

**PROGRAMME SPECIFICATION**

<b>1</b>	<b>Awarding Institution</b>	Newcastle University
<b>2</b>	<b>Teaching Institution</b>	Newcastle University
<b>3</b>	<b>Final Award</b>	MSc / Diploma / Certificate
<b>4</b>	<b>Programme Title</b>	Power Distribution Engineering
<b>5</b>	<b>UCAS/Programme Code</b>	5129 / 3404 / 3035
<b>6</b>	<b>Programme Accreditation</b>	IET
<b>7</b>	<b>QAA Subject Benchmark(s)</b>	
<b>8</b>	<b>FHEQ Level</b>	M
<b>9</b>	<b>Date written/revised</b>	November 2011

**10 Programme Aims**

The programme aims are:

- To educate engineers to understand power distribution engineering as an ordered academic discipline at the post-graduate level by providing them with extensive experience of recent industrial applications and the relevant theoretical background
- To provide candidates with a flexible learning environment which will increase access for employees and prepare them for lifelong learning
- To increase the students' skills of analysis, synthesis and evaluation in order to solve problems in the field of power distribution engineering
- To develop the students' transferable skills (communications, planning, time management, report writing etc.)
- To increase the pool of qualified engineers in power distribution in the UK as required by the UK power industry
- To enhance the student's future career prospects
- To provide a programme which meets the FHEQ at Masters level and which takes appropriate account of the subject benchmark statements in Engineering

More specifically, the aims of each of the individual MSc/ Postgraduate Diploma/ Postgraduate Certificate programmes are:

Certificate:

- To provide a well balanced understanding of the essential disciplines of power distribution engineering including a basic understanding of network design, the role of the asset manager, safety considerations and the legislative framework within which the industry operates.
- To develop skills of communication, group work, analysis, synthesis, evaluation and review and to develop the students' on-line competencies.

Diploma:

In addition to the aims of the Certificate

- To provide a more detailed understanding of the advanced disciplines required by the power distribution engineer
- To develop further the skills of communication, group work, analysis, synthesis, evaluation and review and the students' on-line competencies.

M.Sc.

In addition to the aims of the Diploma

- To develop the student's ability to select, solve, analyse and delineate a problem in power distribution engineering taking account of the principles already enunciated in the Diploma.

## 11 Learning Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the following areas. The programme outcomes have references to the benchmark statements for Engineering.

### Knowledge and Understanding

A successful student will have gained and be able to demonstrate:

- A1 The student will understand the need for the mathematical representation of sinusoidal electrical quantities and be able to perform power system calculations using vectors, complex numbers and matrices.
  - A2 The student will have been educated to the best current practice in the core disciplines and the more advanced subjects of power distribution engineering so that they have an understanding of the principles of electric power distribution, including:
  - A3 An understanding of distribution network design principles.
  - A4 An appreciation of the legislative framework within which the industry is regulated
  - A5 An understanding of the issues concerned with the maintenance and operation of power distribution equipment
  - A6 A familiarity with the use of a variety of monitoring techniques to assess the condition and maintenance requirements of plant and equipment
  - A7 An awareness of the needs of current and future communications for automation of the distribution network, including radio communications
- Dependent on the areas of specialist knowledge made available to him/her from the selected options, the student will also be able to:
- A8 have a grasp of switch-gear operations, the standards applied to them and their modes of failure
  - A9 understand the design and operation of network protection systems and perform relevant calculation exercises
  - A10 understand the design and operation of modern power cables from a theoretical and practical standpoint
  - A11 understand the operation and maintenance requirements of power overhead lines
  - A12 understand the principles of operation of synchronous and induction generators and appreciate the technical challenges and opportunities presented by distributed generation.
  - A13 understand the design of earthing systems and the relevant practical factors
  - A14 understand how transformers work, their specification protection and failure methods

### Teaching and Learning Methods

The primary means of imparting knowledge and understanding (A1-A15) is lectures during the 2-day face-to-face teaching for each module and the corresponding Distributed Learning material that includes many worked examples, exercises and design projects to enable

students to check their learning and extend their knowledge. The students also undertake an independent project under the supervision of a member of academic staff.

Throughout the course students are encouraged to supplement taught material by independent reading for which they are given extensive support and guidance on reading material and how to use them.

In addition, a resource-based Mathematics learning pack has been developed to enable students, particularly those without A-level Maths, to attain A1.

### **Assessment Strategy**

Knowledge and understanding of the subject is primarily assessed by unseen written examinations (A1 to A15) designed to assess a candidate's understanding of the fundamental principles of the subject. This is supplemented by an in-module assessment, which may take the form of a group activity, and a post-module individual assignment to assess the ability to apply knowledge and understanding gained in that particular module.

The individual project is designed to assess the ability to apply knowledge and understanding (A1 to A15) to new cases and situations.

### **Intellectual Skills**

On completing the programme students should be able to:

B1 Select and apply appropriate methods for modelling and analysing problems in Power Distribution Engineering.

B2 Develop and produce appropriate solutions for practical power distribution problems through the application of knowledge and understanding in power distribution

B3 Create power distribution network designs through the synthesis of ideas and information from a wide range of relevant sources

B4 Undertake critical appraisal of information from a wide range of sources relevant to the field.

### **Teaching and Learning Methods**

B1-B4 are taught through a combination of direct face to face teaching, distributed learning, course assignments and project work.

Students are also encouraged to learn by doing, i.e. by performing calculations, using appropriate software packages, undertaking design projects and presenting their own analysis.

### **Assessment Strategy**

These skills are assessed by unseen written examination (B1, B2), in-module assessment (B1, B2), post-module individual assignment (B1-B4) and project work (B1-B4).

### **Practical Skills**

On completing the programme students should be able to:

C1 Use power system analysis software packages to perform network load flow calculations, fault level calculations, harmonic distortion calculations, etc.

C2 Use evaluation and problem solving skills relevant to power distribution engineering.

C3 Search for, retrieve and evaluate information from a wide range of relevant sources and be able to summarise and draw appropriate conclusions from that information

C4 Plan, execute and report a detailed research project related to an area of Power Distribution Engineering

<b>Teaching and Learning Methods</b>
Acquisition of C1-C4 is through a combination of direct face to face teaching, distributed learning, course assignments and project work.
<b>Assessment Strategy</b>
Practical skills (C1-C4) are necessary for the successful completion of the distributed learning material, post-module assignments and the MSc project. More specifically, these are assessed through the post module individual assignments (C1 & C2) and project work (C3 & C4).
<b>Transferable/Key Skills</b>
A successful student will be able to:
D1 demonstrate improved transferable skills in terms of communication, group work, planning and the ability to manage his/her own learning, relevant to a post graduate degree
D2 obtain distributed learning, computer literacy and on-line competencies
<b>Teaching and Learning Methods</b>
Key (transferable) expertise in problem-solving and time-management are developed throughout the Distributed Learning material (D1) and supported by study skills sessions (D1). Teamwork, communication and presentation skills are developed through the use of in module group exercises (D1).  On-line competences are encouraged and developed through the Distributed Learning material, module assignments (D2).
<b>Assessment Strategy</b>
These skills (D1 & D2) are not explicitly assessed, but are needed for the successful completion of all the taught modules and the individual project.

<b>12 Programme Curriculum, Structure and Features</b>
<b>Basic structure of the programme</b>
<p>All the programmes are modular. Part-time MSc candidates programme must complete the four core modules of the programme in year 1 (60 credits) and a further four optional modules in year 2 (60 credits), as approved by the Degree Programme Director, before being allowed to proceed to year 3 and their individual research project (60 credits). The Certificate equates to the first year of work (a total of 60 credits) and the Diploma to the first two years (a total of 120 credits). The programme may also be studied over one year as a full-time MSc course (a total of 180 credits).</p> <p>None of the material is taught at the undergraduate level, with the exception of some elements of Module EEE8044.</p> <p>Full-time delegates will undertake modules at approximately one-monthly intervals, excluding the summer period. Part-time delegates will undertake modules at approximately two-monthly intervals, excluding the summer period. For part-time MSc students, the individual 60-credit project will be carried out in the third year.</p> <p>Students will normally enter the course once a year in September, although some flexibility is offered to part-time students at the discretion of the Degree Programme Director.</p> <p>All modules will have the same structure. The first two days of the module will be directly taught at the School of Electrical, Electronic and Computer Engineering. The remainder of the module will be presented to students as distributed learning to be completed before the module examination.</p>

An important advantage of this structure is that it allows the part-time students to get to know each other and the module leader during the two day face-to-face teaching period before they proceed to the distributed learning component of the module. This will greatly improve the communication between all parties during the distributed learning phase and help create the necessary feeling of community.

The students will receive the distributed learning material in a standardised paper based format. A copy of all teaching material will also be made available on Blackboard. Students will be encouraged to ask questions and take part in email discussions with their fellow students, the Module Leader and the Degree Programme Director.

For part-time students, the four modules comprising the first (or Certificate) year are compulsory. The first four form the basis upon which Diploma and M.Sc. delegates can build their specialist knowledge. A choice of specialist modules is offered in the second (or Diploma) year, which permits delegates to tailor their education to their own (and their company's) needs. In the Diploma year, delegates must complete a further four modules from the remaining modules on offer, as approved by the Degree Programme Director.

Full-time students will be required to take the four core compulsory modules plus a further four modules, as approved by the Degree Programme Director.

The normal structure of the three year part-time scheme can be summarised as follows:

Programme	Year 1	Year 2	Year 3
<b>Certificate</b>	4 compulsory modules	n/a	n/a
<b>Diploma</b>	4 compulsory modules	4 optional modules	n/a
<b>M.Sc.</b>	4 compulsory modules	4 optional modules	Individual Project

The normal structure of the one year full-time MSc can be summarised as follows:

Programme	Year 1
<b>M.Sc.</b>	4 compulsory modules + 4 optional modules + Individual Project

All post-graduate certificate students must complete four modules each worth 15 credits to gain 60 credits.

All MSc and post-graduate diploma students must complete eight modules each worth 15 credits to gain 120 credits.

In addition MSc students must complete an independent investigation written along scientific principles and submit a dissertation to gain an additional 60 credits

Part-time Diploma Students must complete and pass the first four compulsory modules before proceeding to the second year.

Part-time MSc students must complete and pass the first four compulsory modules before proceeding to the second year and a further four optional modules in their second year before proceeding to the dissertation.

#### **Key features of the programme (including what makes the programme distinctive)**

All programmes (MSc, Diploma and Certificate) are modular and all will be offered to part-time students (3 years, 2 years and 1 year, respectively). Full-time students will not be offered the Diploma and Certificate programmes and will only be registered for the MSc programme.

Each module is delivered through a mix of traditional face-to-face teaching and distributed

learning to provide the flexibility demanded by both the student and his employer.

Another important feature of the programme is the use of industrial lecturers to provide students with an updated instruction and appreciation of real life issues and concerns in an area of industry where skills are in great demand.

**Programme regulations (link to on-line version)**

<http://www.ncl.ac.uk/regulations/programme/2011-2012/eece.php>

**13 Criteria for admission**

Normally a good BEng Honours degree or equivalent in electrical and electronic engineering, electronic communications, computer engineering or a related subject.

Candidates with non-standard academic background but with relevant industrial experience will also be considered for entry to the Programme.

Applicants whose first language is not English should normally hold IELTS 6.0 or equivalent.

**14 Support for Student Learning**

*Induction*

During the first week of the first semester students attend an induction programme. New students will be given a general introduction to University life and the University's principle support services and general information about the School and their programme, as described in the Degree Programme Handbook. New and continuing students will be given detailed programme information and the timetable of lectures/practicals/labs/ tutorials/etc. The International Office offers an additional induction programme for overseas students.

*Study skills support*

Students will learn a range of Personal Transferable Skills, including Study Skills, as outlined in the Programme Specification. Some of this material, e.g. time management is covered in the appropriate Induction Programme. Students are explicitly tutored on their approach to both group and individual projects.

Numeracy support is available through Maths Aid and help with academic writing is available from the Writing Centre (further information is available from the Robinson Library).

*Academic support*

The initial point of contact for a student is with a lecturer or module leader, or their tutor (see below) for more generic issues. Thereafter the Degree Programme Director or Head of School may be consulted. Issues relating to the programme may be raised at the Staff-Student Committee, and/or at the Board of Studies.

*Pastoral support*

All students are assigned a personal tutor whose responsibility is to monitor the academic performance and overall well-being of their tutees. In addition the University offers a range of support services, including one-to-one counselling and guidance or group sessions / workshops on a range of topics, such as emotional issues e.g. Stress and anxiety, student finance and budgeting, disability matters etc. There is specialist support available for students with dyslexia and mental health issues. Furthermore, the Union Society operates a Student Advice Centre, which can provide advocacy and support to students on a range of topics including housing, debt, legal issues etc.

*Support for students with disabilities*

The University's Disability Support Service provides help and advice for disabled students at the University - and those thinking of coming to Newcastle. It provides individuals with: advice about the University's facilities, services and the accessibility of campus; details about the

technical support available; guidance in study skills and advice on financial support arrangements; a resources room with equipment and software to assist students in their studies.

#### *Learning resources*

The University's main learning resources are provided by the Robinson and Walton Libraries (for books, journals, online resources), and Information Systems and Services, which supports campus-wide computing facilities.

All new students whose first language is not English are required to take an English Language Proficiency Test. This is administered by INTO Newcastle University Centre on behalf of Newcastle University. Where appropriate, in-session language training can be provided. The INTO Newcastle University Centre houses a range of resources which may be particularly appropriate for those interested in an Erasmus exchange.

### **15 Methods for evaluating and improving the quality and standards of teaching and learning**

#### *Module reviews*

All modules are subject to review by questionnaires which are considered by the Board of Studies. Changes to, or the introduction of new, modules are considered at the Board of Studies and/or the School Teaching and Learning Committee. Student opinion is sought at the Staff-Student Committee and/or the Board of Studies. New modules and major changes to existing modules are subject to approval by the Faculty Teaching and Learning Committee.

#### *Programme reviews*

The Board of Studies conducts an Annual Monitoring and Review of the degree programme and reports to Faculty Teaching and Learning Committee. The FTLC takes an overview of all programmes within the Faculty and reports any Faculty or institutional issues to the University Teaching and Learning Committee.

#### *External Examiner reports*

External Examiner reports are considered by the Board of Studies. The Board responds to these reports through Faculty Teaching and Learning Committee. External Examiner reports are shared with institutional student representatives, through the Staff-Student Committee.

#### *Student evaluations*

All modules, and the degree programme, are subject to review by student questionnaires. Informal student evaluation is also obtained at the Staff-Student Committee, and the Board of Studies. The results from student surveys are considered as part of the Annual Monitoring and Review of the programme and any arising actions are captured at programme and School / institutional level and reported to the appropriate body.

#### *Mechanisms for gaining student feedback*

Feedback is channelled via the Staff-Student Committee and the Board of Studies.

#### *Faculty and University Review Mechanisms*

The programme is subject to the University's Internal Subject Review process. Every five years degree programmes in each subject area are subject to periodic review. This involves both the detailed consideration of a range of documentation, and a two-day review visit by a review team which includes an external subject specialist in addition to University and Faculty representatives. Following the review a report is produced, which forms the basis for a decision by University Teaching and Learning Committee on whether the programmes reviewed should be re-approved for a further five year period.

#### *Accreditation reports*

This programme is accredited by the Institute of Engineering and Technology

## 16 Regulation of assessment

### *Pass mark*

The pass mark is 50%

### *Course requirements*

Progression is subject to the University's Masters Degree Progress Regulations, Taught and Research and Examination Conventions for Taught Masters Degrees. Limited compensation up to 40 credits of the taught element and down to a mark of 40% is possible and there are reassessment opportunities, with certain restrictions.

The University employs a common marking scheme, which is specified in the Taught Postgraduate Examination Conventions, namely:

### **Summary description applicable to postgraduate Masters programmes**

### **Summary description applicable to postgraduate Certificate and Diploma programmes**

<50	Fail	<50	Fail
50-59	Pass	50 or above	Pass
60-69	Pass with Merit		
70 or above	Pass with Distinction		

### *Role of the External Examiner*

An External Examiner, a distinguished member of the subject community, is appointed by Faculty Teaching and Learning Committee, following recommendation from the Board of Studies. The External Examiner is expected to:

- i. See and approve assessment papers
- ii. Moderate examination and coursework marking
- iii. Attend the Board of Examiners
- iv. Report to the University on the standards of the programme

In addition, information relating to the programme is provided in:

The University Prospectus (see <http://www.ncl.ac.uk/postgraduate/>)

The School Brochure (contact [enquiries@ncl.ac.uk](mailto:enquiries@ncl.ac.uk))

The University Regulations (see <http://www.ncl.ac.uk/regulations/docs/2011.html>)

The Degree Programme Handbook (see <http://www.ncl.ac.uk/eece/postgrad/taught/power-dist/handbooks-timetables.htm>)

Please note. This specification provides a concise summary of the main features of the programme and of the learning outcomes that a typical student might reasonably be expected to achieve if she/he takes full advantage of the learning opportunities provided. The accuracy of the information contained is reviewed by the University and may be checked by the Quality Assurance Agency for Higher Education.



## Mapping of Intended Learning Outcomes onto Curriculum/Modules

Intended Learning Outcome	Module codes (Comp/Core in Bold)
A1	<b>EEE8044, EEE8047</b> , <i>EEE8049, EEE8050, EEE8051, EEE8052, EEE8053, EEE8054</i>
A2	<b>EEE8044, EEE8045, EEE8046, EEE8047, EEE8093</b> , <i>EEE8048, EEE8049, EEE8050, EEE8051, EEE8052, EEE8053, EEE8054</i>
A3	<b>EEE8044, EEE8047</b> , <i>EEE8049, EEE8052, EEE8053</i>
A4	<b>EEE8045</b> , <i>EEE8048, EEE8049, EEE8050, EEE8051, EEE8052, EEE8053, EEE8054</i>
A5	<b>EEE8046</b> , <i>EEE8048, EEE8049, EEE8050, EEE8051, EEE8054</i>
A6	<b>EEE8046</b> , <i>EEE8050, EEE8051, EEE8054</i>
A7	<b>EEE8046, EEE8047</b> , <i>EEE8048, EEE8049, EEE8050, EEE8052</i>
Dependent on the areas of specialist knowledge made available to him/her from the selected options, the student will also be able to:	
A8	<i>EEE8048</i>
A9	<i>EEE8049</i>
A10	<i>EEE8050</i>
A11	<i>EEE8051</i>
A12	<i>EEE8052</i>
A13	<i>EEE8053</i>
A14	<i>EEE8054</i>
B1	<b>EEE8044, EEE8045, EEE8046, EEE8047, EEE8093</b> , <i>EEE8048, EEE8049, EEE8050, EEE8051, EEE8052, EEE8053, EEE8054</i>
B2	<b>EEE8044, EEE8045, EEE8046, EEE8047, EEE8093</b> , <i>EEE8048, EEE8049, EEE8050, EEE8051, EEE8052, EEE8053, EEE8054</i>
B3	<b>EEE8044, EEE8045, EEE8046, EEE8047, EEE8093</b> , <i>EEE8048, EEE8049, EEE8050, EEE8051, EEE8052, EEE8053, EEE8054</i>
B4	<b>EEE8044, EEE8045, EEE8046, EEE8047, EEE8093</b> , <i>EEE8048, EEE8049, EEE8050, EEE8051, EEE8052, EEE8053, EEE8054</i>
C1	<b>EEE8044, EEE8045, EEE8046, EEE8047, EEE8093</b> , <i>EEE8048, EEE8049, EEE8050, EEE8051, EEE8052, EEE8053, EEE8054</i>
C2	<b>EEE8044, EEE8045, EEE8046, EEE8047, EEE8093</b> , <i>EEE8048, EEE8049, EEE8050, EEE8051, EEE8052, EEE8053, EEE8054</i>
C3	<b>EEE8044, EEE8045, EEE8046, EEE8047, EEE8093</b> , <i>EEE8048, EEE8049, EEE8050, EEE8051, EEE8052, EEE8053, EEE8054</i>
C4	<b>EEE8093</b>
D1	<b>EEE8044, EEE8045, EEE8046, EEE8047, EEE8093</b> , <i>EEE8048, EEE8049, EEE8050, EEE8051, EEE8052, EEE8053, EEE8054</i>
D2	<b>EEE8044, EEE8045, EEE8046, EEE8047, EEE8093</b> , <i>EEE8048, EEE8049, EEE8050, EEE8051, EEE8052, EEE8053, EEE8054</i>