.5/15

Select one module (7.5 ECTS/15 CATS) from the following (Semester 2 modules):

Module code	Title	Semester	ECTS/CATS
CENV6085	Waste Resource Management	SEM 2	7.5/15
CENV6141	Bioenergy	SEM 2	7.5/15
CENV6148	Energy Performance in Assessment of Buildings	SEM 2	7.5/15
SESM6034	Advanced Electrical Systems	SEM 2	7.5/15

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Appendix 2:

Additional Costs

Students are responsible for meeting the cost of essential textbooks, and of producing such essays, assignments, laboratory reports and dissertations as are required to fulfil the academic requirements for each programme of study. In addition to this, students registered for this programme typically also have to pay for the items listed in the table below.

In some cases you'll be able to choose modules (which may have different costs associated with that module) which will change the overall cost of a programme to you. Details of such costs will be listed in the Module Profile. Please also ensure you read the section on additional costs in the University's Fees, Charges and Expenses Regulations in the University Calendar available at www.calendar.soton.ac.uk.

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
Approved Calculators		Candidates may use calculators in the examination room only as specified by the University and as permitted by the rubric of individual examination papers. The University approved models are Casio FX-570 and Casio FX-85GT Plus. These may be purchased from any source and no longer need to carry the University logo.
Stationery		You will be expected to provide your own day-to-day stationary items, e.g. pens, pencils, notebooks, etc). Any specialist stationery items will be specified under the Additional Costs tab of the relevant module profile.
T**extbooks**		Where a module specifies core texts these should generally be available on the reserve list in the library. However due to demand, students may prefer to buy their own copies. These can be purchased from any source. Some modules suggest reading texts as **optional** background reading. The library may hold copies of such texts, or alternatively you may wish to purchase your own copies. Although not essential reading, you may benefit from the additional reading materials for the module.
Equipment and Materials	Design equipment and materials:	Standard construction/modelling materials will be provided where appropriate, unless otherwise specified in a module profile. For customisation of designs/models calling for material other than standard construction/ modelling materials, students will bear the costs of such alternatives.

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
	Field Equipment and Materials:	
	Protective Clothing: Hard hat; safety boots; hi-viz vest/jackets;	
	Field course clothing:	You will need to wear suitable clothing when attending field courses, e.g. waterproofs, walking boots. You can purchase these from any source.
Printing and Photocopying Costs		Reasonable expenses for travel and materials of up to £300 may be reclaimed through the Faculty Student Office. For project costs in excess of £300 students should discuss possible sources of funding with their supervisor and should not proceed with any expenditure until a further funding source has been agreed. The printing costs associated with dissertation are the responsibility of the student (FEEG6012) Students are expected to cover the costs associated with the printing and binding of reports, including any drawings and graphic presentations. Two copies will need to be submitted. Depending on the quality of printing and binding chosen students can expect to pay approximately £25-30 per copy, totalling approximately £50-60 for both copies.(FEEG6012) In some cases, coursework and/or projects may be submitted electronically. Where it is not possible to submit electronically students will be liable for printing costs, which are detailed in the individual Module Profile and can be found in Appendix 2.xdge23efg7