

# Programme Specification

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## MSc Energy and Sustainability 2019/20

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.

Awarding Institution	University of Southampton
Teaching Institution	University of Southampton
Mode of study	Full time
Duration in years	1 years
Accreditation details	Accredited by Joint Board of Moderators as meeting the requirements for Further Learning for a Chartered Engineer (CEng) candidate who has a partial CEng undergraduate first degree
Final award	Master of Science
Name of award	Energy and Sustainability 3959 Energy, Resources and Climate Change 3960 Energy, Environment and Buildings
Interim Exit awards	Postgraduate Certificate Postgraduate Diploma
FHEQ level of final award	Level 7
UCAS code	N/A
QAA Subject Benchmark or other external reference	QAA Subject Benchmark – Engineering 2015; Accreditation of Higher Education Programmes, Edition 3, Engineering Accreditation Board Characteristic Statement: Master's Degree, QAA 2015
Director of Programmes	Prof. Patrick James
Programme Coordinator	Prof. AbuBakr Bahaj
Date specification was written	2 <sup>nd</sup> May 2009 (Dr A Anwar)
Date Programme was validated	April 2019
Date specification last updated	June 2019

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## Programme Overview

### ***Brief outline of the programme***

This MSc programme relates energy to the environment that we live and work in and the current and projected impacts of climate change. Students learn from an energy perspective how development has led to the fossil fuel dominated societies that exist today. Transition pathways to low carbon, renewable futures are explored across scales of the dwelling, neighbourhood, city and country.

The MSc takes a three stage 'resource' – 'converter technology' – 'demand' approach to analysis of problems across the three pillars of sustainability (1) economic, (2) social and environmental. (3) Workshop activities bring these stages together to enable the development of solutions for cities and countries.

Students are challenged to develop concepts to address multi-faceted development problems. There is a strong focus on group work tasks, developing the key teamwork skills that industry requires. You will often be expected to present your ideas to an assessment panel, as you would as a consultant tendering for a contract. You will have the opportunity to attend field trips which provide the real world context to the concepts developed in lectures. You will have the opportunity to explore the power of big data in an energy context through statistical analysis.

The programme is accredited by the Joint Board of Moderators and meets the further learning requirements to become a Chartered Civil Engineer.

### ***Learning and teaching methods***

Acquisition of core knowledge and understanding is through lectures, seminars, tutorials, field and laboratory classes, workshops, and independent study and research. You are encouraged from an early stage to supplement and consolidate your understanding and knowledge by independent study. The MSc uses a broad

range of learning and teaching methods. In a classroom environment these include lectures, short period breakout group tasks, interactive discussions and workshops. The 'Democratisation of Energy, SESG6041' and 'City Rezoning, CENV6145' are good examples. Feedback is provided on all work submitted.

Fieldtrips provide real world insight, enabling students to translate concepts discussed in lectures to case study sites. Examples include, Weald and Downland Open Air Museum (CENV6147), Fawley Power Station (SESG6041), Eling Tide Mill (SESG6041), Hampshire waste water treatment plant and Poundbury (CENV6145).

### **Assessment**

Testing of the knowledge base and development of skills is through a combination of unseen written examinations and assessed coursework in the form of problem solving exercises, laboratory reports, design exercises, essays and individual projects.

Assessment methods are a mix of exams and coursework (LO EA6M, EA5M, EA7M) balanced between individual and group work. Exams enable students to demonstrate a comprehensive understanding of the scientific principles (LO SM7M). Questions are a mix of shorter problems assessing core understanding (LO SM7M, SM9M) and longer, open ended tasks where students have the ability to demonstrate a deeper understanding and critical thinking (LO SM8M).

The ability of students to present their work is assessed through poster presentations and individual and group formal presentations / reports (LO P11m, G1, G2, G3m, G4). Group work alongside the dissertation assesses management and research analysis skills (LO EA7M, D9M, D10M, D11M). Engineering practice is assessed through group work on specific briefs such as the Tide Mill and 2 countries to 80% renewables tasks (LO P9m, P10m, P11m). Sustainability and ethical practice and general skills are assessed throughout the programme, driven by the brief of numerous courseworks and the dissertation study (LO EL8M, EL9M, EL10M, EL11M, EL12M, EL13M, G1, G2, G3m, G4).

### **Special Features of the programme**

There are a number of special features to the programme aimed at building a cohort identity, supporting students, particularly international, and improving the student experience and learning opportunity. These include:

1. Induction week activities, including a group outdoor activity aimed at promoting interaction between the students on the MSc Energy and Sustainability. Photo Challenge on day 1 of the introduction module (SESG6041).
2. This programme includes a number of workshops and field trips. These include the 3 day 'Democratisation of Energy' workshop where the challenges of delivering energy policy in terms of fairness, acceptability and cost are explored. Large group work tasks such as 'The Island Project' enable students to apply and extend their knowledge to solve complex, multi-disciplinary problems.
3. Co-creation of dissertation ideas / concepts with academic staff through a workshop.

**Please note:** 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.

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## **Educational Aims of the Programme**

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The aims of the programme are to:

- Support you to develop a sound understanding of the fundamental principles, methods, analysis and synthesis in engineering design and applications appropriate to Energy and Sustainability.
- Through a range of specialist modules integrated within the structured learning environment, reflecting the internationally-renowned research expertise within the School, enable you to broaden and deepen your knowledge, skills and abilities.
- Align your career pathway with the requirements for chartered engineer status.
- Offer you a degree structure that is relevant to industry and responsive to changes in technology and the needs of the community.
- Embed you with a supportive and intellectually stimulating environment that encourages an attitude of independent learning and enquiry, and fosters an ethos of lifetime learning and professional development.

- Assist you in developing research projects which are supported by the research activities within the Faculty and stimulate individual innovation, self-assessment and teamwork skills required in engineering.
- Afford you the opportunity of applying theoretical knowledge gained on the programme through a substantial piece of research (dissertation).

## Programme Learning Outcomes

The programme provides opportunities for you to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the areas detailed below. The programme learning outcomes have been developed with reference to the Subject Benchmark Statement for engineering (<https://www.qaa.ac.uk/docs/qaa/subject-benchmark-statements/sbs-engineering-15.pdf>) and the Characteristics Statement for Master's Degrees ([https://www.qaa.ac.uk/docs/qaa/quality-code/master's-degree-characteristics-statement.pdf?sfvrsn=6ca2f981\\_10](https://www.qaa.ac.uk/docs/qaa/quality-code/master's-degree-characteristics-statement.pdf?sfvrsn=6ca2f981_10)). The former of these is aligned with the Engineering Council publication Accreditation of Higher Education Programmes (AHEP): UK Standard for Professional Engineering Competence (third edition) ([https://www.engc.org.uk/engcdocuments/internet/Website/Accreditation%20of%20Higher%20Education%20Programmes%20third%20edition%20\(1\).pdf](https://www.engc.org.uk/engcdocuments/internet/Website/Accreditation%20of%20Higher%20Education%20Programmes%20third%20edition%20(1).pdf))

Learning outcomes listed are AHEP 3 Learning Outcomes: Technical and 'Non-Technical' MSc programmes which provide further learning (FL) to partly meet the educational requirement for CEng.

### Knowledge and Understanding

Having successfully completed this programme you will be able to demonstrate knowledge and understanding of:

	<b>Science and mathematics</b> Engineering is underpinned by science and mathematics, and other associated disciplines, as defined by the relevant professional engineering institution(s). On graduation you will have achieved:
SM7	A comprehensive understanding of the relevant scientific principles of Energy and Sustainability
SM8	A critical awareness of current problems and/or new insights most of which is at, or informed by, the forefront of aerodynamic and computation
SM9	Understanding of concepts relevant to Energy and Sustainability, some from outside engineering, and the ability to evaluate them critically and to apply them effectively, including in engineering projects

	<b>Design</b> Design at this level is the creation and development of an economically viable product, process or system to meet a defined need. It involves significant technical and intellectual challenges and can be used to integrate all engineering understanding, knowledge and skills to the solution of real and complex problems. On graduation you will have the knowledge, understanding and skills to:
D9	Knowledge, understanding and skills to work with information that may be incomplete or uncertain, quantify the effect of this on the design and, where appropriate, use theory or experimental research to mitigate deficiencies
D10	Knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations

	<b>Economic, legal, social, ethical and environmental context</b> Engineering activity can have impacts on the environment, on commerce, on society and on individuals. On graduation you will have the skills to manage your activities and to be aware of the various legal and ethical constraints under which you are expected to operate, including:
EL8	Awareness of the need for a high level of professional and ethical conduct in engineering
EL9	Awareness that engineers need to take account of the commercial and social contexts in which they operate
EL10	Knowledge and understanding of management and business practices, their limitations, and how these may be applied in the context of Energy and Sustainability
EL11	Awareness that engineering activities should promote sustainable development and ability to apply quantitative techniques where appropriate

EL12	Awareness of relevant regulatory requirements governing engineering activities in the context of Energy and Sustainability
EL13	Awareness of and ability to make general evaluations of risk issues in the context of Energy and Sustainability, including health & safety, environmental and commercial risk

	<b>Engineering practice</b> This is the practical application of engineering skills, combining theory and experience, and use of other relevant knowledge and skills. On graduation you will have achieved:
P9	A thorough understanding of current Energy and Sustainability practice and its limitations, and some appreciation of likely new developments
P11	Understanding of different roles within an engineering team and the ability to exercise initiative and personal responsibility, which may be as a team member or leader
P12	Advanced level knowledge and understanding of a wide range of engineering materials and components

### **Teaching and Learning Methods**

Acquisition of core knowledge and understanding is through lectures, seminars, tutorials, field and laboratory classes, computer classes, workshops, and independent study and research. You are encouraged from an early stage to supplement and consolidate your understanding and knowledge by independent study.

### **Assessment methods**

Testing of the knowledge base is through a combination of unseen written examinations and assessed coursework in the form of problem solving exercises, laboratory reports design exercises, essays and individual and group projects.

### **Skills**

Having successfully completed this programme you will be able to:

	<b>Engineering analysis</b> Engineering analysis involves the application of engineering concepts and tools to the solution of engineering problems. On graduation you will have achieved:
EA5	Ability to use fundamental knowledge to investigate new and emerging technologies
EA6M	Ability both to apply appropriate engineering analysis methods for solving complex problems in engineering and to assess their limitations
EA7	Ability to collect and analyse research data and to use appropriate engineering analysis tools in tackling unfamiliar problems, such as those with uncertain or incomplete data or specifications, by the appropriate innovation, use or adaptation of engineering analytical methods

	<b>Design</b> Design at this level is the creation and development of an economically viable product, process or system to meet a defined need. It involves significant technical and intellectual challenges and can be used to integrate all engineering understanding, knowledge and skills to the solution of real and complex problems. On graduation you will have the knowledge, understanding and skills to:
D11	Ability to generate an innovative design for products, systems, components or processes to fulfil new needs

	<b>Engineering practice</b> This is the practical application of engineering skills, combining theory and experience, and use of other relevant knowledge and skills. On graduation you will have achieved:
P10	Ability to apply engineering techniques taking account of a range of commercial and industrial constraints

	<b>Additional general skills</b> On graduation you will have developed transferable skills, additional to those set out in the other learning outcomes, that will be of value in a wide range of situations, including the ability to:
G1	Apply their skills in problem solving, communication, working with others, information retrieval, and the effective use of general IT facilities
G2	Plan self-learning and improve performance, as the foundation for lifelong learning/CPD

G3	Monitor and adjust a personal programme of work on an on-going basis
G4	Exercise initiative and personal responsibility, which may be as a team member or leader

	<b>Discipline Specific Skills</b> On completion of the Energy and Sustainability Science programme you will be able to:
	Design and conduct an appropriate programme of work to set objectives for research in the context of Energy and Sustainability
	Use scientific and technical literature in support of research
	Apply fundamental knowledge and understanding of essential facts, concepts and principles relevant to Energy and Sustainability in researching complex problems

### ***Teaching and Learning Methods***

Intellectual skills are developed through the teaching and learning activities. Analysis and problem solving skills are further developed through regular problem sheets issued by module lecturers and through small group teaching. Experimental, research and design skills are further developed through coursework exercises, laboratory work, and design and research projects. Individual feedback is provided on all work submitted. Appreciation of the practical applications of these skills is provided by interaction with industry through visiting lectures and industrial visits.

### ***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 and oral presentations. Skills are formatively assessed through written reports and oral presentations, practical and laboratory reports. Summative assessment is through unseen examinations, extended essays, written reports and oral presentations, and completion of a research project.

## **Programme Structure**

The University uses the European Credit Transfer Scheme (ECTS) to indicate the approximate amount of time a typical student can expect to spend in order to complete successfully a given module or programme, where 1 ECTS indicates around 20 nominal hours of study. Previously, Credit Accumulation and Transfer Scheme (CATS) points were used for this purpose where 1 CATS credit was 10 nominal hours of study. The University credit accumulation and transfer scheme is detailed.

The teaching is structured on a semester pattern. You study modules comprising 90 ECTS (180 CATS). The course is only available full-time. In addition to the final award, there are the following exit points:

- Postgraduate Certificate of Higher education, following successful completion of 30 ECTS (60 CATS).
- Postgraduate Diploma of Higher education, following successful completion of 60 ECTS (120 CATS).

Each module forms a linked part of the programme of study and carries a credit rating. The syllabus and assessment related to each module is detailed in the associated module profile.

The Programme Structure is outlined in Appendix 1. In Appendix 2 the modules contributing to meeting the different programme learning outcomes are listed.

Your contact hours will vary depending on your module/option choices. Full information about contact hours is provided in individual module profiles

### ***Typical course content***

In addition to the research project you will select 8 taught modules from the MSc Energy and Sustainability programme catalogue.

The programme follows university guidelines for inclusivity and flexibility and provides an array of teaching and learning approaches that will enable any student who meets the entry requirements to access the curriculum and demonstrate achievement of all the intended learning outcomes.

### **Progression Requirements**

The programme follows the University's regulations for [Progression, Determination and Classification of Results: Postgraduate Master's Programmes](https://www.southampton.ac.uk/calendar/sectioniv/index.page) as set out in the University Calendar  
<https://www.southampton.ac.uk/calendar/sectioniv/index.page>

### **Intermediate exit points (where available)**

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**

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Level 7 (MSc)	Much of the study undertaken at Masters level reflects research at the forefront of Civil Engineering. 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.
PGDip (Part II only)	You will have attained knowledge of research being undertaken by academic staff at the forefront of Civil Engineering. You will have shown that you are capable of applying knowledge to solve problems, 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 be able to contribute to solving problems individually and as part of a team. You will have the qualities needed for employment in circumstances requiring sound judgement and personal responsibility under the guidance of others, in complex and unpredictable professional environments.
PGCert (Part II only)	You will have been exposed to research being undertaken by academic staff at the forefront of Civil Engineering. You will have gained experience in applying knowledge to solve problems, and you will understand how the boundaries of knowledge are advanced through research. You will be able to deal with complex issues by following existing procedures, and will be able to contribute to solving problems individually and as part of a team. You will have some of the qualities needed for employment in circumstances requiring sound judgement and personal responsibility under the guidance of others, in complex and unpredictable professional environments.

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## 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.

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## Support for student learning

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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 particular School 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. There is a wide range of online training and workshops available to support writing, study skills, IT and maths. The Academic skills hub holds several workshops every week day to support students.
- 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. Students can also access SVE (Southampton Virtual Environment), a virtual Windows University of Southampton desktop that can be accessed from personal devices such as PCs, Macs, tablets and smartphones from any location.
- 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.
- Central IT support through a comprehensive website, telephone and online ticketed support and a dedicated helpdesk in the Hartley Library.
- Enabling Services offering assessment and support (including specialist IT support) facilities 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 and Employability services, 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 School of Engineering and your Discipline you will be able to access:

- Student handbook for Civil Engineering students.
- Introductory sessions for all years of the programme.
- Library information retrieval seminar.
- Engineering Development and Manufacturing Centre (EDMC) equipped with a range of workshop equipment, CAD/CAM.
- Engineering specific software.

- Personal academic tutors to assist you with personal problems and to advise on academic issues (contact maintained during periods of studying abroad). A Senior Tutor is also available should you need additional support.
- Access to academic staff through an open door policy as well as timetabled tutor meetings, appointment system and e-mail.
- Research seminars and invited lectures.
- School Student Office for the administration of your programme.

## Methods for evaluating the quality of teaching and learning

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

- Anonymous evaluation questionnaires for each module of the programme.
- Acting as or represented by Student Representatives on the staff-student liaison committee. You are also represented on the School Programmes Committee and Faculty Education Committee.
- Meetings, individually or as group, with programme external examiner.

It should be noted that meetings with personal academic tutors can also be used to comment on quality related issues.

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

- Evaluation for each module of the programme based on your feedback from evaluation questionnaires and carried out by lecturer(s) involved in the module and colleagues acting as advisors.
- A discipline specific Education Board which convenes several times a year to consider the quality of delivery of each module of your programme.
- Moderation of examination papers, coursework and projects, both internally and externally.
- Comments by external examiners, who produce an annual report.
- Annual examiners' meetings and Boards of Examiners.
- Annual programme and module reviews considering your feedback from all sources, feedback from Education Boards, external examiners and other bodies and student performance in assessment.
- Periodic meetings of the Civil Engineering Industrial Advisory Board.
- Response to results from the National Student Survey.
- Accreditation by professional institutions.
- Programme Revalidation by the University at least every 5 years.

Note that quality assurance of part of the programme taken abroad, where applicable, is subject to the quality procedures of the relevant institutions. These procedures are subject to periodic monitoring by members of staff of the Faculty of Engineering and Physical Sciences.

## Career Opportunities

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Student graduating from our MSc degrees obtain employment as graduate engineers with many leading employers both consultants and contractors and also regulatory authorities and local authorities. Support is available to develop their CVs and interview skills. In addition to careers in civil engineering, the transferrable skills that our students obtain make them attractive to a wide range of graduate recruiters, from financial services through to IT and management consultancy.

## External Examiner(s) for the programme

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**Name** Professor Tim O'Doherty

**Institution** Cardiff University

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.

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**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 at <http://www.southampton.ac.uk/studentservices/academic-life/faculty-handbooks.page> and at [http://www.southampton.ac.uk/engineering/undergraduate/courses/civil\\_engineering/h201\\_meng\\_civil\\_engineering.page?](http://www.southampton.ac.uk/engineering/undergraduate/courses/civil_engineering/h201_meng_civil_engineering.page?)

Revision History

1. February 2008 (MH)
2. Updated regulations March 2013 (D Mead)
3. Updated March 2014 (CQA)
4. CQA\_130614
5. CQA\_FPC\_addition\_of\_disclaimer\_statement\_Aug\_2015
6. Update to Programme Overview (CMA changes) – September 2015
7. Annual textual updates – CQA – August 2016.
8. Updated to reflect 201819 version and removal of Admissions Criteria – CQA March 2018
9. Updated Faculty name to Faculty of Engineering and Physical Sciences July 2018
10. Programme validation, LO AHEP3, Patrick James, March 2019
11. Revision following Programme Validation, LO, April 2019

## MSc Energy and Sustainability

The information within this Appendix is liable to change in minor ways from year to year. It is accurate at the time of writing.

Both Energy and Sustainability themes (3959 Energy, Resources and Climate Change, and 3960, Energy, Environment and Buildings) have a common semester 1 of four compulsory modules. Choose one optional module in semester 2 alongside the three compulsory modules.

**The research component of the MSc consists of a Core module (FEEG6012) of 30 ECTS/60 CATS which is a research dissertation.**

Where optional modules have been specified, the following is an indicative list of available optional modules, which are subject to change each academic year. Please note in some instances modules have limited spaces available.

3959 Energy, Resources and Climate Change

Module Code	Module Name	Semester	ECTS/ CATS Credit Points	Type of module	Level
FEEG6025	Data Analysis & Experimental Methods for Civil and Environmental Engineering	1	7.5/15	Compulsory	7
ENVS6032	Geographical Information Systems for Environmental Consultants	1	7.5/15	Compulsory	7
CENV6147	Climate Change Energy and Settlements	1	7.5/15	Compulsory	7
SESG6041	Introduction to Energy Technologies, Environment and Sustainability	1	7.5/15	Compulsory	7
CENV6085	Waste Resource Management	2	7.5/15	Compulsory	7
CENV6141	Bioenergy	2	7.5/15	Compulsory	7
CENV6090	Energy Resources and Engineering	2	7.5/15	Compulsory	7
FEEG6012	Research Project for FEE Masters Programmes (core)	3	30/60	Core	7
	<b>Plus 15 credits (ONE MODULE) from:</b>				
CENV6145	Climate Design of Buildings and Cities	2	7.5/15	Optional	7
CENV6148	Energy Performance Assessment of Buildings	2	7.5/15	Optional	7

## 3960 Energy, Environment and Buildings

Module Code	Module Name	Semester	ECTS/ CATS Credit Points	Type of module	Level
FEEG6025	Data Analysis & Experimental Methods for Civil and Environmental Engineering	1	7.5/15	Compulsory	7
ENVS6032	Geographical Information Systems for Environmental Consultants	1	7.5/15	Compulsory	7
CENV6147	Climate Change Energy and Settlements	1	7.5/15	Compulsory	7
SESG6041	Introduction to Energy Technologies, Environment and Sustainability	1	7.5/15	Compulsory	7
CENV6148	Energy Performance Assessment of Buildings	2	7.5/15	Compulsory	7
CENV6145	Climate Design of Buildings and Cities	2	7.5/15	Compulsory	7
CENV6090	Energy Resources and Engineering	2	7.5/15	Compulsory	7
FEEG6012	Research Project for FEE Masters Programmes (core)	3	30/60	Core	7
	<b>Plus 15 credits (ONE MODULE) from:</b>				
CENV6085	Waste Resource Management	2	7.5/15	Optional	7
CENV6141	Bioenergy	2	7.5/15	Optional	7

**Modules contributing to meeting the different programme learning outcomes.**

	<b>Learning Outcome</b>	<b>Assessment method</b>	<b>Module</b>	<b>Examples LO descriptors within module profiles</b>
	<b>Science and Mathematics (SM)</b>			
<b>SM7M</b>	A comprehensive understanding of the relevant scientific principles of the specialisation	Exam, coursework	CENV6148, CENV6090, CENV6147, SESG6041, CENV6145, FEEG6025, ENVS6032, FEEG6012, CENV6085, CENV6141	CENV6148 <i>EXAM – COMPULSORY QUESTION ON BUILDING PHYSICS</i>  CENV6090 <i>LECTURES ON CARNOT ENGINES, BETZ LIMIT AND FLUID FLOW. ASSESSED THROUGH CONFERENCE PRESENTATION – POSTER EVENT ON STUDENT’S SELECTED TOPIC.</i>
<b>SM8M</b>	A critical awareness of current problems and/or new insights most of which is at, or informed by, the forefront of the specialisation engineering	Exam, coursework	CENV6148, CENV6090, SESG6041, FEEG6025, FEEG6012, CENV6141	SESG6041 <i>GROUP REPORT AND PRESENTATION - 2 COUNTRY ANALYSIS 2040 SCENARIOS</i>
<b>SM9M</b>	Understanding of concepts relevant to the discipline, some from outside engineering, and the ability to evaluate them critically and to apply them effectively, including in engineering projects.	Exam, coursework	CENV6147, SESG6041, CENV6145, ENVS6032, CENV6141	CENV6148 <i>MACC CURVE ANALYSIS OF SAP RATING IMPROVEMENT – COURSEWORK. LIMITATIONS RELATING TO THE COMBINATIONS OF MEASURES AND HOW THEY INTERACT TO ALTER OVERALL ENERGY DEMAND.</i>
	<b>Engineering analysis (EA)</b>			
<b>EA6M</b>	Ability both to apply appropriate engineering analysis methods for solving complex problems in engineering and to assess their limitations	Exam, coursework	CENV6148, CENV6147, SESG6041, CENV6145, FEEG6025, ENVS6032, FEEG6012, CENV6141	CENV6145 <i>SCOPING STUDY AND GROUP REGENERATION TASKS – ENCOMPASSING TRANSPORT, ENERGY, SUSTAINABILITY, ENVIRONMENT. ASSESSMENT OF HOW SUCCESSFULLY STUDENTS APPLY CONCEPTS TO THE CASE STUDY SITE.</i>
<b>EA5M</b>	Ability to use fundamental knowledge to investigate new and emerging technologies	Exam, coursework	CENV6148, CENV6090, SESG6041, FEEG6025, ENVS6032	CENV6148 <i>SAP COURSEWORK SELECTING COMPONENT UPGRADES TO IMPROVE ENERGY RATING – SUPPORTED BY MACC CURVE ANALYSIS.</i>
<b>EA7M</b>	Ability to collect and analyse research data and to use appropriate engineering analysis tools in tackling unfamiliar problems, such as those with uncertain or incomplete data or specifications, by the appropriate innovation,	Exam, coursework	CENV6148, CENV6090, CENV6147, SESG6041, CENV6145, FEEG6025, ENVS6032, FEEG6012, CENV6141	CENV6147 <i>ISLAND PROJECT SETTLEMENT PROBLEM – UNFAMILIAR CLIMATE - FORMAL REPORT</i>

	use or adaptation of engineering analytical methods			
	<b>Design (D)</b>			
D9M	Knowledge, understanding and skills to work with information that may be incomplete or uncertain, quantify the effect of this on the design and, where appropriate, use theory or experimental research to mitigate deficiencies	Exam, coursework	CENV6148, CENV6147, SESG6041, CENV6145, FEEG6025, ENVS6032, FEEG6012, CENV6141	CENV6145 ASSESSED THROUGH THE DEVELOPED GROUP WORKSHOP CONCEPTS
D10M	Knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations	Exam, coursework	CENV6148, CENV6147, SESG6041, CENV6145, FEEG6025, ENVS6032, FEEG6012, CENV6141	CENV6148 APPLY SAP METHODOLOGY TO COURSEWORK STUDY BUILDING – ASSESSED BY COMPUTER MODEL OUTPUT AND COURSEWORK REPORT
D11M	Ability to generate an innovative design for products, systems, components or processes to fulfil new needs	Exam, coursework	CENV6147, SESG6041, CENV6145, ENVS6032	CENV6147 FOLLOW ISLAND PROJECT OUTLINE BRIEF OF A 15 YEAR LIFETIME SETTLEMENT – INCLUDING BUILDINGS, ENERGY SYSTEMS, FOOD PRODUCTION AND BUSINESS MODEL. ASSESSED VIA FORMAL REPORT AND PRESENTATION
	<b>Economic, legal, social, ethical and environmental context (EL)</b>			
EL8M	Awareness of the need for a high level of professional and ethical conduct in engineering	Exam, coursework	CENV6148, CENV6090, SESG6041, CENV6145, FEEG6025, FEEG6012, CENV6085, CENV6141	CENV6090 COVERED THROUGHOUT THE LECTURES – NUCLEAR POWER AND SAFETY, COAL EXTRACTION, AIR POLLUTION, THERMAL POLLUTION FROM THERMAL POWER STATIONS, ASSESSED INDIRECTLY THROUGH THE INDIVIDUAL ESSAY AND CONFERENCE EVENT (5 MINUTE PRESENTATION AND POSTER SESSION) IN TERMS OF HOW THE STUDENT HAS CONSIDERED THESE ASPECTS.
EL9M	Awareness that engineers need to take account of the commercial and social contexts in which they operate	Exam, coursework	CENV6148, CENV6090, CENV6147, SESG6041, FEEG6012, CENV6085	SESG6041 ELING TIDE MILL SOLUTION – COSTING. ECONOMIC AND SOCIAL ANALYSIS OF 2040 2 COUNTRY SCENARIOS – REPORT AND PRESENTATION
EL10M	Knowledge and understanding of management and business practices, their limitations, and how these may be applied in the context of the particular specialisation	Exam, coursework	CENV6147, SESG6041, FEEG6012, CENV6085	SESG6041 APPLYING PRINCIPLES FROM LECTURES TO 2 COUNTRY ANALYSIS 2040 SCENARIO – ASSESSED BY REPORT AND PRESENTATION. ELING TIDE MILL SOLUTION – PRESENTATION.
EL11M	Awareness that engineering activities	Exam, coursework	CENV6148, CENV6090,	CENV6145 SCOPING STUDY AND GROUP REGENERATION TASKS –

	should promote sustainable development and ability to apply quantitative techniques where appropriate		CENV6147, SESG6041, CENV6145, ENVS6032, FEEG6012, CENV6085, CENV6141	ENCOMPASSING TRANSPORT, ENERGY, SUSTAINABILITY, ENVIRONMENT. ASSESSMENT OF HOW SUCCESSFULLY STUDENTS APPLY CONCEPTS TO THE CASE STUDY SITE. COMPUTATIONAL METHODS MAY BE APPLIED TO THE SCOPY STUDY SOLUTION.
EL12M	Awareness of relevant regulatory requirements governing engineering activities in the context of the particular specialisation	Exam, coursework	CENV6148, FEEG6025, ENVS6032, FEEG6012, CENV6085, CENV6141	CENV6148 PART L – CONSERVATION OF FUEL AND POWER, EU EPBD – ENERGY PERFORMANCE IN BUILDINGS DIRECTIVE, ASSESSED THROUGH SAP REPORT COURSEWORK AND RELEVANT EXAM QUESTIONS
EL13M	Awareness of and ability to make general evaluations of risk issues in the context of the particular specialisation, including health & safety, environmental and commercial risk	Exam, coursework	CENV6148, SESG6041, FEEG6012, CENV6085	SESG6041 ELING TIDE MILL DEVELOPED SOLUTION – CONSIDERATION OF RISK – ASSESSED VIA PRESENTATION
	<b>Engineering Practice (P)</b>			
P12M	Advanced level knowledge and understanding of a wide range of engineering materials and components	Exam, coursework	CENV6148, CENV6090, CENV6147, SESG6041, CENV6145, FEEG6012, CENV6085, CENV6141	CENV6145 CONSIDERATION OF DISTRICT HEAT AND COOL NETWORK WITHIN THE CASE STUDY AREA FOR COURSEWORKS
P9m	A thorough understanding of current practice and its limitations, and some appreciation of likely new developments	Exam, coursework	CENV6148, CENV6147, FEEG6012, CENV6085	CENV6148 PART L, SAP, EU EPBD, RENEWABLE INCENTIVES - ASSESSED VIA SAP COURSEWORK AND EXAM QUESTIONS
P10m	Ability to apply engineering techniques, taking account of a range of commercial and industrial constraints	Exam, coursework	CENV6148, CENV6090, CENV6147, SESG6041, CENV6145	SESG6041 ELING TIDE MILL SOLUTION (GEARBOX, TURBINE, INVERTER ETC) MATERIALS AND COMPONENTS – ASSESSED VIA PRESENTATION. REPORT AND PRESENTATION - 2 COUNTRY ANALYSIS 2040 IS TO ACHIEVE AN 80% RENEWABLE ACROSS ALL SECTORS
P11m	Understanding of different roles within an engineering team and the ability to exercise initiative and personal responsibility, which may be as a team member or leader	Exam, coursework	CENV6147, SESG6041, CENV6145	SESG6041 TIDE MILL AND 2 COUNTRY GROUP WORK TASKS – ASSESSMENT OF GROUP COHESION IN PRESENTATIONS AND REPORT
	<b>Additional general skills (G)</b>			
G1	Apply their skills in problem solving, communication, information retrieval, working with others,	Exam, coursework	CENV6148, CENV6090, CENV6147, SESG6041, CENV6145, FEEG6025,	CENV6147 VERNACULAR ARCHITECTURE CONFERENCE AND PAPER, ISLAND PROJECT REPORT AND PRESENTATION OUTPUTS

	and the effective use of general IT facilities		ENVS6032, FEEG6012	
G2	Plan self-learning and improve performance, as the foundation for lifelong learning/CPD	Exam, coursework	CENV6147, SESG6041, FEEG6025, ENVS6032, FEEG6012	SESG6041 <i>INDIVIDUAL ESSAY, 2 COUNTRY GROUP WORK CONTRIBUTION - ASSESSED VIA THE WRITTEN SUBMISSIONS</i>
G3m	Monitor and adjust a personal programme of work on an on-going basis	Exam, coursework	CENV6147, SESG6041, ENVS6032, FEEG6012	SESG6041 <i>INDIVIDUAL ESSAY, 2 COUNTRY GROUP WORK CONTRIBUTION - ASSESSED VIA THE WRITTEN SUBMISSIONS</i>
G4	Exercise initiative and personal responsibility, which may be as a team member or leader	Exam, coursework	CENV6147, SESG6041, CENV6145, FEEG6012	CENV6147 <i>ISLAND PROJECT TIME MANAGEMENT TO MEET SCHEDULES OF GROUP - ASSESSED BY GROUP COHERENCE IN TERMS OF PRESENTATION AND FORMAL REPORT</i>

**3960 Energy and Sustainability, Energy and Buildings**  
**MSc AHEP3 Learning Outcomes (MSc level) mapping.**  
 LO COUNT - NO MODULES ARE PASSED BY REFERRAL METHOD

Note: EACH LO IS MAPPED A MINIMUM OF 3X ACROSS THE PROGRAMME. A LO MUST OCCUR IN ALL OPTIONAL MODULES TO BE CONSIDERED.

REFERRAL IN ANY 2 MODULES WILL STILL ENSURE ALL LO ARE MET FROM THE OTHER PASSED MODULES IN THE CASE OF A MODULE REFERRAL NOT COVERING ALL THE LO OF THE NORMAL ASSESSMENT (SEE INDIVIDUAL MODULE PROFILES)

MSc	AHEP3 LO	COMPULSORY MODULES								OPTIONAL MODULES	
		S2 CENV6148	S2 CENV6090	S1 CENV6147	S1 SESG6041	S2 CENV6145	S1 FEEG6025	S1 ENVS6032	S3 FEEG6012	S2 CENV6085	S2 CENV6141
		Energy Performance Assessment of Buildings	Energy Resources and Engineering	Climate Change, Energy and Settlements	Introduction to Energy Technologies, Environment and Sustainability	Climate Design of Building and Cities	Data Analysis & Experimental Methods for Civil and Environmental Engineering	Geographical Information Systems for Environmental Consultants	MSc Research Project	Waste Resource Management	Bioenergy
	9 SM7M	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	5 SM8M	Y	Y	N	Y	N	Y	N	Y	N	Y
	5 SM9M	N	N	Y	Y	Y	Y	Y	N	N	Y
	7 EA6M	Y	N	Y	Y	Y	Y	Y	Y	N	Y
	5 EA5M	Y	Y	N	Y	N	Y	Y	N	N	N
	8 EA7M	Y	Y	Y	Y	Y	Y	Y	Y	N	Y
	7 D9M	Y	N	Y	Y	Y	Y	Y	Y	N	Y
	6 D10M	Y	N	Y	Y	Y	Y	Y	N	Y	N
	5 D11M	N	N	Y	Y	Y	Y	Y	N	N	N
	7 EL8M	Y	Y	N	Y	Y	Y	N	Y	Y	Y
	9 EL9M	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	4 EL10M	N	N	Y	Y	N	Y	N	Y	Y	N
	9 EL11M	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	3 EL12M	Y	N	N	N	N	Y	N	Y	Y	N
	4 EL13M	Y	N	N	Y	N	Y	N	Y	Y	N
	7 P12M	Y	Y	Y	Y	Y	N	n	Y	Y	Y
	4 P9M	Y	N	Y	N	N	Y	N	Y	Y	N
	6 P10M	Y	Y	Y	Y	Y	Y	N	N	N	N
	4 P11M	N	N	Y	Y	Y	Y	N	N	N	N
	9 G1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	6 G2	N	N	Y	Y	N	Y	Y	Y	Y	Y
	6 G3m	N	N	Y	Y	N	Y	Y	Y	Y	Y
	5 G4	N	N	Y	Y	Y	Y	N	Y	Y	n



### 3959 Energy and Sustainability, Energy, Sustainability and Climate Change

#### MSc AHEP3 Learning Outcomes (MSc level) mapping.

LO COUNT - NO MODULES ARE PASSED BY REFERRAL METHOD

Note: EACH LO IS MAPPED A MINIMUM OF 3X ACROSS THE PROGRAMME. A LO MUST OCCUR IN ALL OPTIONAL MODULES TO BE CONSIDERED.

REFERRAL IN ANY 2 MODULES WILL STILL ENSURE ALL LO ARE MET FROM THE OTHER PASSED MODULES IN THE CASE OF A MODULE REFERRAL NOT COVERING ALL THE LO OF THE NORMAL ASSESSMENT (SEE INDIVIDUAL MODULE PROFILES)

MSc	AHEP3 LO	COMPULSORY MODULES								OPTIONAL MODULES	
		S2 CENV6085	S2 CENV6090	S1 CENV6147	S1 SESG6041	S2 CENV6141	S1 FEEG6025	S1 ENVS6032	S3 FEEG6012	S2 CENV6148	S2 CENV6145
		Waste Resource Management	Energy Resources and Engineering	Climate Change, Energy and Settlements	Introduction to Energy Technologies, Environment and Sustainability	Bioenergy	Data Analysis & Experimental Methods for Civil and Environmental Engineering	Geographical Information Systems for Environmental Consultants	MSc Research Project	Energy Performance Assessment of Buildings	Climate Design of Building and Cities
	9 SM7M	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	5 SM8M	N	Y	N	Y	Y	Y	N	Y	Y	N
	5 SM9M	N	N	Y	Y	Y	Y	Y	N	N	Y
	7 EA6M	N	N	Y	Y	Y	Y	Y	Y	Y	Y
	4 EA5M	N	Y	N	Y	N	Y	Y	N	Y	N
	8 EA7M	N	Y	Y	Y	Y	Y	Y	Y	Y	Y
	7 D9M	N	N	Y	Y	Y	Y	Y	Y	Y	Y
	6 D10M	Y	N	Y	Y	N	Y	Y	N	Y	Y
	4 D11M	N	N	Y	Y	N	Y	Y	N	N	Y
	7 EL8M	Y	Y	N	Y	Y	Y	N	Y	Y	Y
	9 EL9M	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	5 EL10M	Y	N	Y	Y	N	Y	N	Y	N	N
	9 EL11M	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	3 EL12M	Y	N	N	N	N	Y	N	Y	Y	N
	4 EL13M	Y	N	N	Y	N	Y	N	Y	Y	N
	7 P12M	Y	Y	Y	Y	Y	N	n	Y	Y	Y
	4 P9M	Y	N	Y	N	N	Y	N	Y	Y	N
	5 P10M	N	Y	Y	Y	N	Y	N	N	Y	Y
	3 P11M	N	N	Y	Y	N	Y	N	N	N	Y
	9 G1	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
	7 G2	Y	N	Y	Y	Y	Y	Y	Y	N	N
	7 G3m	Y	N	Y	Y	Y	Y	Y	Y	N	N
	5 G4	Y	N	Y	Y	n	Y	N	Y	N	Y

### 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](http://www.calendar.soton.ac.uk).

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
Approved Calculators		Students 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 specifies permissible models from time to time and these may be purchased from any source.
Stationery		You will be expected to provide your own day-to-day stationary items, e.g. pens, pencils, notebooks, etc). · The third year module FEEG3003 Individual Project requires you to print an AI portrait poster on paper. The typical cost for this is in the range £5 to £20.
Textbooks		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 <b>optional</b> 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:	We provide a wide range of resources to support project based modules and activities and these will allow you to complete your assessed exercises to the highest standard. However, you may wish to customise your project by purchasing additional resource e.g. alternative manufacturing materials, electronic components, etc. You may also incur additional costs for printing e.g. large format drawings.  <b>FEEG6012</b> Reasonable expenses for travel and materials of up to £300 may be reclaimed through the School of Engineering 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. <a href="http://www.southampton.ac.uk/engineering/undergraduate/modules/feeg6012_msc_research_project.page?">http://www.southampton.ac.uk/engineering/undergraduate/modules/feeg6012_msc_research_project.page?</a>
	Field Equipment and Materials:	None
IT	Computer discs	Available from UoS shop as required
Clothing		

Main Item	Sub-section	PROGRAMME SPECIFIC COSTS
	Fieldcourse clothing:	You will need to wear suitable clothing when attending field courses, e.g. waterproofs, walking boots. You can purchase these from any source.
<b>Printing and Photocopying Costs</b>		<p>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.</p> <p><b>FEEG6012</b> Students are responsible for the printing costs of their poster for the Poster Presentation Day. This may range from approximately £5 - £20. <a href="https://www.southampton.ac.uk/courses/modules/feeg3003.page">https://www.southampton.ac.uk/courses/modules/feeg3003.page</a></p> <p>Reasonable expenses for travel and materials of up to £300 may be reclaimed through the School of Engineering 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. (equipment).</p>
<b>Optional Visits (e.g. museums, galleries)</b>		Some modules may include additional optional visits. You will normally be expected to cover the cost of travel and admission, unless otherwise specified in the module profile. For costs related to study abroad please see the relevant module profile.
<b>Travel and Subsistence</b>		For additional costs related to travel and subsistence for the Industrial Placement Year, please refer to the module profile for FEEG 3009