MSc Energy and Power Systems Management

Programme Specification

Primary Purpose

Course management and quality assurance.

Secondary Purpose

Detailed information for students, staff and employers. Current students should refer to the related Course Handbook for further detail.

Disclaimer

The University of Portsmouth has checked the information given in this Programme Specification Supplement. We will endeavour to deliver the course in keeping with this Programme Specification Supplement; however, changes may sometimes be required arising from annual monitoring, student feedback, review and update of units and courses. Where this activity leads to significant changes to units and courses, there will be prior consultation of students and others, wherever possible, and the University will take all reasonable steps to minimize disruption to students. It is also possible that the University may not be able to offer a unit or course for reasons outside of its control, for example; the absence of a member of staff or low student registration numbers. Where this is the case, the University will endeavour to inform applicants and students as soon as possible. Where appropriate, the University will facilitate the transfer of affected students to another suitable course.

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Contents

Course Details

1. Named Awards

MSc Energy and Power Systems Management

2. Course Code (and UCAS Code if applicable)

C2562F/P

3. Awarding Body

University of Portsmouth

4. Teaching Institution

University of Portsmouth

5. Accrediting Body

The course will be submitted for accreditation from the IET (Institute of Engineering and Technology) in the next accreditation event

6. QAA Benchmark Groups

Engineering

7. Document Control Information

Version 1.2, July 2017

8. Effective Session

2018-19

9. Author

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10. Faculty

Technology

11. Department

School of Energy and Electronic Engineering

Curriculum

12. Educational Aims

The course aims to equip students to work as engineers, at an advanced level, in the fields of power systems technology, energy systems and management, renewable and sustainable energy, electrical machines and power electronics.

In addition, and more generally:

- Provide a challenging and stimulating study environment.

- Develop a range of key skills by means of opportunities provided in the study units.
- Accommodate student needs in relation to maximising their career potential by enabling them to develop knowledge, understanding and skills in their chosen subject area.

Being an MSc course, students are encouraged and expected to be able to reach a level of competence and professionalism where they can effectively integrate their technical and non-technical knowledge to solve a range of problems of a complex nature.

The course enables students to develop both analytical and design skills across the range of subjects. This is achieved through theoretical studies alongside practical design projects and laboratory experiments. Students also become conversant with industrial practice and familiar with industrial strength analysis and various simulation tools.

13. Reference Points

- University of Portsmouth curricula framework
- The university policy on Key Skills
- The scholarship and research expertise of academic members of staff
- Framework for Higher Education Qualifications (FHEQ)
- National Qualifications Framework
- UK Standard for Professional Engineering Competence
- QAA Code of Practice for the Assurance of Academic Quality and Standards in Higher Education
- QAA's Engineering Subject Benchmark and the Engineering Council's UK-SPEC

The core elements of the engineering benchmark, interpreted in the context of engineering, are:

- **Underpinning Science and Mathematics (US)**: Comprehensive knowledge and understanding of scientific principles and methodology appropriate to electronic design and related disciplines, to enable appreciation of its scientific and engineering context, and to support their understanding of historical, current, and future developments and technologies; with particular reference to principles governing: analogue circuits and systems; digital and microprocessor systems, including hardware description languages; control systems; telecommunication systems; software systems. An awareness of developing technologies, knowledge and understanding of mathematical principles and methods, mathematical and computer models appropriate to electronic design, and an appreciation of their limitations, with particular reference to methods required in analogue electronics, control systems, telecommunications and signal processing. Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their own discipline, and the ability to apply them effectively in engineering projects.
- **Engineering Analysis (E)**: Understanding of engineering principles and the ability to apply them to analyse key engineering processes and investigate new or emerging technologies; ability to identify, classify and describe the performance of systems and components through analytical methods and modelling techniques; ability to apply quantitative methods and computer software to electronic engineering problems and the ability to assess the limitations of particular cases; understanding of and ability to apply a systems approach to engineering problems in such areas as analogue circuits and systems; digital and microprocessor systems, including hardware description languages; control systems; telecommunication systems; software systems. Ability to extract data pertinent to an unfamiliar problem, and apply in its solution using computer based engineering tools when appropriate.
- **Design (D)**: Creation and development of an economically viable product or system to meet a defined need and an ability to generate innovative design to fulfil new needs. Knowledge, understanding and skills to: identify constraints including environmental and sustainability limitations, health and safety and risk assessment issues; understanding of customer and user needs; identify and manage cost drivers; use creativity and innovation; ensure fitness for purpose for all aspects of the problem and manage the design process. Wide knowledge and

comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations;

- **Economic, Social and Environmental Context (S)**: Knowledge and understanding of commercial and economic context of engineering processes; knowledge of management techniques which may be used to achieve engineering objectives, sustainable development; awareness of the framework of relevant legal requirements including personnel, health, safety, and risk (including environmental risk) issues; the ability to make general evaluations of commercial risks through some understanding of the basis of such risks; extensive knowledge and understanding of management and business practices, and their limitations, and how these may be applied appropriately; understanding of the need for a high level of professional and ethical conduct in engineering.
- **Engineering Practice (P)**: Solution of engineering problems to meet specified technical requirements as well as time and resource constraints. Knowledge of characteristics of particular equipment, processes, or products; extensive knowledge of materials and components; workshop and laboratory skills; engineering project management methods, including planning, monitoring, control and reporting; use of technical literature and other information sources; awareness of nature of intellectual property and contractual issues; understanding of appropriate codes of practice and industry standards; awareness of quality issues; ability to work with technical uncertainty; electronic design practices, including: electronic components and data sheets; use of laboratory instruments and equipment; pcb design, fabrication, assembly and test; design and proving of analogue and digital circuits, understanding or engineering practice and limitations, appreciation of new developments; ability to apply engineering techniques with consideration to commercial and industrial constraints.

The abbreviations in parentheses are used for cross reference purposes in the learning outcomes in 14.

14. General Learning Outcomes

Level 7

Master's degrees are awarded to students who have demonstrated:

- a systematic understanding of knowledge, and a critical awareness of current problems and/or new insights, much of which is at, or informed by, the forefront of their academic discipline, field of study or area of professional practice
- a comprehensive understanding of techniques applicable to their own research or advanced scholarship
- originality in the application of knowledge, together with a practical understanding of how established techniques of research and enquiry are used to create and interpret knowledge in the discipline
- conceptual understanding that enables the student:
  - to evaluate critically current research and advanced scholarship in the discipline
  - to evaluate methodologies and develop critiques of them and, where appropriate, to propose new hypotheses

Typically, holders of the qualification will be able to:

- deal with complex issues both systematically and creatively, make sound judgements in the absence of complete data, and communicate their conclusions clearly to specialist and non-specialist audiences
- demonstrate self-direction and originality in tackling and solving problems, and act autonomously in planning and implementing tasks at a professional or equivalent level
- continue to advance their knowledge and understanding, and to develop new skills to a high level

And holders will have:

- the qualities and transferable skills necessary for employment requiring:

- the exercise of initiative and personal responsibility
- decision-making in complex and unpredictable situations

- the independent learning ability required for continuing professional development

15. Learning Outcomes

A. Knowledge and Understanding of:

A.1 Energy Management, Economics and Risk Analysis (US, E, D, S, P)
A.2 Smart Grid Fundamentals (US, E, D, S, P)
A.3 Renewable and Alternative Energy (US, E, S, P)
A.4 Electrical Power systems Technology (US, E, D, P)
A.5 Electrical Machines and Drives (US, E, D, S, P)
A.6 Nuclear Technology (US, E, D, S, P)

B. Cognitive (Intellectual or Thinking) Skills, able to:

B.1 Systematically use knowledge of energy and power systems principles and underlying mathematics as tools for solving problems (US, E)
B.2 Apply critically, knowledge and understanding of energy and power systems creatively to generate practical products, systems and services (D, S, P)
B.3 Advise and make judgments on the management of and strategic use of energy and power systems (S, P)
B.4 Evaluate and justify the various methodological approaches to digital system design and select appropriate strategies to meet defined needs (E, D)
B.5 Plan, conduct, interpret and report on experiments (D, P)
B.6 Plan, manage, undertake, evaluate, interpret and report on a significant project (P)

C. Practical (Professional or Subject) Skills, able to:

C.1 Use systematically standard and specialist measuring instruments in appropriate situations to acquire data for identified purposes (P)
C.2 Use systematically computer systems for simulation, analysis and presentation within defined problem domains (D, E)
C.3 Model energy and power systems systematically using appropriate techniques and software (D, E)
C.4 Design, construct, test and evaluate systems applicable to energy and power systems (D, P, E)
C.5 Prepare schedules for the systematic building of complex energy and power systems (D, P)
C.6 Use appropriate codes of practice, informed by legislation and best practice as they apply to energy and power systems (D, P, S)

D. Transferable (Graduate and Employability) Skills, able to:

D.1 Work effectively individually and in group settings to achieve set goals (D, S)
D.2 Communicate effectively in writing and through graphical representations in professional and academic settings (D, S)
D.3 Apply appropriate mathematical techniques in analysis and problem solving (E, P)
D.4 Assess problem domains and formulate appropriate problem solving strategies (E, D, P)
D.5 Build on previous experience in order to generalise (D, P)
D.6 Use appropriate information technology to handle text, data, simulation, design and testing (P)

16. Learning and Teaching Strategies and Methods

The teaching and learning strategies aim to ensure that learning empowers the students to improve their levels of informed and independent critical analysis and idea dissemination. The most commonly adopted methods for achieving these aims consist of:

- Lectures are the primary means of conveying an academic overview of a particular topic area. This will be re-enforced and expanded through worked examples and/or case studies, a key

element of which will be plenary discussion. In this way students will gain from multiple viewpoints in the topic area, and experience in developing and defending coherent argument. Students will also be expected to use a range of ICT in enabling them to develop their understanding of the subject matter during their studies.

- Tutorials and case studies are normally delivered to smaller (than class sized) groups of students. These classes provide an opportunity for academics staff to resolve problems in the students' understanding. In addition to tutorials set by the unit lecturers, a weekly drop in tutorial session is time tabled as an additional support to students. Students can see their lecturers in their office regarding any enquiries about the materials covered in timetabled lectures and practical sessions.
- Laboratory Classes are used to introduce experimental techniques and practical methods. They provide an excellent opportunity for students to practice team-working and communication skills.
- VLE Provision is via the University's established Moodle system. As well as for the posting of lecture and tutorial material, Moodle will be used to host on-line discussions, useful videos and quizzes.
- Open assignments are used in a number of modules where students are required to seek additional information so that they can develop and demonstrate their understanding of the course material. Students will be required to work independently or in small groups.
- Oral and Poster Presentations may be included as part of coursework assignments. These presentations allow students to develop such communication skills.
- Formative Assessments do contribute to the final marks achieved for each module and also provide an opportunity for students to develop their critical evaluation skills and to monitor their own academic progress. They also provide a useful opportunity for lecturers to give feedback to the students and to monitor and improve the students' learning experience. These assessments will take the form of Closed book exams, open book exams, in-class tests and on-line tests during lectures; as well as evaluation and discussions relating to logbooks and equipment during laboratory classes. Students will have opportunities to develop their oral and presentation skills during tutorials and workshops.
- Individual Research Project is completed in the summer (for the main Sept intake) or in teaching block 2 (for Jan intake) of the degree programme. This project represents a substantial, individual research project on an aspect of sustainable power and energy. It is conducted under the supervision of a member of staff. This project provides excellent opportunity for the student to pull together every aspect of their development during the programme. Wherever possible the School will make the maximum use of industry-university links so that graduates will be aware of modern commercial and managerial practices appropriate to the engineering industry. This includes industrial speakers and engagement in real engineering projects set by industrial collaborators. The school is constantly reviewing its delivery mechanisms in order to identify further opportunities to enhance student learning.

17. Assessment Strategy

The assessment strategy adopted within this MSc course reflects the programme's emphasis on applied practice and the development of a range of skills. In all assessments students will be expected to demonstrate an appropriate level of understanding of the relevant theoretical issues. The design of the assessment strategy has regard for the following factors:

- Coursework Assignments, Laboratory Reports, Technical Reports, Oral and Poster Presentations may be used throughout the degree programme. They constitute the only or the major form of assessment in some modules. Coursework assignments are designed to give students the opportunity to demonstrate their understanding of the course material (particularly when the student is required to seek additional information). Students are also able to demonstrate their presentation and communication skills. Assignments can be conducted on an individual basis or in small groups.
- Computer Based Tests and Assessed Simulations are used in modules that involve a substantial computer-based element. These assessments give the students an opportunity to demonstrate their proficiency in a simulated professional situation.

- Peer Assessment may be used in modules that involve a substantial team-working element. Normally, students will moderate the final marks for the group project to reflect the contributions of different team member to encourage full an equal participation by each student. Students may also peer review other students' coursework to develop their critical thinking skills, but this case the quality of the peer review is assessed.
- The Individual Research Project/ Dissertation is the largest individual project. The project is assessed via a written dissertation

18. Course Structure, Progression and Award Requirements

See Unit Web Search[1] for full details on the course structure and units

This is a 1 - or 3 - year programme depending on whether a student elects for full-time or part-time study. The course normally consists of 20 credit point units, where 20 credits represent 200 hours of study time and usually includes up to 48 hours of time-tabled activities. The course offers a total 180 credits for the MSc award and ends with a 60 credit individual project. A Postgraduate Diploma exit award requires 120 credits. A Postgraduate Certificate exit award requires 60 credits from the taught units. The individual project may be undertaken at the University or, given agreement on supervision arrangements, in UK industry.

F/T students study 3 units in teaching block 1 (TB1) from Sept.-Dec. and 3 units in TB2 from Jan. – May, followed by the MSc project from June-Sept. TB1 units' exam take place in Dec. and TB2 exams in June. P/T students study 3 units in year 1, one unit in TB1 and two units in TB2. In year 2, they study two units in TB1 and one unit in TB2. The project is done in year 3 from Sept.-Sept.

19. Employability Statement

The course is designed for motivated graduates with electrical/electronic or related engineering or scientific backgrounds to meet the increasing demand from the energy and power industry. The MSc Energy and Power Systems Management course is for newly qualified and practising engineers and those considering a career in engineering who aim to develop their academic and professional excellence and wish to extend their knowledge and skills in this exciting field. The programme has been carefully developed for graduates with electrical/electronic or related background to meet the increasing demand from the energy and power industry. There are tremendous opportunities for you to make a significant impact that will shape the future in the field of energy and power generation, transmission and management.

- The final project allows students to investigate a significant digital systems problem and propose results. This may (subject to availability) be industrial project.
- Seminars from experts in the field from academia and industry will, subject to availability, be arranged during the academic year and students will be encouraged to attend.
- All units have aspects which contribute to the development of employability skills and/or research skills for further study.

Course Management

20. Support for Student Learning

- The Course is managed by a Course Leader.
- Extensive induction programme introduces the student to the University and their course.
- Each student has a personal tutor, responsible for pastoral support and guidance.
- In addition to class tutorials, extra support is given to individual students via time tabled Drop-in tutorials.
- University support services include careers, financial advice, housing, counselling etc.

[1] www.port.ac.uk/unitwebsearch

- The Academic Skills Unit (ASK).
- The Additional Support and Disability Advice Centre (ASDAC).
- Excellent library facilities.
- The University of Portsmouth has consistently been awarded an excellent rating for student support and guidance in a number of Quality Assurance Agency inspections.
- Student course and unit handbooks provide information about the course structure and University regulations etc.
- Feedback is provided for all assessments.

21. Admissions Criteria

A. Academic Admissions Criteria

Standard University rules apply and this will normally mean that candidates are in possession of an honours degree with at least a classification of 2.2 or equivalent and in a relevant discipline. All other qualifications or experience presented must be forwarded to the Admissions Tutor for a University of Portsmouth decision. English – IELTS 6 or TOEFL 550 (215 computer-based).

B. Disability

The University makes no distinction in its admissions policy with regard to disability and will endeavour to make all reasonable adjustments in order to make it possible for students to study at Portsmouth on a course of their choice.

22. Evaluation and Enhancement of Standards and Quality in Learning and Teaching

A. Mechanisms for Review and Evaluation

- Course Leader's Annual Standards and Quality Evaluative Review.
- Head of School's Annual Standards and Quality Evaluative Review.
- Unit and Course Level student feedback considered at Board of Studies.
- Unit Assessment Board consideration of student performance for each programme.
- Annual Standards and Quality Reports to Board of Studies, including consideration of Subject and Award External Examiner Reports.
- Periodic Programme Review.
- Student Representatives and Student/Staff Consultative Committees.
- National Student Survey.
- Staff Performance and Development Review.
- Peer Review and Development Framework.
- Faculty Learning and Teaching Committee.

B. Responsibilities for Monitoring and Evaluation

- Unit Co-ordinators for unit content and delivery.
- Course Leader for day-to-day running of course.
- Board of Studies with overall responsibilities for operation and content of course.
- Head of School.
- Associate Dean (Academic).
- Associate Dean (Students).
- Quality Assurance Committee.
- Unit, Award and Progression Board of Examiners.

C. Mechanisms for Gaining Student Feedback

- Student Representation on Board of Studies.
- Student Staff Consultative Committees.
- Unit and Course level student feedback questionnaires.
- University participates in external student surveys, eg National Student Survey (NSS), Postgraduate Research Experience Survey (PRES) and International Student Barometer (ISB).

D. Staff Development Priorities

- Academic staff undertake activities related to research, scholarship, teaching and learning and student support and guidance.
- Annual staff performance and development reviews match development to needs.
- Managers undertake a variety of management development programmes.
- All academic staff encouraged to seek Higher Education Academy membership.
- Academic staff new to teaching required to undertake Initial Professional Development Programme (iPROF).
- Support Staff are encouraged to attend short courses in areas such as minute taking, and specific IT packages.
- The School is an IET Academic Partner.

23. Assessment Regulations

The current University of Portsmouth academic regulations will apply to this programme (*see Assessment and Regulations*[2]).

24. Role of Externals

Subject External Examiners who will:

- Oversee unit assessment and usually attend Unit Assessment Boards
- Review unit assessment strategy
- Sample assessment artefacts
- Present report to Unit Assessment Boards

Award External Examiners (usually also a Subject External Examiner) who will:

- Oversee and attend Award/Progression Boards
- Scrutinise and endorse the outcomes of assessment
- Ensure that the standard of the award is maintained at a level comparable with that of similar awards elsewhere in the United Kingdom

25. Indicators of Standards and Quality

A. Professional Accreditation/Recognition

The School of Energy and Electronic Engineering will apply for accreditation for this course under UK-SPEC by the Institution of Engineering and Technology (IET) in the next accreditation event.

B. Periodic Programme Review (or equivalent)

Successful Periodic Programme Review 11 December 2012, confirming both fitness of purpose of curriculum and effectiveness of annual monitoring and review processes.

[2] www.port.ac.uk/departments/services/academicregistry/qualitymanagementdivision/assessmentandregulations/

C. Quality Assurance Agency

QAA Higher Education Review, March 2015, judgements about standards and quality meet UK expectations (*for full report see Higher Education Review of the University of Portsmouth, March 2015*[3]).

D. Others

The School of Engineering is an IET Academic Partner.

26. Further Information

Further information may be found in:

- Student Handbook
- University of Portsmouth Curriculum Framework Document
- University of Portsmouth Prospectus
- University of Portsmouth[4] and School/Department[5] websites

[3] http://www.qaa.ac.uk/docs/qaa/reports/university-of-portsmouth-her-15.pdf?sfvrsn=5071f581_4

[4] www.port.ac.uk/

[5] http://www.port.ac.uk/school-of-engineering/