Course Handbook

MSc Renewable Energy Engineering

2020-21

Dr Katerina Fragaki
School of Engineering

Please read this Handbook in conjunction with the University's Student Handbook.

Contents

1. Welcome to the course

Welcome to the Renewable Energy Engineering programme at UCLan.

Please read this handbook carefully as it is a source of information on the academic, administrative and operational aspects of your course and it is intended to explain what is required of you, and what you should expect from us. Please feel free to discuss any aspects with any member of the course team.

We trust that you will find the course both enjoyable and rewarding. In the meantime, if you have any queries or concerns, please contact either the Course Leader or any member of the Course Team.

Enjoy your time studying with us!

Dr Katerina Fragaki - Course Leader for MSc Renewable Energy Engineering

1.1 Rationale, aims and learning outcomes of the course

This is an advanced course in the area of renewable energy engineering, with an emphasis on the design, analysis and implementation of renewable energy projects.

The course is designed to help you develop critical understanding that you can apply to assist the wide range of renewable energy industries. You will learn to effectively plan, critically analyse, evaluate and successfully design renewable energy systems. The course will equip you with the engineering knowledge and practical skills necessary to develop and implement creative solutions to engineering problems encountered in renewable energy capture and conversion, system design and analysis, project development and implementation. It will use lab and field-testing facilities for measuring and monitoring performance of different renewable energy systems, such as wind turbines, photovoltaic power systems and heat pumps.

You will also learn to select and use specialized software for component and system design, simulation of the performance and monitoring of renewable energy systems. These tools include Matlab/Simulink, ANSYS and SciLab for wind turbine blade design and CFD, GH WindFarmer and WAsP for wind farm design, PVsyst for photovoltaic system design and Labview for system monitoring.

The full program specifications, including learning outcomes, are provided as appendices.

Awards and duration

1. MSc: 1 year full-time or 2 years part-time (1 day a week)
2. MSc with professional placement: 20 to 22 months full-time
3. MSc with work placement: 14 to 16 months full-time
4. PGDip: 9 months full-time or 18 months part time (1 day a week)
5.PGCert: 6 months full-time or 9 months part time (1 day a week)

Professional/Work Placement options

The Professional/Work Placement options will give you the opportunity to research, secure and undertake a period of work experience or industrial placement in an organization appropriate to the field of study. They take place after the completion of the taught modules.

Professional Accreditation

This MSc is accredited by the Institution of Engineering and Technology (IET), as further learning satisfying the educational requirements for Chartered Engineer (CEng) registration.

1.2 Course Team

Dean of School			
Dr Robert Wallace	CM210	01772893311	rrwallace@uclan.ac.uk
Academic Lead			
Dr Jonathan Francis	CM023	0177289 3229	jfrancis1@uclan.ac.uk
Head of UCLan Energy			
Dr John Whitton	KM002	01772894211	jwhitton@uclan.ac.uk
Course Leader			
Dr Katerina Fragaki	CM021	01772893826	AFragaki@uclan.ac.uk

Teaching staff

Staff	**Room**	**Module**	**Telephone#**	**Email**
Dr Justin Whitty	CM	MP4709	1772 89 3274	jwhitty@uclan.ac.uk
Dr Katerina Fragaki	CM021	MP4708 MP4710 EL4166	01772893826	AFragaki@uclan.ac.uk
TBC	TBC	MP4713	TBC	TBC
Dr Ahmed Onsy	CM109	MP4701 MP4706	01772892685	aonsy@uclan.ac.uk
Dr Nathalie Renevier	CM134	MP4705	0177289 3316	NRenevier@uclan.ac.uk

CM rooms are in Computing & Technology Building (C&T Building) KM rooms are in Kirkham Building

Learning and Information Services (LIS) Customer Support (West Hub)
Telephone: 01772895355 (5355 from Campus)
E-mail address: LISCustomerSupport@uclan.ac.uk

1.3 Expertise of **staff**

The course team are particularly qualified to teach this course. They are engaged in relevant research or other scholarly activities. More information on the course team members can be found on the webpages.

1.4 Academic Advisor

You will be assigned an Academic Advisor who will provide additional academic support during the year. They will be the first point of call for many of the questions that you might have during the year. Your Academic Advisor will be able to help you with personal development, including developing skills in self-awareness, reflection and action planning.

1.5 Administration details

Campus Admin Services provides academic administration support for students and staff and are located in the following hubs which open from 8.45am until 5.15pm Monday to Thursday and until 4.00pm on Fridays. The hub can provide general assistance and advice regarding specific processes such as extenuating circumstances, extensions and appeals.

Computing and Technology Building
Art, Design and Fashion
Computing
Physical Sciences and Computing
Film, Media and Performance
Engineering
Journalism, Languages and Communication
telephone: *01772 891994 or 01772 891995*
email: *CandThub@uclan.ac.uk*

1.6 Communication

The University expects you to use your UCLan email address and check regularly for messages from staff. If you send us email messages from other addresses they risk being filtered out as potential spam and discarded unread.

Communication is through e-mail, blackboard and telephone.

Each member of teaching staff has “office hours” during which can be contacted by the students.

Members of teaching staff may have a preferred way to be contacted and they communicate this to the students.
Students should monitor their e-mails at least on daily basis.

We try to reply to most e-mails within a 48 h time frame. However, this may not always be possible.

If either the student's home address, email address or local address changes during the time at the University, the student should inform both the Academic advisor and the School Office (CM210). This should be done in writing using the appropriate form. If your contact details are not up to date, important communications may fail to reach you.

1.7 External Examiner

The University has appointed an External Examiner to the course who helps to ensure that the standards of the course are comparable to those provided at other higher education institutions in the UK. The name of this person, their position and home institution can be found below.

Dr Steven Firth, Senior Lecturer in Building Performance Modelling, School of Architecture, Building and Civil Engineering Loughborough University, UK

External Examiner reports for the Engineering courses can be accessed electronically via the Engineering@UCLan Blackboard pages.

2. Structure of the course

2.1 Overall structure

In this session you can see what the course includes and the different paths (full time and part time) to complete, and information about the optional placements and how they fit in the course structure.

Programme at a Glance	
Core Modules • SC4107 or EL4166 Research Methods (20 credits) • MP4708 Renewable Energy Technology (20 credits) • MP4709 Energy Systems (20 credits) • MP4710 Design and Analysis of Renewable Energy Systems (20 credits) • EL4895 Masters Project (Engineering) (60 credits)	Option Modules Two of the following: • MP4701 Design and Operation of Sustainable Systems (20 credits) • MP4705 Engineering Management Systems (20 credits) • MP4706 Sensors, Instrumentation & Control (20 credits) • MP4713 Wind Turbine Generators, Power Electronics and Control (20 credits)
Optional Placement; Modules • EL4101 Professional Placement, (120 credits) Or • EL4102 Work Placement (60 credits)	

Please note that the School reserves the right to not run any optional module(s) if there are not sufficient student numbers to make this module viable. There may also be restrictions in the maximum number of students that optional modules can accommodate.

Awards:

• **Postgraduate Certificate (PGCert) in Renewable Energy Engineering**

Requires 60 credits at level 7, (EL4166, MP4708, and one of the optional modules)

• **Postgraduate Diploma (PGDip) in Renewable Energy Engineering**

Requires 120 credits at level 7, (EL4166, MP4708, MP4709, MP4710, and two of the optional modules)

• **Master of Science (MSc) in Renewable Energy Engineering**

Requires (180 credits) at level 7 (EL4166, MP4708, MP4709, MP4710, EL4895 and two of the optional modules)

• **Master of Science (MSc) in Renewable Energy Engineering with Professional Placement**

Requires (180 credits) at level 7 (EL4166, MP4708, MP4709, MP4710, EL4895 and two of the optional modules) plus successful completion of EL4101

• **Master of Science (MSc) in Renewable Energy Engineering with Work Placement**

Requires (180 credits) at level 7 (EL4166, MP4708, MP4709, MP4710, EL4895 and two of the optional modules) plus successful completion of EL4102

Course Schedule

The course can be studied either (i) Full time or (ii) Part time, and has only September start.

The Course Schedule is as shown here:

<u>Mid-September</u>
Induction week. This includes introduction to the library, the University facilities and the course. Part A of Supportive Sort Course is also running this week. The detailed programme of the induction week is on Blackboard.

Note that prior to the induction week there is the student orientation week organized for international students. This information is sent by the International Office.

<u>September to January</u>

Taught part of the course, first term Modules (all compulsory)

• EL4166 Research Methods
• MP4708 Renewable Energy Technology
• MP4709 Energy Systems

Part B of the Supportive Short Course is running at the beginning of this term.

The lectures/labs are scheduled to run two days a week (Monday and Thursday)

Full time Students have to attend and pass all three modules (60 credits total) The lectures/labs are scheduled to run two days a week (Monday and Thursday)
Part time Students have to attend and pass one or two modules (20 or 40 credits total) the first academic year and one or two the second academic year Attendance at one day a week (Monday or Thursday)

Mid-January: EXAMS

End-January: Decisions about Work and/or Professional placements

February to May
Taught part of the course, second term
Module (compulsory)

- MP4710 Design and Analysis of Renewable Energy Systems

Modules (optional; select two)

- MP4701 Design and Operation of Sustainable Systems
- MP4705 Sustainable Systems Development
- MP4706 Sensors, instrumentation & Control
- MP4713 Wind Turbine Generators, Power Electronics and Control

The lectures/labs are scheduled to run three days a week (Monday, Wednesday and Thursday)

Full time Students have to attend and pass three modules (60 credits total) The lectures/labs are scheduled so that it is possible for a student to attend two days a week.
Part time Students have to attend and pass one or two modules (20 or 40 credits total) the first academic year and one or two the second academic year The lectures/labs are scheduled so that it is possible for a student to attend one day a week.

March/April:

1. Field trips to UK renewable energy installations

2. Project titles available to students; Students select their project; Project allocation; (Part time students select their project the same time the second academic year)

Mid-May: EXAMS

June to September: Work on the project (***Part time students work on the project the second academic year***)

July/August: Interim report and interim viva of the project

September: Submission of the final project report and project viva.

Please note that, typically, students are allowed to proceed to the project only if they have passed all the taught modules. Students enrolled for PGDip can only proceed to MSc if they pass all the taught modules.

Placement Options: Placements take place after the taught part of the course and before the MSc Project. Placements are options only for the MSc in Renewable Energy Engineering, not the PGDip.

• MSc (*without placement*)
The student does the MSc project in the summer (directly after the taught part of the course.

• *Option 1*;12 months, maximum, Professional Placement
The Professional placement is from June to May. Then the student will do the MSc project the following summer (starting in June)

• *Option 2*; 3 months, maximum, Work Placement.
The work placement is during summer. Then the student will do the MSc project after the summer, in the first term (starting in September the next academic year)

2.2 Modules available

Each module is a self-contained block of learning with defined aims, learning outcomes and assessment. A standard module is worth 20 credits. It equates to the learning activity expected from one sixth of a full-time undergraduate year. Modules may be developed as half or double modules with credit allocated up to a maximum of 120 credits per module.

Core Modules

EL4166 Research Methods (Dr Katerina Fragaki)
The aim of this module is to develop the individual skills necessary to conduct technical studies at an advanced level effectively.

MP4708 Renewable Energy Technology (Dr Katerina Fragaki)
This module aims to provide students with, firstly, a detailed analysis of the nature of renewable energy sources and how it affects renewable energy exploitation and technology; secondly, engineering knowledge of the technologies used to extract energy from renewable sources together with explanation/investigation of the physics of energy extraction.

MP4709 Energy Systems (Dr Justin Whitty)

The aim of this module is to apply fundamental laws of thermodynamics to modern energy systems considering technological merits in terms of energy sustainability, renewable technologies, economical and environment impact; to investigate electricity generation, transmission and distribution, smart grids, energy storage, and nuclear power; and finally to consider the legislation to date and recommend future changes for increased efficiency.

MP4710 Design and Analysis of Renewable Energy Systems (Dr Katerina Fragaki)
This module aims to provide students with the fundamental engineering knowledge and practical skills for the design and analysis of renewable energy systems, and for the integration and applications of renewable energy systems with energy storage and distribution.

EL4895 Masters Project (Engineering) (Supervised by a member of the teaching staff)
The aim of this module is for the student to undertake a major piece of advanced level work having some significant elements of research and originality. This will require the student to specify, plan, execute and report a programme of work leading to the investigation / design of a product / system / service incorporating a number of the following activities: investigation, analysis, design, implementation / simulation, evaluation, test, manufacture, with aspects involving the study of current research or advanced developments (academic or industrial) leading to the development of new knowledge, methods or applications.

Examples of completed projects:

- *An Assessment for Wind Energy Development of a Rural Location near Lancaster*
- *Repowering an Onshore Wind Farm in the United Kingdom*
- *A study of the energy performance and economic viability of solar thermal systems in UK houses*
- *Performance and supply demand matching of grid-connected photovoltaics (PV) in dwellings*
- *On the structural analysis of fibreglass asymmetric aerodynamic components with in-situ loading conditions.*

Please note that the Project is individual work

Option Modules

MP4701 Design and Operation of Sustainable Systems (Dr Ahmed Onsi)
The aim of this module is to introduce students to a range of design methods and standards relating to modern design processes and operational practices for the sustainable operation of industrial equipment.

MP4705 Engineering Management Systems (Dr Nathalie Renevier)
This module examines the main methods for developing sustainable engineering programme for industrial plants. It provides a comprehensive understanding of theory and practice of sustainable systems engineering strategies to achieve high plant efficiency, optimise on product quality, and address safety and environmental issues.

MP4706 Sensors, Instrumentation & Control (Dr Ahmed Onsi)
This module introduces methods of computer interfacing of industrial or scientific instruments and data processing for monitoring and control of engineering processes. It provides a comprehensive understanding of the use of advanced instrumentation

and sensing methods. The module will also consider the application of signal processing methods and system design methods.

MP4713 Wind Turbine Generators, Power Electronics and Control (TBC)
The aims of this module are to provide students with a comprehensive appreciation of the electrical aspects, generators, power electronics and grid connection of wind turbines; to provide a vehicle to enable the students to integrate and synthesise their knowledge related to the development and testing of wind turbine generator and control system, and to apply this in a practical and dynamic setting.

Placement modules (Optional)

EL4101 Professional Placement (Engineering)
This module allows students to develop an understanding of the professional practices associated with working in the engineering industry. Students will research, secure and undertake a period of work experience or industrial placement in an organisation appropriate to the field of study. The placement period should normally cover a minimum of 38 weeks full-time throughout the course of the module and a maximum of 40 weeks. Subject to negotiation with tutors, the placement might extend across more than one organisation. Students will be expected to reflect upon this work experience critically and to apply their experience to theoretical and conceptual elements of their course.

EL4102 Work Placement (Engineering)
This module allows students to develop an understanding of the professional practices associated with working in engineering. Students will research, secure and undertake a period of work experience or industrial placement in an organisation appropriate to the field of study. The placement period should normally cover a minimum of 10 weeks full-time throughout the course of the module and a maximum of 15 weeks. Subject to negotiation with tutors, the placement might extend across more than one organisation. Students will be expected to reflect upon this work experience critically and to apply their experience to theoretical and conceptual elements of their course.

2.3 Course requirements

Apart from the modules mentioned in the previous session, you can also benefit from attending additional tutorial sessions (e.g. the short course) and, for International students, a free available English language module.

If you are an International student you will find the following link useful:

http://www.uclan.ac.uk/international/

This MSc course is accredited by IET, The Institution of Engineering and Technology.

More information about IET can be found in the link:

http://www.theiet.org/about/

More information about IET Accreditation can be found in the link:
http://www.theiet.org/academics/accreditation/

The benefits of picking an IET accredited course can be found in the link:
http://www.theiet.org/students/studying-engineering/choosing-course/accredited-course.cfm

As a student undertaking this course, you are bound by the Code of Conduct as specified by ***IET*** and subject to the UCLan procedure for the consideration of Fitness to Practise.

2.4 Module Registration Options

Discussions about your progression through the course normally take place in February and in May each year after the exams. It is an opportunity for you to make plans for your study over the rest of the course. These discussions are with both the Academic advisor and the Course Leader.

Discussions about a student's progress may take place, when needed, between the student and the student's Academic Advisor. These are additional opportunities to identify whether a student feels capable of completing the course of study and gets advice on the extra support available.

2.5 Study Time

2.5.1 Weekly timetable

A timetable will be available once you have enrolled on the programme, through the student portal.

2.5.2 Expected hours of study

20 credits is a standard module size and equals 200 notional learning hours.
In order to get most out of the lectures/labs the students are advised to read the material covered soon after the lecture/lab and identify points for further reading. For the specific hours of study required for each module, please refer to the module descriptor which will be provided by the module leader.

2.5.3 Attendance Requirements

You are required to attend all timetabled learning activities for each module. Notification of illness or exceptional requests for leave of absence must be made to C&T Hub:

CandTHubAttendance@uclan.ac.uk Tel. (01772) 891994 / 1995

Regarding international students; under PBS, UCLan is obliged to tell United Kingdom Visa and Immigration (UKVI) if the student withdraws from a course, defer or suspend his/her studies, or fails to attend the course regularly.

Out of term work

During Christmas and Easter holidays students may need to study for the exams or prepare their coursework. It is in the responsibility of the students to ensure that they stay within accessible distance from the University Campus if they need to use the University facilities or to have meetings with classmates (in the case of a group project, for example).

Meetings during the MSc Project

MSc project takes place during the summer. Students are required to have weekly meetings with the supervisor. This means that the student meets the supervisor in person to discuss the progress and future work. These meetings are compulsory and should take place even in case the student feels that no progress has been achieved since the last meeting.

Students should be aware that many members of staff may take some holidays, or attend conferences during the summer months. There should be an agreement

between the student and the supervisor on how the student will handle the project while the supervisor is away.

Students are expected to stay within accessible distance to the University campus so that they can use the University facilities and attend the project meetings. They are not normally expected to take holidays during the summer; if this happens, it has to be in agreement with both the supervisor of the project, and the Course Leader, and the duration of the holidays should not exceed 7 working days in total.

3. Approaches to teaching and learning

3.1 Expertise of staff

The staff teaching in this course are experts in various aspects of renewable energy. Information about the teaching staff and their area of expertize can be found on their webpage.

3.2 Learning and teaching methods

At this advanced lever of study students are expected to be independent learners. However, support and guidance is provided by the staff where needed. The learning environment includes

• Free supportive short course tailored to students' individual needs. This is a group of lectures/tutorials, provided as part of the independent learning on foundation topics such as electric circuits, 3-phase current, rotating machines, maths, and excel.

• Lectures combined with practical sessions

• Sites visits on UK renewable energy installations

• Expert (guest) lectures or seminars

• Variety in assessment for learning methods including: examination, coursework, tests, presentations, poster defence and written reports; group work, individual work

3.3 Study skills

The University provides

• English language classes for free

• WISER can provide academic writing advice
http://www.uclan.ac.uk/students/study/wiser/index.php

3.4 Learning resources

3.4.1 Learning Information Services (LIS)

Generic information is included in the Student Handbook.

3.4.2 Electronic Resources

Generic information is included in the Student Handbook. Some electronic resources will be made available through Blackboard incorporated in module material.

3.5 Personal development planning

The Academic Advisor (see 4.1) is available to support students in developing their PDP during their time on this course.

3.6 Preparing for your career

There are free sessions on employability that students are strongly advised to attend.

4. Student Support

The Academic Advisor (4.1) is available to support the student.

4.1 Academic Advisors

Once a student joins the course he/she is assigned an Academic Advisor, a member of the teaching staff who provides academic guidance and support. You must see your Personal Tutor when requested

4.2 Students with disabilities

There is a named lead for students with disabilities within the School (Javad Yazdani, CM138, Phone 01772-892685, JYazdani@uclan.ac.uk).

4.3 Students' Union

The Students' Union offers thousands of volunteering opportunities ranging from representative to other leadership roles. We also advertise paid work and employ student staff on a variety of roles. You can find out more information on our website: http://www.uclansu.co.uk/

5. Assessment

5.1 Assessment Strategy

Please note that all modules will be assessed. You are expected to attempt all required assessments for each module for which you are registered, and to do so at the times scheduled unless authorised extensions, special arrangements for disability, or extenuating circumstances allow you to defer your assessment. Assessment is typically done through both coursework/assignments and exams with the weightings reflecting the course content.

As a general rule, at level 7 (PGDip and MSc level), there is an assessment threshold requirement of 40% for each assessed coursework, with a module pass mark of 50%. Apart from the formative assessment, assessment of some coursework may be summative.

5.2 Notification of assignments and examination arrangements

Students are notified of assessments by their module tutors. They will advise of the requirements, the marking criteria and of the respective submission dates. Coursework Most lecturers upload the brief of individual assessments and their respective deadlines for submission on Blackboard, together with any information related to each assignment. Sometimes lecturers may prefer to give the assignments and any related information on a hard copy or by e-mail.

Assignments and coursework should be submitted either

1. Electronically through Blackboard,

or

2. To the assignment boxes located on the ground floor of Computing & Technology Building (usually in CM007). Each assignment must have a signed 'Assignment Submission Form' attached.

Examinations

The examination arrangements are available from the University web site. These arrangements are not generally made by the module tutors.

5.3 Referencing

Students are expected to be aware of the need for appropriate referencing and familiar with the system used in their own field. Every reference in the list should enable the reader to identify the work cited and to locate the specific passage referenced. There are different ways of listing references in a bibliography but you should be consistent once you have decided on your method. WISER supply a number of helpful guides and resources online: www.uclan.ac.uk/wiser

5.4 Confidential material

In the cases where Engineering students might use confidential information they should take guidance from their module tutor on the ethical and legal responsibilities to respect confidentiality and maintain anonymity of individuals within their assignments. In the case where a student completes a dissertation or project that contains sensitive information it is important to complete the assignment within the deadlines. The assessment (such as, presentation and report) should deal with the confidential information in a manner that allows the student to complete the assessment within the specified deadlines.

5.5 Cheating, plagiarism, collusion or re-presentation

Please refer to the information included in section 6.6 of the University Student Handbook for full definitions. The University uses an online Assessment Tool called Turnitin. A pseudo-Turnitin assignment will be set up using the School space on Blackboard to allow students to check as many drafts as the system allows before their final submission to the 'official' Turnitin assignment. Students are required to self-submit their own assignment on Turnitin and will be given access to the Originality Reports arising from each submission. In operating Turnitin, Schools must take steps to ensure that the University's requirement for all summative assessment to be marked anonymously is not undermined and therefore Turnitin reports should either be anonymised or considered separately from marking. Turnitin may also be used to assist with plagiarism detection and collusion, where there is suspicion about individual piece(s) of work.

5.6 How do I know that my assessed work had been marked fairly?

Assessment is an integral part of the course. Module staff work closely together to design assessments, agree the marking criteria and approve final versions of assessments to ensure that these are appropriate. The criteria for assessment will be communicated to you clearly during the module teaching.

All module staff engage in development and training in assessment, marking and feedback. Once the assessments have been completed the module team will discuss the assessment methods and marking criteria, prior to starting to mark, so that there is a common understanding of what is expected of students. All assessed modules have moderation built into the marking process. Moderation involves sampling

students' assessed work to make sure that the learning outcomes and agreed marking criteria have been interpreted and applied in the same way. This ensures that you and your fellow students are treated equitably and that the academic standards are applied consistently. During the marking process the module leader will co-ordinate moderation to ensure that at least 10% of assessed work (or a minimum of three pieces) has been reviewed by other markers and any concerns about consistency or accuracy addressed with the whole module team. Your work may or may not be part of this sample, but the processes for developing assessments and marking criteria as well as moderation mean that you can be confident that teaching staff are marking assessments to the same criteria. Module teams may then use feedback from moderation to improve clarity about the nature and purpose of future assessment, or to make changes if required.

Modules are also moderated externally. The module leader will arrange for the external examiner to receive a sample of work for review and comment. External examiners cannot change individual grades, but can act as 'critical friends' and confirm that marking standards are in line with other, similar courses in the sector. If, on reviewing the sample, external examiners feel that the marking criteria have not been applied consistently the work of the whole cohort will be reviewed.

6. Classification of Awards

The University publishes the principles underpinning the way in which awards and results are decided in Academic Regulations. Decisions about the overall classification of awards are made by Assessment Boards through the application of the academic and relevant course regulations.

7. Student Feedback

You can play an important part in the process of improving the quality of this course through the feedback you give.

We encourage students to provide constructive feedback throughout their time at university, through course reps, surveys and any other appropriate means. In addition to the ongoing discussion with the course team throughout the year, there are a range of mechanisms for you to feedback about your experience of teaching and learning. We aim to respond to your feedback and let you know of our plans for improvement.
The Students' Union and University work closely together to ensure that the student voice is heard in all matters of student-life. The Students' Union can support you in voicing your opinion, provide on-going advice and support, and encourage your involvement in all feedback opportunities.

7.1 Student Staff Liaison Committee meetings (SSLCs)

Details of the Protocol for the operation of SSLCs is included in section 8.2 of the University Student Handbook.

Course Representatives
A course representative is a student who represents their fellow students' views and opinions to the course team, school, university and students' union. Course representatives work proactively and diplomatically to improve the academic and non-academic experiences of students.
The role of a course representative is extremely beneficial to both students on your course and the university. It enables students to have ownership of their student

experience and voice their opinions and share positive practice with the course team, primarily the Student Staff Liaison Committee Meetings.
Course representatives will be elected every year either in September. Alongside receiving recognition, support and respect being a course representative is a great opportunity to enhance your employability skills. If you are interested in becoming a course representative and wish to find out more about the role simply contact the Students' Union Advice and Representation Centre by emailing: coursereps@uclan.ac.uk.

8. Appendices
8.1 Programme Specification(s)

UNIVERSITY OF CENTRAL LANCASHIRE

Programme Specification

This Programme 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/she takes full advantage of the learning opportunities that are provided.

Sources of information on the programme can be found in Section 17

1. Awarding Institution / Body	University of Central Lancashire
2. Teaching Institution and Location of Delivery	UCLan Main Campus, Preston
3. University Department/Centre	School of Engineering
4. External Accreditation	Institution of Engineering and Technology http://www.theiet.org/
5. Title of Final Award	MSc Renewable Energy Engineering MSc Renewable Energy Engineering with professional placement MSc Renewable Energy Engineering with work placement PGDip Renewable Energy Engineering
6. Modes of Attendance offered	Full time / Part time
7. UCAS Code **7b JACS and HECOS Code**	Not applicable H221/100175
8. Relevant Subject Benchmarking Group(s)	Mechanical Engineering, Electrical Engineering/ Power Electronics
9. Other external influences	
10. Date of production/revision of this form	February 2013 (CEPS) Last Updated December 2014 Considered at PR March 2019 (no academic changes)
11. Aims of the Programme	
11.1 Aims of the MSc Programme In additional to aims of the PGDip (in §11.2) programme the MSc component will aim:	
• To enhance students' critical approach to theories, techniques and methods in renewable energy projects. This will refine and enhance academic competence in a variety of disciplinary backgrounds, and provide an applied focus for postgraduate study with a strong professional and industrial orientation.	
• To develop understanding of theories and practical skills necessary for the students to be responsible for the implementation, operation and management of renewable energy systems following appropriate practical experience, with minimum further training.	

- To enhance and relate students' communication skills to the needs of the renewable energy sector.

11.2 Aims of the PGDip Programme

In additional to aims of the PGCert (in §11.3) programme the PgDip component will aim:

- To provide students with a learning environment in which they will demonstrate their capacity for independent study, their ability to collaborate with others in team settings, and their capacity for critical thought and reflection.
- To equip students with appropriate research skills to undertake independent research at postgraduate level.
- To encourage and enable the students to become reflective practitioners.
- To enhance students' career potential, personal and professional effectiveness and performance in employment, and assist them in making a positive and sustained contribution to their wider community.

11.3 Aims of the PGCert Programme

- To develop students' knowledge in renewable energy systems and renewable energy engineering.
- To develop an awareness of the planning and regulations related to renewable energy projects.
- To develop understanding of theories and practical skills necessary for the students to be responsible for the design, analysis and evaluation of renewable energy systems.
- To enable students to evaluate the complex environmental, social and economic impacts of renewable energy projects, and to critically assess and respond to policy and regulation frameworks.

12. Learning Outcomes, Teaching, Learning and Assessment Methods

A. Knowledge and Understanding

A1. Apply and critically evaluate principles, practices and tools for the design/development and analysis/evaluation of renewable energy systems.
A2. Critically analyse the environmental, social and economic impacts of renewable energy projects.
A3. Effectively plan renewable energy systems (Specific for MSc Award)
A4. Assess and critically evaluate tools for the operation/management and control/monitoring of renewable energy systems.
A5. Plan, conduct and write a research project report in a professional manner within guidelines and document research/field work (Specific for MSc Award).

Teaching and Learning Methods

Teaching will be through lectures, field visits, and industrial case studies which are developed by both academic staff and industrial partners.
The Masters Project allows for student centred study, developing a high level of masters level research skills appropriate to their strengths.

Assessment methods

A variety of assessments including assignment and project reports, presentations and examinations thoroughly test the students' knowledge and understanding of the subjects and their ability to apply that knowledge.

B. Subject-specific skills

B1. Select and use specialised software competently for the design/development and analysis/evaluation of specific renewable energy system.
B2. Effectively use tools for the operation/management and control/monitoring of specific renewable energy system.
B3. Effectively demonstrate a professional approach to planning issues and regulations relevant to a specific renewable energy project.
B4. Critically evaluate the environmental, social and economic implications of a specific renewable energy project.

Teaching and Learning Methods

Teaching will be through lectures, tutorials, labs, field visits and industrial case studies. The Masters Project allows students to develop a detailed knowledge and practical skills in a particular aspect of renewable energy project.

Assessment methods

A variety of assessments including assignment, lab and field visit reports, project reports and presentations thoroughly test the students' ability to apply their knowledge and practical skills in specific renewable energy projects.

C. Thinking Skills

C1. Apply and combine technical and non-technical knowledge to practical engineering problem solving.
C2. Obtain, synthesis and apply information from a broad range of sources.
C3. Analyse complex concepts and communicate the outcome effectively and professionally in a format suitable for a professional audience (Specific for MSc Award).

Teaching and Learning Methods

Various methods will enhance the students' thinking skills, including field visits and industrial case studies allowing application of knowledge to real-life scenarios. As a postgraduate programme, this will build on expertise acquired in previous courses. It also provides opportunities for professionals with experience of the renewable energy industry to place this expertise in an academic context.
The Masters Project allows students to develop the students' thinking skills further through student centred studying.

Assessment methods

A variety of assessments including field visit reports, project reports and presentations thoroughly test the students' thinking skills and their ability to apply that skills for specific renewable energy projects.

D. Other skills relevant to employability and personal development

D1. Communicate effectively through writing and presentation to a diverse audience.
D2. Read, synthesise and produce reports to a professional standard.
D3. Learn and work independently and become reflective practitioners.
D4. Work confidently as part of a team.

Teaching and Learning Methods

Group project and project preparation, field visits, preparation of and participation in student-led project presentations, critical reflection.

Assessment methods

A variety of assessments including field visit reports, group project presentations, Masters Project report and presentation thoroughly test the students' ability to apply these other skills.

13. Programme Structures

Level	Module Code	Module Title	Credit rating
		Compulsory module for MSc only:	
Level 7	EL4895	Masters Project (Engineering)	60
		Compulsory modules for both MSc and PGDip:	
Level 7	MP4709	Energy systems	20
Level 7	MP4710	Design and analysis of renewable energy systems	20
Level 7	MP4708	Renewable energy technology	20

14. Awards and Credits*

Master of Science with professional placement in Renewable Energy
Requires 9 module passes (180 credits) at level 7 plus successful completion of EL4101

Master of Science with work placement in Renewable Energy
Requires 9 module passes (180 credits) at level 7 plus successful completion of EL4102

		Compulsory modules for both MSc and PGDip (One)		**Masters Degree in Renewable Energy Engineering** Requires 180 credits at Level 7.
Level 7	EL4166	Research Methods	20	
		OR		
Level 7	**SC4107**	Research methodology and project management	20	**Postgraduate Diploma in Renewable Energy Engineering** Requires 120 credits at level 7.
		Option modules (Choose two of the following modules)		
Level 7	MP4706	Sensors, instrumentation and control	20	**Postgraduate Certificate in Renewable Energy Engineering** Requires 60 credits at level 7
Level 7	MP4713	Wind turbine generators, power electronics and control	20	
Level 7	MP4701	Design & operation of sustainable systems	20	
Level 7	MP4705	Sustainable systems development	20	
		Optional module for Professional placement		
Level 7	EL4101	Professional Placement (Engineering)	120 (notional credits)	
		Optional module for work placement		
Level 7	EL4102	Internship placement (Engineering)	60 (notional credits)	

15. Personal Development Planning

Academic Advisors will be assigned to all students and will assist them in developing and implementing their own Personal Development Plans. These seek to build on and enhance students' skills of reflection on their academic, personal and professional development, increase self awareness of individual skills, qualities, attitudes and capabilities; improve their learning and performance by encouraging and enabling student to take responsibility for their own development and further develop the necessary skills for independent learning. By the completion of their programme of study, and in the process of achieving this objective, students should be able to identify their own strengths, weaknesses and needs and direction for change; set goals and plan action for developing, monitoring and reviewing their own progress; compile their own records of learning experiences and achievement, including progress reviews, personal reflections and action plans; plan realistically for their career progression and manage their own career development and lifelong learning. All of this is facilitated by the course team in the School of Computing, Engineering and Physical Sciences, especially relating to Wind Energy Engineering Research Group and John Tyndall Institute.

16. Admissions criteria *
(including agreed tariffs for entry with advanced standing)

**Correct as at date of approval. For latest information, please consult the University's website.*
• Honours degree in relevant scientific, engineering and technology subjects, grade 2:2 or above. • Overseas equivalent qualifications and English IELTS 6.5 or equivalent if English is not the first language. • Students with qualifications such as HND with relevant industrial/engineering experience are welcomed. They will be judged on an individual basis and may be required to attend for interview'
17. Key sources of information about the programme
• University web site (www.uclan.ac.uk)
• School website http://www.uclan.ac.uk/scitech/computing_engineering_physical/index.php
• Course Leaders
• Admissions tutor

18. Curriculum Skills Map

Please tick in the relevant boxes where individual Programme Learning Outcomes are being assessed

Level	Module Code	Module Title	Core (C), Compulsory (COMP) or Option (O)	Programme Learning Outcomes															
				Knowledge and understanding					Subject-specific Skills				Thinking Skills			Other skills			
				A1	A2	A3	A4	A5	B1	B2	B3	B4	C1	C2	C3	D1	D2	D3	D4
LEVEL 7	EL4895	Masters Project (Eng)	C	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	MP4709	Energy Systems	COMP	✓	✓						✓	✓	✓	✓				✓	
	MP4710	Design and Analysis of Renewable Energy Systems	COMP	✓	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓		✓
	MP4708	Renewable Energy Technologies	COMP	✓			✓		✓	✓			✓					✓	
	EL4166	Research Methods	COMP											✓		✓	✓	✓	
	SC4107	Research Methodology and Project management	COMP											✓		✓	✓	✓	
	MP4706	Sensors, Instrumentation and Control	O	✓			✓		✓	✓			✓					✓	
	MP4713	Wind Turbine Generators, Power Electronics and Control	O	✓			✓		✓	✓			✓					✓	
	MP4701	Design & Op of Sustainable Systems	O										✓	✓					
	MP4705	Sustainable Systems Development	O										✓	✓					
	EL4101	Professional Placement (Engineering)	O													✓	✓	✓	✓
	EL4102	Work Placement (Engineering)	O													✓	✓	✓	✓

Note: *Mapping to other external frameworks, e.g. professional/statutory bodies, will be included within Student Course Handbooks*

19. Learning Outcomes for Exit Awards

Postgraduate Diploma in Renewable Energy Engineering

A1. Apply and critically evaluate principles, practices and tools for the design/development and analysis/evaluation of renewable energy systems.
A2. Critically analyse the environmental, social and economic impacts of renewable energy projects.
A4. Assess and critically evaluate tools for the operation/management and control/monitoring of renewable energy systems.
B1. Select and use specialised software competently for the design/development and analysis/evaluation of specific renewable energy system.
B2. Effectively use tools for the operation/management and control/monitoring of specific renewable energy system.
B3. Effectively demonstrate a professional approach to planning issues and regulations relevant to a specific renewable energy project.
B4. Critically evaluate the environmental, social and economic implications of a specific renewable energy project.
C1. Apply and combine technical and non-technical knowledge to practical engineering problem solving.
C2. Obtain, synthesis and apply information from a broad range of sources.
D1. Communicate effectively through writing and presentation to a diverse audience.
D2. Read, synthesise and produce reports to a professional standard.
D3. Learn and work independently and become reflective practitioners.
D4. Work confidently as part of a team.

Postgraduate Certificate in Renewable Energy Engineering

A1. Apply and critically evaluate principles, practices and tools for the design/development and analysis/evaluation of renewable energy systems.
A2. Critically analyse the environmental, social and economic impacts of renewable energy projects.
A4. Assess and critically evaluate tools for the operation/management and control/monitoring of renewable energy systems.
B1. Select and use specialised software competently for the design/development and analysis/evaluation of specific renewable energy system.
B2. Effectively use tools for the operation/management and control/monitoring of specific renewable energy system.
B3. Effectively demonstrate a professional approach to planning issues and regulations relevant to a specific renewable energy project.
B4. Critically evaluate the environmental, social and economic implications of a specific renewable energy project.
C1. Apply and combine technical and non-technical knowledge to practical engineering problem solving.
C2. Obtain, synthesis and apply information from a broad range of sources.
D1. Communicate effectively through writing and presentation to a diverse audience.
D2. Read, synthesise and produce reports to a professional standard.
D3. Learn and work independently and become reflective practitioners.