University of Central Lancashire

Course Handbook
MSc Mechanical Engineering

2018-19

Course Leader: Dr Justin Whitty

School of Engineering

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

Contents

1. Welcome to the course

Welcome to MSc Mechanical Engineering at UCLan. We are committed to provide you with an exciting and challenging education, and help you to deepen your knowledge and understanding in the context of mechanical engineering.

Please read the 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. Feel free to discuss any aspects with myself or any member of the course team. Enjoy your time studying with us!

Justin Whitty, Course Leader for MSc Mechanical Engineering

1.1 Rationale, aims and learning outcomes of the course

The MSc Mechanical Engineering course is intended to provide the opportunity to gain specialisation in mechanical engineering and to enable graduates to become Chartered Engineer. It has been developed as a direct result of the need for professionals within the mechanical engineering industries. The course is designed to meet Engineering Council's requirements for Partial CEng (Further Learning) and will be put forward for professional accreditation with both Institute of Mechanical Engineers (IMechE) and Institute of Engineering and Technology (IET).

The course is one year in full time and two years in part time mode. The MSc course is also designed to provide you with optional industrial placements of either three months or one year. Satisfactory completion of an industrial placement leads to the award of either MSc Mechanical Engineering with Work Placement or MSc Mechanical Engineering with Professional Placement.

The aims of the MSc Mechanical Engineering courses are:

• To provide students with skills to systematically apply mechanical engineering principles to solve complex and unpredictable real-world engineering problems, with great autonomy.
• To provide students with an in-depth knowledge and understanding of specialised areas within mechanical engineering.
• To equip students with necessary skills and expertise required to design, analyse and optimise mechanical systems..
• To prepare students for professional careers in mechanical engineering requiring high levels of judgement, team-working, leadership, initiative, delegation and decision-making responsibilities.
• To provide students with research and communication skills required to investigate new and emerging technologies and help them to be at the forefront of mechanical engineering developments.
• To develop high level of professional and ethical conduct in engineering and critical awareness of commercial and industrial constraints, health and safety and risks within the context of mechanical engineering applications.
• To fulfil educational requirements for future progression to Chartered Engineer status.

1.2 Course Team

Head of School	Rob Wallace
Academic Lead and Course Leader	Justin Whitty

Module Leaders and/or Project Supervisors			
Academic Staff	**Room**	**Telephone**	**e-mail address**
Muqi Wulan	CM037	01772-893247	MWulan@uclan.ac.uk
Matt Dickinson	CM123	01772-893261	MDickinson1@uclan.ac.uk
Graham Calderbank	CM028	01772-893318	GJCalderbank@uclan.ac.uk
Tony Broad	CM123	01772-893358	AIBroad@uclan.ac.uk
Justin Whitty	CM127	01772-893274	JWhitty@uclan.ac.uk
Hadley Brooks	CM124	01772-893326	HLBrooks@uclan.ac.uk
Gonzalo Garcia-Atance …	CM221	01772-893323	GGarcia-AtanceFatjo@uclan.ac.uk
Ahmed Onsy	CM109	01772-893266	AOnsy@uclan.ac.uk
Ian Sherrington	CM110	01772-893322	ISherrington@uclan.ac.uk
Nathalie Renevier	CM037	01772-893316	NRenevier@uclan.ac.uk
Andrew Fsandi	CM127	01772-893812	AFsadni@uclan.ac.uk
Liben Jiang	KM124	01772-895789	LJiang2@uclan.ac.uk

1.3 Expertise of staff

Dr Gonzalo Garcia-Atance Fatjo is a Lecturer in engineering. He is lecturing advanced materials and material selection. Gonzalo is research active within the area of tribotechnology and is a member of the Jost Institute.

Dr Ahmed Onsy is a Lecturer and Course Leader for MSc Maintenance Engineering. His main research interests are intelligent diagnostics and health management systems, smart maintenance systems, advanced mechatronics and embedded systems.

Dr Nathalie Renevier is a Senior Lecturer and Course Leader for the BEng (Hons) Mechanical Maintenance Engineering. She is lecturing maintenance management and is coordinating all the BEng and MEng projects. Her area of research is surface engineering (coatings, surface treatments).

Dr Hadley Brooks a Lecturer in our mechanical engineering courses. He is lecturing design and operation of sustainable systems. His research interest area is in additive manufacturing.

Professor Ian Sherrington is Professor of Tribotechnology and Director of the Jost Institute. He contributes to mechanical systems reliability and Advanced Tribology.

Dr Matthew Dickinson is a Lecturer and Course Leader for BEng/MEng Computer Aided Engineering. He is research active within the area of Tribotechnology, focussing around the piston assembly and is a member of the Jost Institute.

Mr Graham Calderbank is a Lecturer and Course Leader for BEng/MEng Motor Sports Engineering. He is research active within the area of tribotechnology and during his time at

the University he has become a member of the Jost Institute. Graham is now involved in research relating to the lubrication of marine diesel engines.

Mr Anthony Ian Broad is a Senior Lecturer in Engineering and skilled Mechanical Engineer with extensive industrial and teaching experience. Expertise in a range of engineering subject areas. Project supervisor for BEng and MEng Degree students.

Dr Justin Whitty is a Senior Lecturer and Course Leader for BEng/MEng Mechanical Engineering. He specialises in computational mechanics.

Dr Andrew Fsandi is a Lecturer in Mechanical Engineering. He specialises in computational and experimental investigation of nanofluids and gas-liquid multiphase flows; Air quality & low impact buildings.

Dr Liben Jiang is a Senior Lecturer and specialises in renewable and sustainable energy technologies and thermoelectric heating/cooling systems

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 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.

Allen Building

Medicine
Dentistry
telephone: 01772 895566
email: AllenHub@uclan.ac.uk

Harris Building

Lancashire Law School
Humanities and the Social Sciences
Centre for Excellence in Learning and Teaching
telephone: 01772 891996/891997
email: HarrisHub@uclan.ac.uk

Foster Building

Forensic and Applied Sciences
Pharmacy and Biomedical Sciences
Psychology
Physical Sciences

telephone: 01772 891990/891991
email: FosterHub@uclan.ac.uk

Computing and Technology Building

Art, Design and Fashion
Computing
Journalism, Media and Performance
Engineering
telephone: 01772 891994/891995
email: CandTHub@uclan.ac.uk

Greenbank Building

Sport and Wellbeing
Management
Business
telephone: 01772 891992/891993
email: GreenbankHub@uclan.ac.uk

Brook Building

Community, Health and Midwifery
Nursing
Health Sciences
Social Work, Care and Community
telephone: 01772 891992/891993
email: BrookHub@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.

The School of Engineering will primarily contact you via your UCLan email address, but you should also regularly check the Starfish system (student relationship management software). Details on how to do this will be given during your induction weeks, and by your academic advisors. Students can contact staff members by email, but please be aware that staff members may at times be away on business or research trips and not always have immediate access to email. In the event you need to contact a member of staff urgently then you are free to contact any other members of the team detailed above. Appointments with staff should be made via email or by using the Starfish system.

1.7 External Examiner

The University will appoint an External Examiner to your course who helps to ensure that the standards of your course are comparable to those provided at other higher education institutions in the UK. The name of this person, their position and home institution will be made available to you. If you wish to make contact with your External Examiner, you should do this through your Course Leader and not directly. External Examiner reports will be made available to you electronically. The School will also send a sample of student coursework to the external examiner(s) for external moderation purposes, once it has been marked and internally moderated by the course tutors. The sample will include work awarded the highest and lowest marks and awarded marks in the middle range.

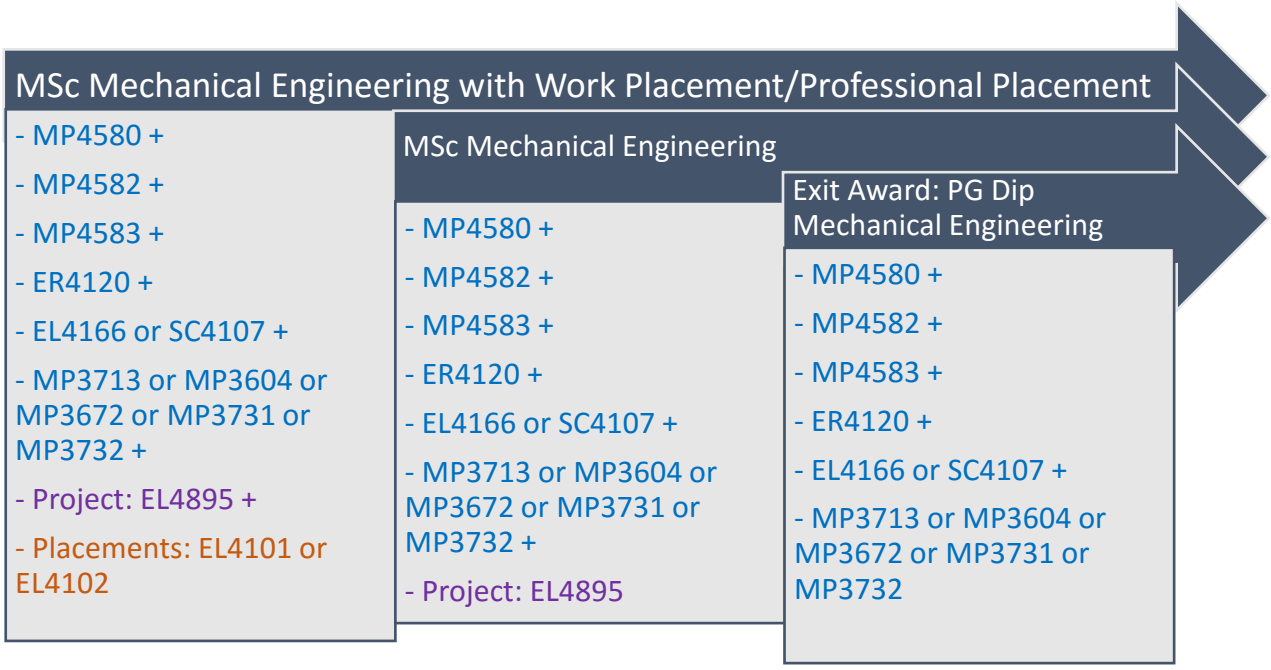
2. Structure of the course

2.1 Overall structure

13. Programme Structures				**14. Awards and Credits**
Level	**Module Code**	**Module Title**	**Credit rating**	
Level 7	EL4895 (Core)	Project (Engineering)	60	**MSc Mechanical Engineering** Requires 180 credits at level 6 or above with a minimum of 160 credits at level 7. For the award of Distinction overall APM of 70% or above must be achieved. For the award of Merit overall APM of 60% or above must be achieved. **MSc Mechanical Engineering with Professional Placement** Requires 180 credits at level 6 or above with a minimum of 160 credits at level 7 plus successful completion of EL4101
Level 7	EL4166 (COMP) **OR** SC4107 (COMP)	Research methods Research Methodology and Project Management	20 20	
Level 7	MP4580 (COMP) MP4582 (COMP) MP4583 (COMP)	Engineer and Society Advanced Tribology	20 20 20	

	ER4120 (COMP)	Advanced Engineering Systems Computational Mechanics	20	**MSc Mechanical Engineering with Work Placement** Requires 180 credits at level 6 or above with a minimum of 160 credits at level 7 plus successful completion of EL4102 **Exit Awards:** **Postgraduate Diploma Mechanical Engineering** Requires 120 credits at level 6 or above with a minimum of 100 credits at level 7. Postgraduate Diploma is normally an exit award for students who can't successfully complete the Project. **Postgraduate Certificate Mechanical Engineering** Requires 60 credits at level 6 or above with a minimum of 40 credits at level 7.
Level 7	EL4101 (O)	**Optional module for Professional placement** Professional Placement (Engineering)	120	
Level 7	EL4102 (O)	**Optional module for internship** Work Placement (Engineering)	60	
Level 6	MP3713 (O) MP3604 (O) MP3672 (O) MP3731 (O) MP3732 (O)	Choose one of the following modules: Mechanics and Materials Advanced Computer Aided Design Engineering Simulation Engineering Design Operations Management B	 20 20 20 20 20	

Progression Routes



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.

2.3 Course requirements

Specific course requirements that will affect your final award, core/compulsory and option modules and placements or field trip activities are detailed in your course supplement. Some of these 'course requirement' may be set by the professional body that accredits your course and may take precedence over the University's Academic Regulations, these, where applicable, can be found in the course supplement – so please familiarise yourself with them and ask your course leader for further clarification if required.

2.4 Progression Information

Discussions about a student's progress may take place, when needed, between the student and the student's Academic Advisor and/or Course Leader. 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

Timetables are accessible online through the UCLan Student Portal:

https://dailytimetable.uclan.ac.uk/

2.5.2 Expected hours of study

20 credits is a standard module size and equals 200 notional learning hours.
That is to say, the normal amount of work involved in achieving a successful outcome to your studies is to study for 10 hours per each credit you need to achieve – this includes attendance at UCLan and time spent in private study.
This requirement translates to a total of 6 hours per 20 credit module per week. We expect that you commit 36 hours study per week (pro-rata for part-time students and/or semester-based modules), inclusive of your contact hours. So for a typical module you may have a 2 hour lecture, and a 1 hour tutorial, leaving you approximately 3 hours for self-directed study (further reading, tutorial questions, assignments, revision). Often you will be working in groups for practical work and you should try and arrange to meet up outside the scheduled class times. You will also need to use equipment such as computer and laboratory facilities for practical work, again sometimes outside the scheduled class times.

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:
Campus Admin Services: ☎ 01772 891994 or
01772 891995 | ✉ CandThub@uclan.ac.uk

Exceptional absence requests are made to Justin Whitty (Academic Lead for Mechanical Engineering): ☎ 01772 893274 | ✉ jwhitty@uclan.ac.uk

You are encouraged to seek the advice of your Academic Adviser and/or Course Leader if your personal circumstances make it difficult to meet your study obligations.

Students should report non-attendance to the hub email – CandTHubAttendance@uclan.ac.uk or by telephoning the hub on 01772 891994 or 01772 891995.

3. Approaches to teaching and learning

3.1 Learning and teaching methods

The programme uses a number of different assessment techniques that will allow you to demonstrate your understanding of concepts and issues covered. These may be broadly categorised as *examination* and *coursework*, but several different types are used, e.g. open-book exams, closed- book exams, laboratory reports, practical assessments in the laboratory, computer simulation and analysis, written reports etc.

Evidence of achievement, upon which assessment will be based, will be gained through a programme of practical exercises, assignments and exams. Each week you may be involved in some practical work such as a laboratory exercise, a computer-based assignment, group or individual project work etc. You will often work in groups and make group presentations but you will write up and submit work individually so that you gain credit for your contribution, not that of somebody else.

It should be emphasised that the purpose of assessment is to not only grade you, and provide information to facilitate management of the course, but also to provide feedback to you. In this way you can monitor your own progress, refine your own judgement of your abilities and regulate it accordingly. You should keep all the returned work in a file and you may have to

submit this at the end of the year for the external examiners to assess. Individual module leaders will distribute information on the methods of assessment used, and their weighting, at the start of each module.

As outlined in the school handbook the normal amount of work involved in achieving a successful outcome to your studies is to study for 10 hours per each credit you need to achieve – this includes attendance at UCLan and time spent in private study.

3.2 Study skills

The course Team is committed to helping you develop the necessary study skills for success but this relies on your motivation and desire to develop and improve your skills. One of the most important study skills to develop is reading the feedback from your assignments and acting on it to improve your future work. So make sure that when you receive any feedback, develop an action plan and keep it handy to refer back to when your write your next piece of work.

All of our academic staff are able to support you in the development of your academic writing skills and you should discuss these with Course Leader and/or module leaders.

Please see your Study Skills Handbook for detailed support in the development of study skills.

There are a variety of services to support students and these include

http://www.palgrave.com/skills4study/index.asp

WISER https://www.uclan.ac.uk/students/study/wiser/index.php
LIS https://www.uclan.ac.uk/students/study/

3.3 Learning resources

3.3.1 Learning Information Services (LIS)

At UCLan all laboratories, workshops and other specialised equipment and facilities are centrally managed, thus making them available to users right across the campus. For further information please visit: http://www.uclan.ac.uk/students/study/specialist_teaching_resources/index.php.

3.3.2 Electronic Resources

LIS provide access to a huge range of electronic resources – e-journals and databases, e-books, images and texts.

3.4 Personal development planning

Your academic advisor will help you to develop a personal development plan through your course of meetings with him or her. This plan will help you to gain important skills and experiences which will help prepare you for your future careers.

3.5 Preparing for your career

Your future is important to us, so to make sure that you achieve your full potential whilst at university and beyond, your course has been designed with employability learning integrated into it. This is not extra to your degree, but an important part of it which will help you to show future employers just how valuable your degree is. These “Employability Essentials” take you on a journey of development that will help you to write your own personal story of your time at university:

- To begin with, you will explore your identity, your likes and dislikes, the things that are important to you and what you want to get out of life.
- Later, you will investigate a range of options including jobs and work experience, postgraduate study and self- employment,
- You will then be ready to learn how to successfully tackle the recruitment process.

It’s your future: take charge of it!

Careers offers a range of support for you including:-

- career and employability advice and guidance appointments
- support to find work placements, internships, voluntary opportunities, part-time employment and live projects
- workshops, seminars, modules, certificates and events to develop your skills

4. Student Support

Within the school of engineering you will find many people will be happy to help you. For module related support, you would normally contact the module tutor in the first instance. Likewise, for course enquiries your course leader will assist. Your academic advisor will also be able to provide support and direction on a number of matters. For more general enquiries the you can visit any one of the hubs. There are helpful guides available online too, just visit: http://www.uclan.ac.uk/students/

4.1 Academic Advisors

Academic Advisers provide help for students with problems and are responsible for overseeing the progress of students, their welfare, academic counselling and guidance. Your Academic Adviser is allocated when you enrol. You must see your Academic Adviser when requested and meet at least once per semester. Ensure they know you and have your current email address.

Please seek help relating to lecture material and practical classes from the module tutor in the first instance. If necessary make an appointment to seek additional support. Please remember that academic staff are busy people and may not be able to give you instant help.

Although Academic Advisers and Course Leaders will deal with most of the day-to- day questions which arise, the Head of School is always willing to see students and an appointment can be made through the Student Hub. Advice relating to administrative issues may be obtained from the Student Hub.

4.2 Students with disabilities

If you have a disability that may affect your studies, please either contact the Disability

Advisory Service - disability@uclan.ac.uk - or let one of the course team know as soon as possible. With your agreement information will be passed on to the Disability Advisory Service. The University will make reasonable adjustments to accommodate your needs and to provide appropriate support for you to complete your study successfully. Where necessary, you will be asked for evidence to help identify appropriate adjustments.

Assessment arrangements for students with a disability

Arrangements are made for students who have a disability/learning difficulty for which valid supporting evidence can be made available. Contact the Disability Adviser for advice and information, disability@uclan.ac.uk

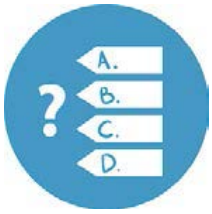
The School of Engineering Disability Tutor is: Dr J. Yazdani, Email: JYazdani@uclan.ac.uk

4.3 Students' Union One Stop Shop

The Opportunities Centre is the Union's One Stop Shop to find employment or volunteering whilst you study. With thousands of jobs and voluntary positions advertised, agency work through the Bridge and information on over 2000 volunteer positions within the Union.

If your course is for students not studying on the main campus please include the following : – as one of the thousands of students who are not studying on the main UCLan campus in Preston, the Students Union is still your union, please check http://www.uclansu.co.uk/ for full details on what we may be running in your partner institution.

5. Assessment



5.1 Assessment Strategy

The assessment strategy for each module will be outlined within the module. The modules will be assessed either as coursework or by a combination of coursework and examinations with the weightings reflecting the course content (theory/practical). Each of the assessments that you complete will assess a series of learning outcomes defined in the modules. Note that within some modules you may complete assessments that do not carry marks, these are termed formative and are an opportunity for you to gain feedback on your progress that will help you in your summative (mark carrying) assessments.

5.2 Notification of assignments and examination arrangements

This information will be provided within your course supplement handbook and in your module information packs.

5.3 Referencing

For most of your assignments you will be expected to do some further reading, and you are required to think and produce increasingly original work around the work of others. **Do not fall into the 'plagiarism trap' either deliberately or by accident.** You need to give suitable credit to those that have produced the work that you are using.
You should reference any information you have refer to in your assignment using the Harvard referencing system (a guide to this system can be found on the WISER Blackboard space, accessed through the student portal).
You find information on the Harvard referencing system on the internet (google 'Harvard Referencing').

5.4 Confidential material

In the cases where Engineering students might use confidential information you should take guidance from your module tutor on your ethical and legal responsibilities to respect confidentiality and maintain anonymity of individuals within their assignments.

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.

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.

- Distinction; overall mark of 70% or above must be achieved.
- Merit; overall mark of 60% or above must be achieved.
- Pass; overall mark of 50% or above.

7

7. Student Feedback

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

In addition to the on-going 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. We encourage students to provide constructive feedback throughout their time at university, through course reps, surveys and any other appropriate means,

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.

The purpose of a SSLC meeting is to provide the opportunity for course representatives to feedback to staff about the course, the overall student experience and to inform developments which will improve future courses. These meetings are normally scheduled once per semester.

Meetings will be facilitated using guidelines and a record of the meeting will be provided with any decisions and / or responses made and / or actions taken as a result of the discussions held. The meetings include discussion of items forwarded by course representatives, normally related to the following agenda items
(dependent on time of year).

The course team encourage student feedback in all areas and recognize that additional items for discussion may also be raised at the meeting

- Update on actions completed since the last meeting
- Feedback about the previous year – discussion of external examiner's report; outcomes of National /UCLan student surveys.
- Review of enrolment / induction experience;

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	University of Central Lancashire
3. University School/Centre	School of Engineering
4. External Accreditation	Accreditation will be sought from both IMechE and IET
5. Title of Final Award	MSc Mechanical Engineering.
6. Modes of Attendance offered	Full Time; Part time
7a) UCAS Code	
7b) JACS Code	

8. Relevant Subject Benchmarking Group(s)	QAA Engineering Subject Benchmark (Available at: http://www.qaa.ac.uk/en/Publications/Documents/SBS-engineering-15.pdf**)** Engineering Council UK-SPEC (Available at: https://www.engc.org.uk/ukspec)
9. Other external influences	Accreditation requirements of IMechE. Accreditation requirements of IET QAA Academic Infrastructure Codes of Practice.
10. Date of production/revision of this form	January 2017

11. Aims of the Programme

- To provide students with skills to systematically apply mechanical engineering principles to solve complex and unpredictable real-world engineering problems, with great autonomy.
- To provide students with an in-depth knowledge and understanding of specialised areas within mechanical engineering.
- To equip students with necessary skills and expertise required to design, analyse and optimise mechanical systems..
- To prepare students for professional careers in mechanical engineering requiring high levels of judgement, team-working, leadership, initiative, delegation and decision-making responsibilities.
- To provide students with research and communication skills required to investigate new and emerging technologies and help them to be at the forefront of mechanical engineering developments.
- To develop high level of professional and ethical conduct in engineering and critical awareness of commercial and industrial constraints, health and safety and risks within the context of mechanical engineering applications.
- To fulfil educational requirements for future progression to Chartered Engineer status.

12. Learning Outcomes, Teaching, Learning and Assessment Methods

The Engineering Council sets the overall requirements for the Accreditation of Higher Education Programmes (AHEP) in engineering, in line with the UK Standard for Professional Engineering Competence (UK-SPEC). AHEP sets the learning outcome for accredited degree programmes in five categories: Science and Mathematics (SM); Engineering Analysis (EA); Design (D); Economic, Legal, Social, Ethical and Environmental Context (ET); Engineering Practice (EP). The latest edition of AHEP can be found at this link: http://www.engc.org.uk/ahep

The following sections A, B, C, and D are written in the UCLan format, referring to the corresponding learning outcomes in AHEP (for full CEng). Postfix 'fl' Indicates that the learning outcome is for Partial CEng (Further Learning) accreditation.

A. Knowledge and Understanding

A1. Comprehensive understanding of the scientific principles and concepts relevant to Mechanical Engineering, some from outside engineering, and the ability to evaluate them critically and to apply them effectively, including in engineering projects. (SM1fl, SM3fl)

A2. Knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations. (D2fl)

A3. Knowledge, understanding and skills to work with information that may be incomplete or uncertain, quantify the effect of this on the design and, where appropriate, use theory or experimental research to mitigate. (D1fl)

A4. Knowledge and understanding of management and business practices, their limitations, and how these may be applied in the context of mechanical engineering. (ET3fl)

A5. Awareness that engineering activities should promote sustainable development and ability to apply quantitative techniques where appropriate. (ET4fl)

A6. Advanced level knowledge and understanding of a wide range of engineering materials and components. (EP1fl)

Teaching and Learning Methods

Lectures/classes: offer information, literature review and illustrative application and present and explore core ideas in the subject. A student prepares solutions to questions on an examples sheet, which will be discussed in a class. This provides a student with the opportunity to follow-up the lectures with first self-study and then group discussion to deepen their individual knowledge of the topic.
Research skills classes: research skills are taught in classes, principally involving group activities, with some preparation and post class assignments. These are in support of general skill development and to support the group and research projects in particular.
Practical sessions: computational methods are taught as a series of computer-based practicals with short introductory lectures on theory. This enables a student to understand issues in application of computational methods to simulated and real problems and also develop computing skills relevant to the rest of the course including the research project. Practicals, computer-based and experimental lab based, provide an opportunity for a student to consolidate the theory they have learned in lectures with practical experience.
Group project: provides an opportunity to study a real mechanical, thermal, materials engineering problems in depth, practice analytic and problem-solving skills, and work in a team.
Individual project: involves a literature review, problem specification and experiments/analysis written up in a report. This enables a student to demonstrate that they can apply the knowledge they have acquired on different aspects of the course to a mechanical and tribological engineering problem in some depth as well as put into practice general research skills.
In addition:
Expert (guest) lectures or seminars: provide a student with the opportunity to hear internal speakers and external speakers from industry. This enables a student to gain appreciation of some applications, needs and roles of maintenance engineers as well as career opportunities.

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. Thorough understanding of current practice and its limitations, and some appreciation of likely new developments. (EP2fl)
B2. Apply appropriate engineering analysis methods for solving complex problems in mechanical engineering and to assess their limitations. (EA 1fl)
B3. Awareness of relevant regulatory requirements governing engineering activities in the context of mechanical engineering (ET5fl)
B4. Awareness of and ability to make general evaluations of risk issues in the context of mechanical engineering, including health & safety, environmental and commercial risk (ET6fl)
B5. Critical awareness of current problems and/or new insights most of which is at, or informed by, the forefront of the mechanical engineering. (SM2fl)

Teaching and Learning Methods

Lectures/classes: offer information, literature review and illustrative application and present and explore core ideas in the subject. A student will apply intellectual skills to prepare solutions to examples sheet questions which will be discussed in class.
Practical sessions: computational methods are taught as a series of computer-based practicals with short introductory lectures on theory. This enables a student to understand issues in application of computational methods to simulated and real problems and also develop computing skills relevant to the rest of the course including the research project. Practicals, computer-based and experimental lab based, provide an opportunity for a student to consolidate the theory they have learned about in lectures and apply it to problems.
Group project: provides an opportunity to study a real sustainable mechanical and tribology engineering problem in depth, practice analytic and problem-solving skills, and work in a team
Individual project: involves a literature review, problem specification and experiments/analysis written up in a report. This enables a student to practice the application of techniques they have learned about to an engineering problem in some depth as well as put into practice general research skills.

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.

C. Thinking Skills

C1. Use fundamental knowledge to investigate new and emerging technologies (EA2fl).
C2. Generate an innovative design for products, systems, components or processes to fulfil new needs. (D3fl)
C3. Collect and analyse research data and to use appropriate engineering analysis tools in tackling unfamiliar problems, such as those with uncertain or incomplete data or specifications, by the appropriate. (EA3fl)
C4. Apply engineering techniques, taking account of a range of commercial and industrial constraints. (EP3fl)

Teaching and Learning Methods

Lectures/classes: offer information, literature review and illustrative application and present and explore core ideas in the subject. A student will apply intellectual skills to prepare solutions to examples sheet questions which will be discussed in class.
Practical sessions: computational methods are taught as a series of computer-based practicals with short introductory lectures on theory. This enables a student to understand issues in application of computational methods to simulated and real problems and also develop computing skills relevant to the rest of the course including the research project. Practicals, computer-based and experimental lab based, provide an opportunity for a student to consolidate the theory they have learned about in lectures and apply it to problems.
Group project: provides an opportunity to study a real sustainable mechanical and tribology engineering problem in depth, practice analytic and problem-solving skills, and work in a team
Individual project: involves a literature review, problem specification and experiments/analysis written up in a report. This enables a student to practice the application of techniques they have learned about to an engineering problem in some depth as well as put into practice general research skills.

Assessment methods

A variety of assessments including, written examinations, written essay assignments, Group project report and team presentation, Individual project report and short presentation/viva.

D. Other skills relevant to employability and personal development

D1. Apply their skills in problem solving, communication, information retrieval, working with others, and the effective use of general IT facilities (G1)
D2. Plan self-learning and improve performance, as the foundation for lifelong learning/CPD (G2)
D3. Monitor and adjust a personal programme of work on an on-going basis (G3)
D4. Exercise initiative and personal responsibility, which may be as a team member or leader (G4)
D5. Understanding of different roles within an engineering team and the ability to exercise initiative and personal responsibility, which may be as a team member or leader. (EP4fl)
D6. Awareness of the need for a high level of professional and ethical conduct and that engineers need to take account of the commercial and social contexts in which they operate in engineering. (ET1fl, ET2fl)

Teaching and Learning Methods

Lectures/classes: offer information, literature review and illustrative application and present and explore core ideas in the subject. A student will prepare solutions to problems set in an examples sheet, which will be discussed in a class. This provides a student with the opportunity to follow-up the lectures with first self-study and then group discussion to deepen their individual knowledge of the topic.
Practical sessions: Computational methods will be taught as a series of computer-based practicals with short introductory lectures on theory. This enables a student to understand issues in application of computational methods to simulated and real problems and also develop computing skills relevant to the rest of the course including the research project. Practicals, computer-based and experimental lab based, will provide an opportunity for a student to consolidate the theory they have learned about in lectures with practical experience.
Group project: provides an opportunity to study a real sustainable mechanical engineering problems in depth, practice analytic and problem-solving skills, and work in a team.

Individual project: involves a literature review, problem specification and experiments/analysis written up in a report. This enables a student to apply knowledge developed on the course practice to a engineering problem in some depth as well as put into practice general research skills. Student led presentation: involves a self directed study and preparation of and participation in student-led project presentations
Assessment methods
A variety of assessments including, group project presentations, Masters Project report and presentation thoroughly test the students' ability to apply these other skills.

13. Programme Structures*				14. Awards and Credits*
Level	**Module Code**	**Module Title**	**Credit rating**	
Level 7	EL4895 (Core)	Project (Engineering)	60	**MSc Mechanical Engineering** Requires 180 credits at level 6 or above with a minimum of 160 credits at level 7. Students who also successfully complete module EL4101 will receive the award with 'professional placement'. Students who also successfully complete module EL4102 will receive the award with 'work placement'. **Exit Awards:** **Postgraduate Diploma Mechanical Engineering** Requires 120 credits at level 6 or above with a minimum of 100 credits at level 7. **Postgraduate Certificate Mechanical Engineering** Requires 60 credits at level 6 or above with a minimum of 40 credits at level 7.
Level 7	EL4166 (COMP) **OR** SC4107 (COMP)	Research methods Research Methodology and Project Management	20 20	
Level 7	MP4580 (COMP) MP4582 (COMP) MP4583 (COMP) ER4120 (COMP)	Engineer and Society Advanced Tribology Advanced Engineering Systems Computational Mechanics	20 20 20 20	
Level 7	EL4101 (O)	**Optional module for Professional placement** Professional Placement (Engineering)	120	
Level 7	EL4102 (O)	**Optional module for internship** Work Placement (Engineering)	60	
Level 6	MP3713 (O) MP3604 (O) MP3672 (O) MP3731 (O) MP3732 (O)	Choose one of the following modules: Mechanics and Materials Advanced Computer Aided Design Engineering Simulation Engineering Design Operations Management B	 20 20 20 20 20	

15. Personal Development Planning

Personal Development Planning (PDP) is:

- Reflection on learning, performance, and achievement
- Planning for personal, educational, and career development.

PDP can improve student capacity to understand what and how they are learning; and to review, plan, and take responsibility for their own learning. It will help students to gain a holistic overview of their studies, by reflection and a pro-active approach. It applies to student academic study, extra-curricular pursuits, and career planning. Student Personal Tutor will be able to give more focused attention to personal particular needs.

Student will be introduced to PDP during induction week activities, and will have completed some work in preparation for the first meeting with Personal Tutor. A wide range of material that will constitute the PDP portfolio is available through Blackboard (E-Learn). PDP will form the focus of student regular (once per month) meeting, but can be raised at any other occasion.

Student portfolio work in PDP is assessed but not graded and feedback is provided to students. Students are encouraged to recognise that learning is a lifelong process, and that the time at University will be enhanced by planning and recording. There are many similarities to work-based learning, and Continued Professional Development (CPD) - which is required for membership of professional societies. The skills in PDP are key components of employability – self-reflection, recording, target setting, action planning and monitoring.

Web based materials relevant to PDP are found at:

Personal Development Planning

http://www.uclan.ac.uk/information/services/ldu/pdp/index.php

Skills Learning Resources

http://www.uclan.ac.uk/information/services/ldu/pdp/skills_learning_resources.php

There is much information available from other sources, which student can locate using a web search engine.

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.*

Specific entry requirements for a MSc in Mechanical Engineering degree are:

Entry can be made to the course through holding at least a lower second class award of BEng (Hons) or BSc (Hons) in Mechanical Engineering, Material Engineering or other related subject.

Applications from individuals with non-standard qualifications or relevant work / life experience who can demonstrate the ability to cope with and benefit from Master-level studies are welcome. If you have not studied recently you may need to undertake a Top-Up degree Entry programme first.

Students whose first language is not English will be required to demonstrate competence in the language. The normal minimum standard required is IELTS 6.5 or equivalent.

17. Key sources of information about the programme

- **UCLAN website:** www.uclan.ac.uk
- **QAA: UK Quality Code for Higher Education:** **http://www.qaa.ac.uk/en/Publications/Documents/qualifications-frameworks.pdf**
- **QAA Engineering Subject Benchmark Statement:** **http://www.qaa.ac.uk/en/Publications/Documents/SBS-engineering-15.pdf**

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 relevant to employability and personal development						
				A1	A2	A3	A4	A5	A6	B1	B2	B3	B4	B5	C1	C2	C3	C4	D1	D2	D3	D4	D5	D6
7	EL4895	Project (Engineering)	C	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√			√
	ER4120	Computational Mechanics	COMP	√		√			√	√	√						√		√	√				
	MP4580	Engineer and Society	COMP				√	√		√		√	√					√				√	√	√
	MP4582	Advanced Tribology	COMP	√		√			√	√				√	√	√			√	√				
	MP4583	Advanced Engineering Systems	COMP	√		√			√	√	√						√		√	√				
	EL4101	Professional Placement (Engineering)	O			√	√	√			√	√	√		√	√		√	√	√	√	√	√	√
	EL4166	Research Methods	COMP			√				√				√	√		√		√	√	√	√		√
	SC4107	Research Methodology and Project Management	COMP			√				√				√	√		√		√	√	√	√		√
	EL4102	Work Placement (Engineering)	O			√	√	√			√	√	√		√	√		√	√	√	√	√	√	√
6	MP3731	Engineering Design	O	√	√	√				√	√				√	√			√	√				
	MP3604	Advanced Computer Aided Design	O	√	√	√				√	√				√	√			√	√				
	MP3672	Engineering Simulation	O	√		√			√	√	√						√		√	√				
	MP3732	Operations Management B	O			√	√	√				√	√	√			√	√	√	√	√			√
	MP3713	Mechanics and Materials	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:

For **each exit award available**, list learning outcomes relating to the knowledge and understanding, subject specific skills, thinking, other skills relevant to employability and personal development that a typical student might be expected to gain as a result of successfully completing each level of a course of study.

For example, for a standard BA/BSc (Hons) award the exit award learning outcomes for CertHE (Level 4) and DipHE (Level 5), BA/BSc (Level 6) should be included; for a postgraduate Masters, this would normally be PGDip and PGCert.

Learning outcomes for the award of: __PGCert Mechanical Engineering_____

A1: Comprehensive understanding of the scientific principles and concepts relevant to Mechanical Engineering, some from outside engineering.

A5: Awareness that engineering activities should promote sustainable development and ability to apply quantitative techniques where appropriate.

B1: Thorough understanding of current practice and its limitations, and some appreciation of likely new developments.

B2: Apply appropriate engineering analysis methods for solving complex problems in mechanical engineering and to assess their limitations.

C1: Use fundamental knowledge to investigate new and emerging technologies

C4: Apply engineering techniques, taking account of a range of commercial and industrial constraints.

Learning outcomes for the award of: __PGDip Mechanical Engineering_____

A1: Comprehensive understanding of the scientific principles and concepts relevant to Mechanical Engineering, some from outside engineering.

A2: Knowledge and comprehensive understanding of design processes and methodologies and the ability to apply and adapt them in unfamiliar situations.

A4: Knowledge and understanding of management and business practices, their limitations, and how these may be applied in the context of mechanical engineering.

A5: Awareness that engineering activities should promote sustainable development and ability to apply quantitative techniques where appropriate.

B1: Thorough understanding of current practice and its limitations, and some appreciation of likely new developments.

B2: Apply appropriate engineering analysis methods for solving complex problems in mechanical engineering and to assess their limitations.

C1: Use fundamental knowledge to investigate new and emerging technologies

C2: Generate an innovative design for products, systems, components or processes to fulfil new needs.

C4: Apply engineering techniques, taking account of a range of commercial and industrial constraints.

D1: Apply their skills in problem solving, communication, information retrieval, working with others, and the effective use of general IT facilities.

D4: Exercise initiative and personal responsibility, which may be as a team member or leader.

D5: Understanding of different roles within an engineering team and the ability to exercise initiative and personal responsibility, which may be as a team member or leader.

D6: Awareness of the need for a high level of professional and ethical conduct and that engineers need to take account of the commercial and social contexts in which they operate in engineering.