PROGRAMME SPECIFICATION

PROGRAMME TITLE: PG Diploma/MSc ENERGY MANAGEMENT (C133PJ/136PJ) (C633PJ/C636PJ)

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 he or she takes full advantage of the learning opportunities provided. More detailed information on the specific learning outcomes, content and the learning, teaching and assessment methods of each module can be found at http://www.engineering.ulster.ac.uk/modules and in the programme handbook.

AWARDING INSTITUTION/BODY: University of Ulster
TEACHING INSTITUTION: University of Ulster
LOCATION: Jordanstown Campus
PROGRAMME ACCREDITED BY: Energy Institute/CIBSE
FINAL AWARD: PG Diploma/MSc Energy Management
MODE OF ATTENDANCE: Full-time & Part-time
SPECIALISMS: N/A
PROGRAMME CODE: N/A
HESA CODE: Engineering

EDUCATIONAL AIMS AND OBJECTIVES OF THE PROGRAMME

The aims of the Post Graduate Diploma are:

- to provide an opportunity for graduates and professionals to acquire knowledge of energy management and to develop skills appropriate to its practice.
- to encourage efficient and effective professional interfacing in the process of designing, producing and managing complex building systems and environments.
- to produce graduates with an increased capacity for understanding theoretical concepts and contemporary issues of various aspects of energy.
- to produce graduates who have an in depth knowledge and understanding of the scientific, technological, and socio-economic principles and techniques upon which energy management is founded.
- to produce graduates with an extended capability to apply knowledge and skills in identifying, developing, analysing and appraising solutions to a range of energy problems.
- to enable graduates to apply the skills and knowledge acquired in the programme in a mature professional manner to a field of work appropriate to their chosen career.

The additional aims of the MSc are:

- to produce graduates who have experience of a supervised independent investigation in an area related to energy technology, using an appropriate methodology
- to develop graduates with the capability to pursue a career in research and development through independence, self motivation and initiative in research

MAIN LEARNING OUTCOMES
The programme provides opportunities for students to achieve and demonstrate the following learning.

### 11K KNOWLEDGE AND UNDERSTANDING OF SUBJECT

**K1** To distinguish between current energy technologies based upon both renewable and non-renewable resources and understand how the resources can be managed with a view to future sustainability.

**K2** To recognise the finite nature of fossil fuel resources, the technology involved in the use of fossil fuel resources and the effects these have on the environment.

**K3** To identify how renewable energy technologies and the cleaner use of fossil fuels with existing methods of electricity generation can be integrated into existing energy facilities.

**K4** To comprehend the inter-relationship between the key thermodynamic processes, energy efficiency and energy management to successfully reduce process and building energy needs.

**K5** To identify the essential aspects of scientific investigation, analysis and the reporting of results.

**Learning and Teaching Methods:** Subject related qualities are acquired mainly through on-line lectures, seminars, directed reading, on-line MPEGs, WebCT-based resources, case studies and project work.

**Assessment Methods:** Testing of the knowledge base is principally through, coursework assignments, on-line self-assessment and evaluation tools, and project dissertation.

### 11I INTELLECTUAL QUALITIES

**I1** Analyse and compare energy technologies with a view to increasing process energy efficiency and building energy efficiency and reducing costs.

**I2** Relate how energy efficiency, renewable energy and conventional technologies can create a holistic energy use solution.

**I3** Appraise and evaluate current energy technologies and understand how these resources may be managed with a view to future sustainability and demonstrate how the management of energy can benefit industry financially in the short term and influence sustainability in the longer term.

**I4** Justify and defend the importance and cost-benefits of energy efficiency strategies to minimise the auxiliary energy load prior to specifying new and renewable energy technologies.

**I5** Interpret and evaluate data and information from a variety of sources related to renewable energy technologies to contribute to the development and introduction of new and novel technologies and solutions.

**I6** Select, and apply appropriate research methodologies to an independent investigation.

**I7** Plan, conduct and report a programme of research.

**I8** Assess cost-benefits, safety, reliability, visual/aesthetic/environmental impact and public risk, of renewable energy systems to enable appropriate steps to be taken to manage these conflicting risks.

**Learning and Teaching Methods:** Intellectual qualities are developed mainly through on-line discussion groups and design projects.

**Assessment Methods:** Assessment is focussed on coursework assignments, laboratory and design project reports, on-line self-assessment and evaluation tools, and research dissertation.
### PROFESSIONAL/PRACTICAL SKILLS

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>P1</td>
<td>Select and apply appropriate scientific based techniques and applications for modelling and devising energy technology solutions.</td>
</tr>
<tr>
<td>P2</td>
<td>Prepare and interpret technical reports and drawings related to energy system design.</td>
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<tr>
<td>P3</td>
<td>Source, critically review and use research material.</td>
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<tr>
<td>P4</td>
<td>Plan and execute a significant programme of research and prepare a substantial thesis.</td>
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<tr>
<td>P5</td>
<td>Use relevant measurement equipment /apparatus suitable for investigating performance of energy systems.</td>
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<tr>
<td>P6</td>
<td>Devise a practical solution to an energy supply problem based on often conflicting cost benefits and environmental impact of renewable energy technologies, clean conventional technologies and energy efficiency.</td>
</tr>
<tr>
<td>P7</td>
<td>Analyse and synthesise advanced problems, processes and costs of various aspects of energy management and energy efficiency to design a practical yet environmentally benign domestic/non-domestic energy system.</td>
</tr>
</tbody>
</table>

**Learning and Teaching Methods:** Professional and practical skills are primarily acquired through on-line discussion groups, individual case-based coursework design projects and the dissertation.

**Assessment Methods:** Assessment is focussed on coursework assignments, laboratory and design project reports, on-line self-assessment and evaluation tools, and research dissertation.

### TRANSFERABLE/KEY SKILLS

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>T1</td>
<td>Communicate effectively to engineering and non-engineering professionals.</td>
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<tr>
<td>T2</td>
<td>Exercise informed judgement across a range of functions.</td>
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<tr>
<td>T3</td>
<td>Collect, analyse and present data using a range of computer and interfacing techniques.</td>
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<tr>
<td>T4</td>
<td>Manage time and resources effectively.</td>
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<tr>
<td>T5</td>
<td>Transfer and apply diagnostic and creative skills.</td>
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<tr>
<td>T6</td>
<td>Develop the facility for independent learning, open mindedness and critical enquiry.</td>
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<tr>
<td>T7</td>
<td>Demonstrate creativity and innovation in problem solving.</td>
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</table>

**Learning and Teaching Methods:** Transferable and key skills are delivered throughout the programme through on-line lectures, laboratory work and project work.

**Assessment Methods:** Assessment is principally coursework assignments and research dissertation.
### MODULE OUTCOME MAP

**Please Note:** The matrix displays only the main measurable outcomes. There may be other outcomes detailed in the module descriptions (e.g. attitudes and behaviours) which are not assessed.

<table>
<thead>
<tr>
<th>MODULE TITLES</th>
<th>OUTCOMES</th>
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<tbody>
<tr>
<td><strong>CODE</strong></td>
<td>K1</td>
</tr>
<tr>
<td>Energy Resources and Supply</td>
<td>ENE805J1X</td>
</tr>
<tr>
<td>Efficient Energy Utilisation</td>
<td>ENE806J2X</td>
</tr>
<tr>
<td>Energy Management</td>
<td>ENE808J1X</td>
</tr>
<tr>
<td>Renewable Energy Integration and Energy Efficiency in the Built Environment</td>
<td>ENE801J2X</td>
</tr>
<tr>
<td>Energy Management Project</td>
<td>ENE804J4X</td>
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</table>
12 PROGRAMME STRUCTURE AND REQUIREMENTS FOR THE AWARD

The programme is a linked programme of awards leading to either a Post Graduate Diploma or MSc Renewable Energy. The programme is offered in part-time mode and conforms to the University’s modular requirements. An accumulation of 120 credit points are necessary to complete the PG Diploma and MSc programmes respectively. Progression, transfer and award criteria are outlined in Section 16. Details of the modules and their corresponding credit level and points are listed below.

<table>
<thead>
<tr>
<th>Module Title</th>
<th>Module Code</th>
<th>Credit Level</th>
<th>Credit Points</th>
<th>Module Status</th>
<th>Awards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy Resources and Supply</td>
<td>ENE805J1X</td>
<td>M</td>
<td>30</td>
<td>Compulsory</td>
<td>}</td>
</tr>
<tr>
<td>Efficient Energy Utilisation</td>
<td>ENE806J2X</td>
<td>M</td>
<td>30</td>
<td>Compulsory</td>
<td>} All four</td>
</tr>
<tr>
<td>Energy Management</td>
<td>ENE808J1X</td>
<td>M</td>
<td>30</td>
<td>Compulsory</td>
<td>} for PgD</td>
</tr>
<tr>
<td>Renewable Energy Integration and Energy Efficiency in the Built Environment</td>
<td>ENE801J2X</td>
<td>M</td>
<td>30</td>
<td>Compulsory</td>
<td>}</td>
</tr>
<tr>
<td>Energy Management Project</td>
<td>ENE804J4X</td>
<td>M</td>
<td>60</td>
<td>Compulsory</td>
<td>All four above plus this for MSc</td>
</tr>
</tbody>
</table>

13 SUPPORT FOR STUDENTS AND THEIR LEARNING

Students and their learning are supported in a number of ways:

- A comprehensive WebCT induction programme two weeks prior to the start of their first semester for new students
- School and Programme handbooks and Module Booklets
- Open access to Course Director and academic staff (informal communication between staff and students via email and WebCT Discussion area)
- Student representation on Course Committee
- Opportunity to address general programme concerns through the student/staff consultative committees
- Appointment of personal studies advisors for each student
- Opportunity for feedback on academic progress at end of each semester
- Guidance and information on safety related matters
- Student e-mail accounts and full access to the Internet and WebCT
- Pre-authentication to ATHENS library database on login to WebCT
- Involvement in live research programmes
- The Sport and Recreation Department provide facilities and opportunities for a wide range of recreational and sporting activity
- The University has protocols for assessment of students with special needs
- Library staff for example will help source books and articles, or use of the Literature Online website, whilst Student Affairs staff will offer advice on financial, personal or learning issues.
- The student affairs department is present to ensure students get the maximum benefit from university life. "Our purpose is to assist students, not only in relation to academic achievement, but in their social and personal development, and to help them plan their future careers." http://www.ulst.ac.uk/studaffairs/
- The Student Records System displays a student’s university record, so that they may check their personal details, programme and module enrolments as well as their academic record.

PG Dip/MSc Renewable Energy
CRITERIA FOR ADMISSION TO THE PROGRAMME

Applicants must satisfy the University’s general entry requirements and specific requirements for admission to the programme are detailed below:

Applicants should normally possess:

- an honours degree in a Science or Engineering discipline from a recognised institution or,
- a degree or better in a science or engineering discipline from a recognised institution and have been in related professional employment for at least one year.

Other qualifications deemed by the Senate of the University of Ulster to be equivalent may be considered. It is part of the philosophy of the University to give accreditation for prior learning and to encourage flexibility where students transfer between institutions during a programme for occupational or other reasons.
The following mechanisms are used to maintain, evaluate and improve the quality of teaching and learning:

Mechanisms for review and evaluation of teaching, learning, assessment, the curriculum and outcome standards:

- Formal student feedback is sought on the content and delivery of each module via a free response method or a module forum.
- Upon completion the module team reviews each module. Statistical information, student feedback, content, delivery, assessment methods, resources and proposed enhancements are considered.
- Annual Subject Monitoring, including the views of the External Examiner and module evaluation.
- Staff teaching performance is monitored annually through student questionnaires. In addition, staff members participate in peer observation of their teaching. Staff appraisal is carried out on a 2 year cycle with attention given to the development needs of the individual staff member.

Committees with responsibilities for monitoring and evaluating quality:

- Regular student-staff consultative meetings provide the means of highlighting any difficulties, relating to the programme.
- Course Committees.
- Board of Examiners.
- School Board.
- At school, faculty and University levels there are active Learning and Teaching, and Quality Assurance and Enhancement (QAEC) Committees responsible for co-ordinating and monitoring developments and initiatives relating to innovative methods for delivery, technology mediated learning, as well as general resource issues. In addition, QAEC is responsible for regulating faculty codes of practice relating to programme management and delivery.

Mechanisms for gaining student feedback on the quality of their learning experience:

- Student-Staff Consultative Committee
- Students are given opportunity to be represented at course committee, School and Faculty board
- Module evaluation questionnaires/module forum/module free response

Staff development includes:

- Updating in the subject through research and scholarly activities
- The University has an active Staff Development Unit providing specific training/development for staff. Specifically, all new staff members (opportunity is also provided for existing staff) have to pursue a formal teaching qualification (Postgraduate Certificate) and are encouraged to apply for membership of the HEA.
- Consultancy.
16 REGULATION OF STANDARDS

Assessment rules

Award of Postgraduate Diploma:
Candidates who have successfully completed 4 taught modules (pass mark 50% for each module). The Board of Examiners may recommend a Pass with Commendation to a candidate who has successfully completed the 4 taught modules and gained an overall pass mark of not less than 70% across the eight modules.

Transfer to the MSc programme
Candidates who achieve an average mark of 50% in both examination and coursework for each of the 4 modules will be eligible to transfer onto the Masters degree programme.

Award of the MSc
Candidates who have successfully completed 4 taught modules (pass mark 50% for each module) and the dissertation module (pass mark 50%) will be eligible for the award. The Board of Examiners may recommend the award of MSc with Distinction to candidates who pass all modules, gain an overall pass mark of not less than 70% and have obtained at least 70% in modules to the value of 90 credit points (to include Dissertation)

External examiners
One external examiner is appointed for the programme. The role of the external examiner is to moderate the assessment process, ensure appropriate standards of final awards and ensure that accuracy and consistency of assessment has been applied. The external examiner is required to submit a report on the standard of the programme, assessment and student performance, comparability of these standards with those of similar programmes and the administration of the assessment schemes and processes. Detailed duties are as specified in the current University of Ulster “Handbook for External Examiners”
The subject which included Energy (i.e. Building) achieved a 21 point grading in the 1998 HEFCE/QAA Assessment of Quality exercise.

Teaching staff are encouraged to become accredited members of the HEA. To date some 75% of teaching staff have fulfilled the requirements through completion of the PG Certificate in University Teaching (PGCHEP) or its former guises.

Unit of Assessment 33 Built Environment of which the majority of teaching staff on the programme are members achieved a Grade 5 in the 2001 Research Assessment Exercise.

A significant number of staff hold full membership of appropriate professional bodies such as CIBSE and the Energy Institute.

Graduates from the programme have had excellent employment histories and are employed in energy consultancies and research institutes.