UNIVERSITY OF Southampton

Programme Specification

MSc Energy and Sustainability with Electrical Power Engineering (2020-21)

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	Igor Golosnoy

Programme Overview

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 renewable energy, electric power generation and distribution 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 siting unseen examinations.

Special Features of the programme

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

The aims of the programme are to: 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 electric power generation and distribution infrastructure
2) Integrate knowledge and handle complexity in this area of electrical engineering and sustainable energy generation, 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

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

Knowledge and Understanding

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

A1. The scientific and engineering principles underpinning energy and sustainability in the context of electrical power engineering

A2. Advanced concepts in specialist areas of electric power networks, such as energy generation, transmission and distribution engineering

A3. Techniques, technologies and tools used in these areas

A4. Methods of design, analysis, realisation and evaluation used in these areas

A5. Applicable methods of research and enquiry

A6. Contemporary management, operational and business practices relevant to the energy sector

Teaching and Learning Methods

A1-A6: Most modules consist of a combination of lectures, small group teaching, practical work, directed reading and coursework assignments. These methods may be supplemented by field visits and presentations from visiting specialist speakers where appropriate. At the end of the taught part of the programme you will undertake an individual project associated with a research group. Small group teaching, including all practical work, and the individual project accommodate different learning styles. One-on-one tutorials can support full-class lectures, when required.

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 with literature review components, design exercises, and individual and small-group projects.

Subject Specific Intellectual and Research Skills

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

B1. Specify and design aspects of electrical power systems with attention to a wide range of outcomes, including technical, practical, efficiency/sustainability and security

B2. Test and evaluate the performance of such systems

B3. Evaluate energy and sustainability projects with regard to environmental Impact, safety and reliability

B4. Find, read, understand and explain literature related to advanced and specialised areas of electrical power engineering, including scientific publications, industrial documentation, standards, ethical, legal and environmental guidance

B5. Plan and manage a research project involving an advanced and specialised aspect of electrical power

engineering, using appropriate state of the art techniques, technologies and/or tools

Teaching and Learning Methods

B1-B4: Most modules consist of a combination of lectures, small group teaching, and practical work including advanced design and analysis tools, directed reading and coursework assignments, which can include a literature review.
B4, B5: The Project Preparation module and the Individual Project itself concern the formulation of a research project. Small group teaching, including all practical work, and the individual project accommodate different learning styles. One-on-one tutorials can support full-class lectures, when required.

Assessment Methods

B1-B5: Testing of the subject specific intellectual and research skills is through a combination of unseen written examinations and assessed coursework in the form of problem solving exercises, laboratory reports with literature review components, design exercises, and individual and small-group projects.
B4: The Project Preparation module and the dissertation from the MSc Project include a significant literature survey and peer review, and have assessment criteria related specifically to these skills.
B5: The Project dissertation is centrally focussed on assessing research and development skills.

Transferable and Generic Skills

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

C1. Use conventional and electronic indexing and search methods to find technical information

C2. Present technical information concisely in written and verbal forms to a range of audiences

C3. Work in a pair or in a small group on a given task, managing your own contribution and the overall task

C4. Work independently on a significant research project, managing time and risk in an effective manner

C5. Recognise legal and ethical issues of concern to business, professional bodies and society, and follow relevant guidelines to address these issues

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. The individual project includes independent research, project management and report writing.
C1-C3: Most modules include small group teaching, practical work with one or more lab/coursework partners, directed reading and coursework assignments with a literature review component. The Project Preparation module includes project management and the delivery of a project plan via a presentation. Small group teaching, including all practical work, and the individual project accommodate different learning styles.
C4: The individual project includes independent research and report writing.

C5: Legal, ethical and professional issues are covered in the Project Preparation module.

Assessment Methods

Coursework is generally assessed through written reports. The individual project is assessed by a dissertation of up to 15,000 words. The Project Preparation module is assessed via a literature review, as well as written and presentation versions of the project plan.

Subject Specific Practical Skills

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

D1. Use specialist tools for the design, realisation and evaluation of electrical power systems

Teaching and Learning Methods

Most modules include practical work, involving use of industry-standard specialised tools for the analysis and realisation of electric power flow in national networks, and for the design and optimisation of equipment for the electric power industry.

Assessment Methods

Assessment is based on coursework in the form of technical reports, device designs and realisation, software designs and implementation, and also the MSc dissertation.

Programme Structure

The programme structure table is below:

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

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.

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 technical modules cover core material for Energy and 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 three compulsory modules. The second semester consists of one compulsory module and three optional modules. In the compulsory module Research Methods and Project Preparation, which runs over both semesters, you will undertake appropriate preparatory study for your research project and you will also examine ethical and legal issues around professional practice. 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:
Three compulsory modules. Examinations are held in January.

Semester 2:
One compulsory module and three optional modules. Examinations are held in May/June.

Semester 1+2:
The Research Methods and Project Preparation module is compulsory.

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
ELEC6223 - compulsory

SEMESTER 1 + 2:

ELEC6259 - compulsory

SEMESTER 2 - select three optional modules

ELEC6222 - compulsory
ELEC6225 - optional
ELEC6226 - optional
ELEC6257 - optional
CENV6141 - optional
SESS6067 - optional

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 System Economics	7.5	Compulsory
ELEC6259	Research Methods and 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
CENV6141	Bioenergy	7.5	Optional
ELEC6225	High Voltage Insulation Systems	7.5	Optional
ELEC6257	Mechanical Power Transmission and Vibration (MSc)	7.5	Optional

ELEC6226	Power Electronics for DC Transmission	7.5	Optional
SESS6067	Renewable Energy from Environmental Flows: Wind, Wave and Tide	7.5	Optional

Progression Requirements

The programme follows the University's regulations for ***Progression, Determination and Classification of Results : Undergraduate and Integrated Masters Programmes*** and ***Progression, Determination and Classification of Results: Postgraduate Master's Programmes*** Any exemptions or variations to the University regulations, approved by AQSC are located in ***section VI of the University Calendar***.

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

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, School Programmes Committee OR providing comments to your student representative to feedback 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.

Further details on the University's quality assurance processes are given in the *Quality Handbook.*

Career Opportunities

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) and hold our own annual careers fair.

External Examiner(s) for the programme

Name: Professor A Manu Haddad - University of Cardiff

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 they take 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
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.
Stationery	You will be expected to provide your own dayto-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	Where a module specifies essential (or core) texts, these should be available in the library. Where possible, primary provision will be in electronic format. However, due to demand students may prefer to buy their own copies; these can be purchased from any source. Some modules suggest optional additional or (background) reading texts. The library will 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.

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.