PROGRAMME SPECIFICATION	

1	**Awarding Institution**	Newcastle University
2	**Teaching Institution**	Newcastle University
3	**Final Award**	Master of Science Postgraduate Diploma Postgraduate Certificate
4	**Programme Title**	Renewable Energy
5	**UCAS/Programme Code**	5122F/P 3401F/P 3034F/P
6	**Programme Accreditation**	IMarEST; IMechE: IET; EI
7	**QAA Subject Benchmark(s)**	(relates to Engineering MEng)
8	**FHEQ Level**	7
9	**Date written/revised**	May 2014

10 Programme Aims

The aim of the MSc in Renewable Energy Flexible Learning (Reflex) is to provide high quality, and flexibly delivered, postgraduate training in renewable energy. The programme is suitable for graduates from a range of engineering and related disciplines and has been specifically designed to meet the needs of an expanding renewable energy industry in the UK and beyond,

Reflex provides training in relevant aspects of mechanical, electrical, chemical, and marine and offshore engineering, and integrates this with the development of an understanding of management and policy issues, in order to produce graduates with a mix of skills which are tailored to the renewable energy technology industry.
The programme aims to provide a qualification that meets Level 7 of the Framework for Higher Education Qualifications.

11 Learning Outcomes

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, qualities, skills and other attributes in the areas listed below. Students on the MSc will achieve all the outcomes, while students on the Diploma and Certificate courses will achieve a proportion of the outcomes, relevant to the number of credits taken.

Knowledge and Understanding

On completing the programme students should be able to:

A1 Demonstrate knowledge and understanding of current worldwide energy usage and its impact on climate.

A2 Demonstrate a comprehensive knowledge and understanding of the origins and distribution of different renewable energy sources (solar, wind, hydro, wave, tidal and bioenergy).

A3 Demonstrate a comprehensive knowledge and understanding of the storage/conversion and integration of these renewable energy sources into existing systems.

A4 Demonstrate knowledge and understanding of the operation and control principles of electrical power distribution networks and a basic knowledge and understanding of the structure of such networks and the roles of different energy sources in the provision of a national electricity supply.

A5 Demonstrate a comprehensive knowledge and understanding of a number of key non technical issues including policy, economics, system modelling, environmental issues and energy management.

Teaching and Learning Methods

Knowledge and understanding of A1 – A5 is generally taught via formal lectures, distance learning/self guided material and case studies, supplemented by seminars and tutorials. Students are encouraged to develop their knowledge and understanding by independent reading, for which they are given guidance in the distance learning/self guided material, use of the internet and discussing the subjects with their industry based colleagues and/or other students as well as teaching staff. The use of design exercises during the intensive schools and assessments and application after the intensive school also enable the student to learn and apply their knowledge to their area of personal interest.

Assessment Strategy

Knowledge and understanding are assessed via unseen written examination, course assignments and the project (MSc and PG Diploma students). For A1 and A2 this is supplemented by performance in design exercises, where appropriate.

Intellectual Skills

On completing the programme students should be able to:

B1 Evaluate current research and methodologies.

B2 Demonstrate originality in identifying and considering problems.

B3 Produce and critically appraise engineering solutions.

B4 Deal with complex issues both systematically and creatively.

B5 Make sound judgments in the absence of complete data.

B6 Review options and make decisions while considering a range of issues including technical, financial, environmental and policy.

B7 Collate, analyse and evaluate data.

Teaching and Learning Methods

Intellectual skills are taught primarily through design classes, case studies and seminars. Development of these skills is particularly linked to industrial applications such as group and individual design exercises, post school assignments and, for MSc and PG Diploma, the final project.

Assessment Strategy

Intellectual skills are assessed by post school assignments, design exercises and presentations (where applicable).

Practical Skills

On completing the programme students should be able to:

C1 Demonstrate a critical awareness of theoretical design concepts and their practical implementation within renewable energy systems.

C2 Use appropriate software packages and IT skills for modelling and simulation of renewable energy systems.

C3 Quantify resource potential and determine the appropriate renewable energy resource at a given site.

C4 Analyse the energy capture potential for solar, wind & hydro resources.

C5 Demonstrate practical measuring and auditing skills.

Teaching and Learning Methods

Practical skills are highly relevant in this programme. Lectures and design classes are a key element to teaching practical skills. Design exercises during the modules and work based application as part of the post school study are the key methods for enabling the students to obtain and improve these important skills. In particular, design exercises require the student to apply theoretical work in a practical way, use a variety of software and organise and manage the design process.

Assessment Strategy

Practical skills C1 and C2 are essentially assessed via design exercises (where appropriate) and course assignments. Theoretical design concepts and practical implementation (C1) is also assessed via the unseen written examination.

Transferable/Key Skills

On completing the programme students should be able to demonstrate:

D1 Initiative and personal responsibility.

D2 The ability to work independently for continuing professional development.

D3 The ability to solve problems.

D4 The ability to communicate effectively.

D5 Time and resource planning and management.

D6 The ability to identify IT needs and to use appropriate IT tools.

D7 The ability to use the Library and other information sources appropriately.

Teaching and Learning Methods

The key transferable skills are demonstrated in seminars and through the study skills information in the student handbook. This information is particularly important for the distance learning/self guided element of the programme. Expertise in these skills is developed by presentations (D4, D6), design exercises (D1, D2, D6), and assignments (D1, D2, D4, D6).

Problem solving ability (D3) is demonstrated in the exams and assignments for all modules. The distance learning material for all modules required that the students use information sources appropriately (D7), and the Project dissertation in particular requires this skill, which is introduced at the Induction Session. The distance learning aspect of this programme requires the students to manage their time effectively (D5) and to plan their resource and work load management.

The actual completion of the programme, including the distance learning/self guided pack (using a web based system), will, in itself, significantly develop key skills (D1, D2, D6). Many students will combine this study with commitments at work and at home.

Assessment Strategy

Communication skills (D4) are the most assessed key skills. Assessment includes design exercises and course assignments. Initiative & personal responsibility (D1) are particularly assessed in the project work, though the distance learning method requires students to use their initiative and take responsibility for their independent study. The ability to work independently (D2) is assessed throughout by pre-school & post-school assignments and the exam. Use of IT skills (D6) is not directly assessed but students will need to be able to achieve this learning outcome in order to access the distance learning/self guided material and prepare assignments. The other skills (time management and lone working) are not formally assessed in the programme.

12 Programme Curriculum, Structure and Features

Basic structure of the programme

Reflex will be delivered by a combination of distance learning and one-week intensive schools. Students may complete the programme in either full or part-time mode.

Master of Science 180 credits

The maximum duration is 5 years. All modules are compulsory for the MSc, together with a 60 credit project:

SPG8001 Resources: 10 credits
SPG8002 Photovoltaics & Geothermal Energy: 10 credits
SPG8003 Electrical Generation Systems: 10 credits
SPG8004 Grid Systems: 10 credits
SPG8006 Wind & Hydro Energy Technology: 10 credits
SPG8007 Hydrogen & Fuel Cell Technology: 10 credits
SPG8008 Biomass & Waste Technology: 10 credits
SPG8009 Policy, Politics & Ethics: 10 credits
SPG8012 Energy Management:10 credits
SPG8026 Marine Energy Structures and Devices: 10 credits
SPG8028 Renewable Heating and Cooling: 10 credits
SPG8029 Energy Storage: 10 credits
SPG8095 Renewable Energy Masters Project: 60 credits

Each taught module is 10 credits and this equates to 100 hours study time.

Postgraduate Diploma 120 credits

The maximum duration is 5 years. Candidates shall take optional modules to a value of 120 credits from the following:

SPG8001 Resources: 10 credits
SPG8002 Photovoltaics & Geothermal Energy: 10 credits
SPG8003 Electrical Generation Systems: 10 credits
SPG8004 Grid Systems: 10 credits
SPG8006 Wind & Hydro Energy Technology: 10 credits
SPG8007 Hydrogen & Fuel Cell Technology: 10 credits
SPG8008 Biomass & Waste Technology: 10 credits
SPG8009 Policy, Politics & Ethics: 10 credits
SPG8012 Energy Management:10 credits
SPG8026 Marine Energy Structures and Devices: 10 credits
SPG8028 Renewable Heating and Cooling: 10 credits
SPG8029 Energy Storage: 10 credits
SPG8096 Renewable Energy Project: 30 credits

Postgraduate Certificate 60 credits

The maximum duration is 3 years. candidates shall take optional modules to a value of 60 credits from the following:

SPG8001 Resources: 10 credits
SPG8002 Photovoltaics & Geothermal Energy: 10 credits
SPG8003 Electrical Generation Systems: 10 credits
SPG8004 Grid Systems: 10 credits
SPG8006 Wind & Hydro Energy Technology: 10 credits
SPG8007 Hydrogen & Fuel Cell Technology: 10 credits
SPG8008 Biomass & Waste Technology: 10 credits
SPG8009 Policy, Politics & Ethics: 10 credits
SPG8012 Energy Management:10 credits
SPG8026 Marine Energy Structures and Devices: 10 credits
SPG8028 Renewable Heating and Cooling: 10 credits
SPG8029 Energy Storage: 10 credits

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

The programme has a number of key features, in particular:

- Specifically designed and developed to meet the needs of the renewable energy industry – a new and expanding industry which is supported by UK government and European Union policies.
- Available in a full time and flexible part-time mode thereby offering maximum flexibility to students including providing students who work with the opportunity to study whilst staying in work. Modules are delivered by a combination of intensive schools and distance learning/self guided material, adhering to the guidelines in the Distance Learning Handbook produced by Newcastle University.
- Programme involving specialist expertise from the both universities of Newcastle and Northumbria.

  Distance learning material available via a web based IT system.

Programme regulations (link to on-line version)

http://www.ncl.ac.uk/regulations/programme/

13 Criteria for admission

Undergraduate Degree:

A minimum of a lower-second class Honours degree (or equivalent) in an engineering-related, or cognate subject (e.g. marine, civil, electrical, mechanical or environmental engineering, applied Maths, or Physics (dependent on course content)).

Admissions policy/selection tools

All applicants will be considered based on their academic qualifications and their relevant technical industrial experience.

All applicants should apply through the University Enquiries to Registration portal.

Non-standard Entry Requirements

Applicants who do not meet the standard entry qualifications will be asked to submit a CV detailing academic qualifications and industrial experience. This will be reviewed by the Degree Programme Director on a case by case basis. Those not meeting entry standard levels may be advised on how the appropriate standard required can be achieved. The candidate will be informed of the outcome in writing.

Level of English Language capability

IELTS Level 6.5
TOEFL 575;
Internet based TOEFL 90

14 Support for Student Learning

The Student Services portal provides links to key services and other information and is available at: *http://www.ncl.ac.uk/students/*

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 Development Centre (further information is available from the Robinson Library).

Academic and Pastoral support
Each undergraduate and taught postgraduate student will be assigned a personal tutor.*
A personal tutor is one part of a wider network of advice and guidance available to students to support their personal and general academic development. The module leader acts as the first point of contact for subject-specific academic advice. Thereafter the Degree Programme Director or Head of School may be consulted. Issues relating to the programme may be raised at the Student-Staff Committee, and/or at the Board of Studies. Within the academic unit, students may also receive additional academic and pastoral advice from a range of other student-facing staff including degree programme directors, dissertation/project supervisors, and administrative support staff.
*Arrangements may vary for students taking special types of provision.

The University also offers a wide range of institutional services and support upon which students can call, such as the Writing Development Centre, Careers Service and Student Wellbeing Service. This includes 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 Student Union 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 team 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-sessional 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 Student-Staff Committee and/or the Board of Studies. New modules and major changes to existing modules are subject to approval by the Faculty Learning, Teaching and Student Experience Committee.

Programme reviews
The Board of Studies conducts an Annual Monitoring and Review of the degree programme and reports to Faculty Learning, Teaching and Student Experience Committee. The FLTSEC takes an overview of all programmes within the Faculty and reports any Faculty or institutional issues to the Faculty Learning, Teaching and Student Experience Committee.

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

Student evaluations
All modules, and the degree programme, are subject to review by student questionnaires. Informal student evaluation is also obtained at the Student-Staff Commitee, 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 Student-Staff Committee and the Board of Studies.

Faculty and University Review Mechanisms
Every six years degree programmes in each subject area undergo periodic review. This involves both the detailed consideration of a range of documentation, and a review visit by a review team (normally one day in duration) which includes an external subject specialist and a student representative. Following the review a report is produced, which forms the basis for a decision by University Learning, Teaching and Student Experience Committee on whether the programmes reviewed should be re-approved for a further six year period.

Accreditation reports

Additional mechanisms

16 Regulation of assessment

Pass mark
The pass mark is 50 (Postgraduate programmes). In order to pass each module, students must attain a minimum of 40 in each component of assessment. Failure to reach 40 in each component will result in a module mark no greater than 49. This rule has been introduced as an accreditation requirement on the Reflex or REEM programmes.

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 20 credits of the taught element and down to a mark of 40 is possible and there are reassessment opportunities, with certain restrictions

Common Marking Scheme

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

Summary description applicable to postgraduate Masters programmes Diploma		**Summary description applicable to postgraduate Certificate and 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, after recommendation from the Board of Studies. The External Examiner is expected to:

- See and approve examination papers
- Moderate examination and coursework marking
- Attend the Board of Examiners
- Report to the University on the standards of the programme

In addition, information relating to the programme is provided in:
The University Prospectus: http://www.ncl.ac.uk/postgraduate/ The School Brochure: http://www.ncl.ac.uk/marketing/services/print/publications/ordering/ Degree Programme and University Regulations: http://www.ncl.ac.uk/regulations/docs/ The Degree Programme Handbook:

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.

Annex

Mapping of Intended Learning Outcomes onto Curriculum/Modules

		Intended Learning Outcomes			
Module	**Type**	**A**	**B**	**C**	**D**
SPG8001	Compulsory for MSc, Optional Dip & Cert	1, 2, 4, 5	1,6,7	3,	1,2,3,4,5,6,7
SPG8002	Compulsory for MSc, Optional Dip & Cert	1, 3, 5	1,6,7		1,2,3,4,5,6,7
SPG8003	Compulsory for MSc, Optional Dip & Cert	1, 2, 5	1,2,3,4,5,6,7	1,2	1,2,3,4,5,6,7
SPG8004	Compulsory for MSc, Optional Dip & Cert	1, 2, 4, 5	1,2,3,4,5,6,7	1,2	1,3,4,5,6,7
SPG8006	Compulsory for MSc, Optional Dip & Cert	1,2,3	1,2,3,4,5,6,7	1	1,3,4,5,6,7
SPG8007	Compulsory for MSc, Optional Dip & Cert	1	1,2,3,4,5,6,7	1,2	1,2,3,4,5,6,7
SPG8008	Compulsory for MSc, Optional Dip & Cert	1	1,2,3,4,5,6,7	1	1,2,3,4,5,6,7
SPG8009	Compulsory for MSc, Optional Dip & Cert	1,5	2,4,5,6,7		1,2,3,4,5,6,7
SPG8012	Compulsory for MSc, Optional Dip & Cert	3,5	1,2,3,6,7	4,5	1,2,3,4,5,6,7
SPG8026	Compulsory for MSc, Optional Dip & Cert	1	1,2,3,4,5,6,7	1,2	1,2,3,4,5,6,7
SPG8028	Compulsory for MSc, Optional Dip & Cert	3, 5	1, 3, 6, 7	1, 3, 4	1,2,3,4,5,6,7
SPG8029	Compulsory for MSc, Optional Dip & Cert	1, 2, 4	1, 3, 6, 7	1	1,2,3,4,5,6,7
SPG8095	Compulsory for MSc	Dependent on topic chosen	1,2,3,4,5,6,7	Dependent on topic chosen	1,2,3,4,5,6,7
SPG8096	Compulsory for Diploma	Dependent on topic chosen	1,2,3,4,5,6,7	Dependent on topic chosen	1,2,3,4,5,6,7