

## Programme Specification

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### MSc Energy and Sustainability with Electrical Power Engineering (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 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
Accreditation details	Institution of Engineering and Technology (IET)
Final award	Master of Science (MSc)
Name of award	Energy and Sustainability with Electrical Power Engineering
Interim Exit awards	Postgraduate Certificate in Higher Education Postgraduate Diploma in Higher Education
FHEQ level of final award	Level 7
UCAS code	N/A
Programme code	4486
QAA Subject Benchmark or other external reference	
Programme Lead	Paul Chappell (phc1)

## Programme Overview

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### Brief outline of the programme

The full-time programme is studied over one year. On successful completion of all parts, the MSc provides the student with part of the educational requirement to apply for professional registration as a chartered engineer through the IET. The programme provides the person with skills, knowledge, experience and comprehension of worldwide energy needs and technical solutions to the increasing demand for energy in a sustainable environment. It is expected that graduating students will have experienced the most up-to-date research to develop their engineering skills and to lead a successful career in the industrial energy sector.

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

## Learning and teaching

Students are taught through lectures, tutorials and laboratory sessions. Some modules provide visits to industrial sites and lectures from visiting industrialists and academics to illustrate the breath and depths of energy problems faced by developed and developing countries. Learning and Teaching Strategy within the Faculty seeks to promote independent learning and to develop intrinsically motivated thinkers who can critically analyse engineering problems and find optimal solutions.

## Assessment

The assessment strategy sets out to allow you to demonstrate your successful learning using fair and reliable assessment methods. The student is assessed through a range of settings to demonstrate their knowledge, comprehension and ability. Assessment may include formative and summative tasks such as written reports, coursework using software and sitting unseen examinations.

## Special Features of the programme

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The programme includes visiting speakers from industry and universities giving topic lecturer. There will be visits to industrial sites to illustrate current technology and future directions. The precise list of options may vary in minor ways from year to year, depending on student numbers and staff availability. Some options have perquisites, which are stated in their on-line syllabus.

**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](#).

## Educational Aims of the Programme

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The aims of the programme are to enable you to:

- 1) Develop original ideas and solve complex problems in new or unfamiliar environments, based on advanced knowledge of the key issues and processes in Energy and Sustainability, particularly in relation to the requirements and limitations of the existing bulk electrical energy transport infrastructure
- 2) Integrate knowledge and handle complexity in this area of electrical engineering, formulating sound judgements with incomplete or limited data
- 3) Communicate your conclusions and the underpinning knowledge and rationale clearly and unambiguously to specialist and non-specialist audiences
- 4) Develop your independent learning skills as required for continued professional development

## Programme Learning Outcomes

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### Knowledge and Understanding

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On successful completion of this programme you will have knowledge and understanding of:

- A1. Principles of energy and sustainability.
- A2. Theoretical principles and practical limitations of current knowledge and understanding in Energy and Sustainability, with reference to generation and bulk electrical energy transport.
- A3. Contemporary management, legal, operational and business practices which are relevant to the sector.
- A4. Demonstrate the ability to acquire new knowledge and understanding through the critical reading of scientific and technical books and papers.
- A5. Health and safety issues, risk assessment and regulatory frameworks that underpin the responsibilities of professionals working in energy and sustainability.

### **Teaching and Learning Methods**

Acquisition of core knowledge of understanding is achieved mainly through lectures supplemented by laboratory classes, seminars, tutorials, directed reading, video presentations, case studies, project work, and independent study. These methods may be supplemented by field visits and presentations from visiting specialist speakers where appropriate. Throughout the programme you are encouraged to use additional recommended reading material for private study to consolidate the formal learning process, and to broaden and deepen your understanding.

### **Assessment Methods**

Assessment will be through individual coursework, essays, and reports, oral and poster presentations, fieldbased reports, written assignments consisting of short and long problems, written examinations, a dissertation; and where appropriate, team assignments and presentations. Students are given feedback both verbally and written via the cover sheets for assignments.

### **Subject Specific Intellectual and Research Skills**

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On successful completion of this programme you will be able to:

- B1. Integrate knowledge from various disciplines within Energy and Sustainability in order to solve engineering problems holistically.
- B2. Identify, critically evaluate and apply appropriate scientific methods to produce solutions for complex problems in energy and sustainability.
- B3. Apply professional judgement to energy and sustainability projects with regard to environmental Impact, safety and reliability.
- B4. Carry out and reflect on activities congruent with a professional in energy and sustainability.
- B5. Select and research a topic of relevance to the programme of study and independently conduct the investigation in a planned, structured and professional manner.
- B6. Develop the ability to apply concepts and skills, particularly those of advanced problem solving, critical analysis and evaluation, within the chosen study area.

## **Teaching and Learning Methods**

Intellectual skills cover the range starting from Knowledge, Comprehension, Application, Analysis, Synthesis to Evaluation. The teaching and learning methods used in this programme will develop this range of intellectual skills. Lectures, visiting guest lectures and tutorials will develop knowledge and comprehension, coursework and assignments will develop application. Group discussions and debates and presentations along with group work and individual project/dissertation will develop analysis, synthesis and evaluation skills.

## **Assessment Methods**

The assessment methods in this programme will support the development of intellectual and research skills. Knowledge and Comprehension will be assessed through short examination style questions either as a formal closed book examination or as an open book assignment. Audio-visual presentations, extensive open-ended assignments and novel unexplored problems as projects will be used to assess analysis, synthesis and evaluation skills developed.

## **Transferable and Generic Skills**

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On successful completion of this programme you will be able to:

- C1. Communication - Presentation, audio-visual and written
- C2. Critical evaluation and appraisal
- C3. Information technology including subject specific software and some programming
- C4. Numeracy – mathematical skills
- C5. Analysis of Systems
- C6. Research Skills – library search skills, literature review skills

## **Teaching and Learning Methods**

A number of modules have a significant coursework element. This can range from design work through to presentations resulting from directed reading. Group assignments and design projects are intended to develop team working, project and time management skills. The individual MSc project includes independent research, project management and report writing. Debates and questions will be encouraged in lectures to develop evaluation and appraisal skills. Tutorials will cover industry standard software to develop IT skills. Assessments will be set such that they develop numeracy, analysis and research skills.

## **Assessment Methods**

The assessment in the project will be evaluated for its communication quality i.e. written work, posters, audio-visual presentations etc. Some work will also be peer-reviewed to allow students to develop skills in presenting a fair but good critique. Assignments will require use of generic IT software e.g. spreadsheets, MATLAB etc. which will be evaluated for quality of use as well as for outcome. Assessment may include development of fundamental mathematical models and their implementation to develop numeracy skills and analysis. Independent research as part of the MSc project/dissertation will develop research skills including library search skills, critical review of literature and synthesis into new ideas.

## Programme Structure

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The programme structure table is below:

Information about pre and co-requisites is included in individual module profiles.

### Part I

Typical course content

This programme consists of eight taught modules, each worth 7.5 ECTS (15 CATS) credit points and an individual research project worth 30 ECTS (60 CATS) credit points. Four compulsory modules cover core material for Electrical Power Engineering. Another compulsory module prepares you for your individual research project. Three optional modules can be selected to tailor the programme to your interests. All Energy and Sustainability MSc programmes contain a minimum of 22.5 ECTS points (45 CATS) of optional modules. It is possible to select option courses from other pathways, or from a list of ECS Part 4 undergraduate modules.

Programme details

The programme runs over three semesters. The first semester consists of four compulsory modules. The second semester consists of one compulsory module and three optional modules. Following the first two semesters of the taught component of the programme, the students will undertake a research project which will be assessed by a degree dissertation.

It should be noted that it may not be possible to run some optional modules if the number of students registered on the module is very small. It should also be noted that optional module choice can be restricted by the University Timetable, which varies from year to year: some optional modules may clash with other optional or compulsory modules. Please be aware that many modules are shared between different cohorts; the class size depends on cohort size, which varies from year to year.

Examinations are held at the end of Semester 1 (January) and at the end of Semester 2 (May/June). Students who have successfully completed 30 ECTS (60 CATS) or 60 ECTS (120 CATS) at the level of the award may exit with a Postgraduate Certificate or Postgraduate Diploma, respectively.

The following is the normal pattern of study for a full-time student, completing the programme within 12 calendar months:

Semester 1:

Four compulsory modules. Examinations are held in January.

Semester 2:

Four modules, including one compulsory module (ELEC6211) and three optional modules. Examinations are held in May/June.

Summer:

You will undertake an individual research project lasting up to 14 weeks, which is assessed by a 15,000-word dissertation.

The programme structure, including the compulsory and optional modules for each semester, is summarised below:

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#### SEMESTER 1

ELEC6220 - compulsory

ELEC6221 - compulsory

ELEC6222 - compulsory

ELEC6223 - compulsory

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SEMESTER 2 - select three optional modules

ELEC6211 - compulsory

ELEC3202 - optional

ELEC3216 - optional

ELEC6224 - optional

ELEC6225 - optional

ELEC6226 - optional

CENV6141 - optional

SESG6043 - optional

SESS6067 - optional

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SUMMER

COMP6200 - core

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#### Part I Compulsory

Code	Module Title	ECTS	Type
ELEC6223	Fundamental Principles of Energy	7.5	Compulsory
ELEC6222	Power and Distribution	7.5	Compulsory
ELEC6221	Power Generation: Technology and Impact on Society	7.5	Compulsory
ELEC6220	Power Systems Analysis	7.5	Compulsory
ELEC6211	Project Preparation	7.5	Compulsory

## Part I Core

Code	Module Title	ECTS	Type
COMP6200	MSc Project	30	Core

## Part I Optional

Select three semester 2 modules (22.5 ECTS/45 CATS) from the following:

Code	Module Title	ECTS	Type
ELEC6224	Advanced Electrical Materials	7.5	Optional
CENV6141	Bioenergy	7.5	Optional
ELEC3202	Green Electronics	7.5	Optional
ELEC6225	High Voltage Insulation Systems	7.5	Optional
ELEC3216	Mechanical Power Transmission and Vibration	7.5	Optional
SESG6043	Nuclear Energy Technology	7.5	Optional
ELEC6226	Power Electronics for DC Transmission	7.5	Optional
SESS6067	Renewable energy from environmental flows	7.5	Optional

## Progression Requirements

The programme will follow the University's regulations for *Progression, Determination and Classification of Results: Undergraduate and Integrated Masters Programmes* or the University's regulations for *Progression, Determination and Classification of Results: Standalone Masters Programmes* as set out in the General Academic Regulations in the University Calendar:  
<http://www.calendar.soton.ac.uk/sectionIV/sectIV-index.html>

## 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 particular 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 Hartley Library.
- Enabling Services offering support services and resources via a triage model to access crisis management, mental health support and counselling. Support includes daily Drop In at Highfield campus at 13.00 – 15.00 (Monday, Wednesday and Friday out of term-time) or via on-line chat on weekdays from 14.00 – 16.00. Arrangements can also be made for meetings via Skype.
- assessment and support (including specialist IT support) facilities if you have a disability, long term health problem or Specific Learning Difficulty (e.g. dyslexia).
- 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
- Other support that includes health services (GPs), chaplaincy (for all faiths) and 'out of hours' support for students in Halls and in the local community, (18.00-08.00)
- 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.

Associated with your programme you will be able to access:

Student Handbook and Programme Guide *f* The tutorial system – you will have a personal tutor *f*  
 Student Resource Centre which includes workstations and library *f* Orientation programme  
*f* Access to all academic and research staff (by appointment) *f* Student Information and Resources  
 Website *f* Extensive well equipped and resourced laboratories

## 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 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 Evaluation Exercise (our research activity contributes directly to the quality of your learning experience)



- Institutional Review by the Quality Assurance Agency

Further details on the University's quality assurance processes are given in the [Quality Handbook](#).

## Career Opportunities

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Major employers worldwide are keen to employ our graduates. In the energy industries, there is a shortage of well qualified engineers for research, development and sustainability of power. Across ECS, our graduates find employment in system development, information technology and communications in the IT sector, and in the finance, service, communications and entertainment industries. We have strong relationships with employers, run our own Careers Hub website ([www.ecs.soton.ac.uk/careers](http://www.ecs.soton.ac.uk/careers)) and hold our own annual careers fair.

## External Examiner(s) for the programme

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Name: Professor Scott Roy - University of Glasgow

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 Academic 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.

## Appendix 1:

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 also have to pay for:

### Additional Costs

Type	Details
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.
Textbooks	<p>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.</p> <p>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.</p>
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.
Printing and Photocopying Costs	In the majority of cases, coursework such as essays; projects; dissertations is likely to be submitted on line. However, there are some items where it is not possible to submit on line and students will be asked to provide a printed copy.

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).