Course Handbook

BEng (Hons) Mechatronics and Intelligent Machines

2019/2020

Dr. Ahmed Onsy
School of Engineering

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

Contents

1. Welcome to the course

Welcome to BEng (Hons) Mechatronics and Intelligent Machines 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 Mechatronics and Intelligent Machines 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!

Dr Ahmed Onsy, Course Leader for BEng (Hons) Mechatronics and Intelligent Machines

1.1 Rationale, aims and learning outcomes of the course

The BEng (Hons) Mechatronics and Intelligent Machines course is intended to provide the opportunity to gain specialisation in Mechatronics and Intelligent Machines engineering and to enable graduates to join BEng (Hons) Mechatronics and Intelligent Machines and become Chartered Engineer. It has been developed as a direct result of the need for professionals within the Mechatronics and Intelligent Machines 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 Institute of Engineering and Technology (IET).

The course is one year in full time and two years in part time mode. The BEng 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 BEng (Hons) Mechatronics and Intelligent Machines with Work Placement or BEng (Hons) Mechatronics and Intelligent Machines with Industrial Placement.

The aim of the programme is to educate learners to act effectively in the management and use of mechanical technology. This will involve:
• Selecting and applying existing and emerging mechatronics and intelligent machines technologies to solve engineering problems
• Applying appropriate theoretical and practical methods in mechatronics and intelligent machines engineering
• Applying technical and commercial management processes
• Managing the improvement and control of quality in systems and products
• Developing an appropriate continuing personal development strategy
• To fulfil educational requirements for future progression to Chartered Engineer status.
• To further enhance students' career potential and overall employability.

1.2 Course Team

Head of School	Rob Wallace
Academic Lead	Ahmed Onsy
Course Leader	Ahmed Onsy

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
Tony Broad	CM123	01772-893358	AIBroad@uclan.ac.uk
Hadley Brooks	CM124	01772-893326	HLBrooks1@uclan.ac.uk
Geng Feng	CM221	01772-893323	GFeng@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
Martin Varley	CM134	01772-893272	MRVarley@uclan.ac.uk
Aikaterini Fragaki	CM021	01772-89	AFragaki@uclan.ac.uk

1.3 Expertise

Dr Ahmed Onsy is Principal Lecturer and the Academic Lead – Mechanical Engineering and Maintenance Engineering and Course Leader for BEng (Hons) Mechatronics and Intelligent Machines and MSc Maintenance Engineering. His main research interests are intelligent diagnostics and health management systems, smart maintenance systems, advanced mechatronics and embedded systems.

Dr Geng Feng is a Lecturer in engineering. He is lecturing Reliability & Maintenance Engineering . Geng is research active within the area of tribotechnology and is a member of the Jost Institute.

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 Senior Lecturer in our manufacturing 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 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.

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

Please refer to the programme specification contained in appendix 8.1.

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 Module Registration Options

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.

Students who successfully complete the BEng (Hons) Mechatronics and Intelligent Machines course with a first or second class (Hons) can continue their study and join one of the following MSc courses:

- **MSc Mechatronics and Intelligent Machines**
- **MSc Intelligent Maintenance Engineering**
- **MSc Maintenance Engineering**

For further information about the above courses, please see UCLan web page below
http://www.uclan.ac.uk/courses/msc_pgdip_pgcert_maintenance_engineering.php

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.
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 classtimes.

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.u

Exceptional absence requests are made to Dr. Ahmed Onsy (Academic Lead for Mechatronics and Intelligent Machines Engineering): ☎ 01772 893266 | ✉

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.

You will be able to record your journey using Pebblepad, the university's e-portfolio system, which will leave you with a permanent record of all the fantastic things you have achieved during your time at UCLan.

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

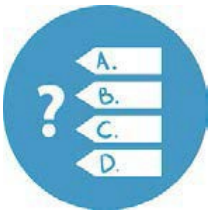
and information, disability@uclan.ac.u

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

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

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.

Degree Apprenticeship Students

Achievement of the formal qualifications is part of a broader audit-based end-point employer endorsement with a rigorous interview/viva, which incorporates a detailed occupational development record and portfolio of evidence. Apprentice certification can only be awarded when all elements have been achieved.

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.

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, Preston
4. External Accreditation	Not Applicable
5. Title of Final Award	BEng (Hons) Mechatronics and Intelligent Machines
6. Modes of Attendance offered	Full time / Part time
7. UCAS Code **7b JACS Code**	H730/100170
8. Relevant Subject Benchmarking Group(s)	QAA Engineering subject benchmark statement 2015 Engineering Council UK-SPEC.
9. Other external influences	The QAA subject benchmark is now aligned with the Engineering Council and Engineering Professors Council statement. (UK Spec)
10. Date of production/revision of this form	January 2019
11. Aims of the Programme	
The aim of the programme is to educate learners to act effectively in the management and use of mechanical technology. This will involve:	
• **Selecting and applying existing and emerging mechatronics and intelligent machines technologies to solve engineering problems**	
• **Applying appropriate theoretical and practical methods in mechatronics and intelligent machines engineering**	
• **Applying technical and commercial management processes**	
• **Managing the improvement and control of quality in systems and products**	
• **Developing an appropriate continuing personal development strategy**	

- **To fulfil educational requirements for future progression to Chartered Engineer status.**
- **To further enhance students' career potential and overall employability.**

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 six categories: Science and Mathematics (SM); Engineering Analysis (EA); Design (D); Economic, Legal, Social, Ethical and Environmental Context (ET); Engineering Practice (EP); Additional general skills (AGS). 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. critical understanding and systematic use of the key aspects of mechatronics systems engineering, including acquisition of intelligent machines (SM, D, EP)
A2. deploy accurately established techniques of analysis including knowledge of a range of simulation methods in engineering design and analysis, (EA)
A3. describe and comment on current research in robotics and autonomous systems, including knowledge of the appropriate use, (SM, D, EP)
A4. knowledge of the methods used in electromechanical systems, microcontroller, programmable logic controllers. embedded real time systems, and the role of engineering in an industrial and commercial context (D, EP, ET4m, ET5m, ET6m)
A5. critical understanding of the processes used in project management, operations and maintenance management, and Engineering professionalism (ET, AGS).

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. Practical's, 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 mechatronics and intelligent machines systems, 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 mechatronics and intelligent machines 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 mechatronics and intelligent machines engineers as well as career opportunities.

Assessment methods

Various including: tutorial questions, examination, Blackboard questions, assignment, presentation, poster, written reports, etc.

B. Subject-specific skills

Graduates must be able to demonstrate that they are able to apply appropriate quantitative science and engineering tools in order to:
B1. Conduct appropriate design, analysis or synthesis (SM, EA)
B2. Specify, plan, manage, review and apply knowledge and understanding, to initiate and carry out an engineering project or solution to a problem (ET, AGS).
B3. critically evaluate assumptions, abstract concepts and data to achieve solutions to engineering problems (EA).

B4 communicate information, ideas, problems and solutions to both specialist and non-specialist audiences. (AGS)

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 mechatronics, intelligent machines systems, 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

Various including: tutorial questions, examination, Blackboard questions, assignment, presentation, poster, written reports, etc.

C. Thinking Skills

Graduates must be able to demonstrate that they are able to:
C1. Comprehend a broader picture and work with an appropriate level of detail when formulating, evaluating and implementing technical solutions (AGS)
C2. Incorporate the broader aspects of engineering and place solutions to problems in a business, environmental and industrial context (AGS)

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 mechatronics and intelligent machines systems, 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

Various including: tutorial questions, examination, Blackboard questions, assignment, presentation, poster, written reports, etc.

D. Other skills relevant to employability and personal development

Graduates must be able to demonstrate that they have acquired transferable skills that will be of values in a wide range of situations. Namely, they should be able to:
D1. Communicate technical ideas accurately, persuasively and succinctly in writing and orally through a variety of media (AGS)
D2. Consider initiative solutions to problems working in association with members of a group (EP)
D3. Decision-making and work independently in in complex problems solving
D4. Locate, use, and critically evaluate information from a number of sources (including IT based sources) (EP, ET)
D5. Use IT skills effectively (AGS)
D6. Learning ability to undertake further professional training (AGS)

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 practical's 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 mechatronics and intelligent machines, 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 an 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

Various including: tutorial questions, examination, Blackboard questions, assignment, presentation, poster, written reports, etc.

13. Programme Structures*				**14. Awards and Credits**
NOTE: The Degree Apprenticeship route through the course has no optional modules. Modules included in this route are marked (DA). This restricted version of the course is mapped to the approved DA Standard 'Product Design and Development Engineer (Level 6)' (ST0027): https://www.instituteforapprenticeships.org/apprenticeship-standards/product-design-and-development-engineer-degree/				
Level	**Module Code**	**Module Title**	**Credit rating**	
		CORE MODULE:		**BEng (Hons) in Mechatronics & Intelligent Machines**
Level 6	EL3995	Project (core)	30	360 credits including 220 credits at Level 5 or above and 100 credits at Level 6 or above.
	or	or		
Level 6	MP3995 (DA)	Project (core)	20	
		COMPULSORY MODULE:		
Level 6	ER3200 (DA)	Mechatronics	20	**BEng Mechatronics and Intelligent Machines**
		OPTION MODULES: choose 3 from: (only one MP module may be chosen)		320 credits including 180 credits at Level 5 or above and 60 credits at Level 6 or above.
Level 6	EL3300	Machine Intelligence	20	
		or		
Level 6	EL3007	Robotics and Autonomous Systems	20	
		or		
Level 6	ER3201 (DA)	Electromechanical Systems	20	
		or		
Level 6	ER3202 (DA)	Programmable Logic Controllers	20	
		or		
Level 6	EL3250	Microcontroller Systems	20	
		or		
Level 6	EL3243	Embedded Real Time Systems	20	
		or		
Level 6	MP3604	Advanced Computer Aided Design	20	
		or		
Level 6	MP3672	Engineering Simulation	20	
		or		
Level 6	MP3680	Fundamental of Engineering Simulation	20	
		or		
Level 6	ER3801 (DA)	Advanced Engineering Portfolio	20	
Level 6		**OPTION MODULES:** choose 1 from:		
Level 6	EL3996	Engineering Professionalism	10	
		or		
Level 6	MP3732	Operations Management B	20	
		or		
Level 6	MP3704 (DA)	Maintenance Management	20	
		or		
Level 6	MP3703	Project Management	20	

Optional module for placement:				
Level 6	EI3999	**Optional module for Industrial Placement** Industrial placement	120	Students who also successfully complete module EI3999 will have the award 'with industrial placement'.
Level 6	EI3998	**Optional module for Work Placement** Work placement (Engineering)	60	Students who also successfully complete module EI3998 will have the award 'with work placement'.
	Choose 1 module from the following options			**Diploma of Higher Education in Computer Aided Engineering** 240 credits including 100 credits at Level 5 or above.
Level 5 or Level 5	SC2153 or MP2714 (DA)	Further Eng'g Maths & Simulation or Computer Aided Design & Simulation	20 or 20	
Level 5	MP2570 (DA)	Engineering Design & Manufacture	40	
		Choose 2 modules from the following options		
Level 5	MP2576 (DA)	Thermo-fluids	20	
Level 5	MP2721 (DA)	Operations Management A	20	
Level 5	EL2241 (DA)	Electronic Systems	20	
	Choose 1 module from the following options			
Level 5 or Level 5	MP2590 or EL2104 (DA)	Dynamic Modelling of Eng'g Systems or Instrumentation & Control (O)	20 or 20	
Level 4	ER1010 (DA)	Engineering Analysis	30	**Certificate of Higher Education** 120 credits including 100 credits at Level 4 or above.
Level 4	ER1020 (DA)	Engineering Design	30	
Level 4	ER1030 (DA)	Engineering Science	30	
Level 4	ER1730 (DA)	Electronics and Electronic Engineering Practice	30	

* Pre-requisite(s) or equivalent may apply.
Only one module could be chosen from: MP3604, MP3672, MP3680.
Only one module could be chosen from: EL3996, MP3732, MP3704, MP3703; If EL3995 is chosen as the project module, EL3996 must be chosen.

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

Programme Specifications include minimum entry requirements, including academic qualifications, together with appropriate experience and skills required for entry to study. These criteria may be expressed as a range rather than a specific grade. Amendments to entry requirements may have been made after these documents were published and you should consult the University's website for the most up to date information.
Students will be informed of their personal minimum entry criteria in their offer letter.

Standard UCLan entry criteria apply for this course. The UCAS points requirement is reviewed regularly and current information is available on the course web pages.

Entry qualifications (A-levels, BTEC, and other equivalent qualifications) must include Maths, Science or Technology at A2 level or equivalent, and GCSE Maths and English at Grade C or above.

Applications from individuals with non-standard qualifications, relevant work or life experience and who can demonstrate the ability to cope with and benefit from degree-level studies are considered.

Students permitted to enter with Advanced Standing (L5 or L6) will normally be required to posses at least an HNC, HND, Foundation Degree, or other equivalent UK, EU or overseas qualification in Engineering based subjects related to Mechatronics and Intelligent Machines, or overseas Engineering students who completed three years of study in subjects' area related to Mechatronics and Intelligent Machines. All applicants will be assessed for admission to the course on an individual basis.

Students speaking English as a second language are required to achieve IELTS 6.0 or equivalent (e.g. as demonstrated by previous study in English.)

17. Key sources of information about the programme

- University web site (www.uclan.ac.uk)
- School website http://www.uclan.ac.uk/research/engage/eic/index.php
- Course Leader Maintenance Engineering, (http://www.uclan.ac.uk/staff_profiles/ahmed_onsy.php)
- Admissions tutor
- 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

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	B1	B2	B3	B4	C1	C2	D1	D2	D3	D4	D5	D6
LEVEL 6	EL3995 MP3995	Project	C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
	ER3200	Mechatronics	COMP	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	EL3300	Machine Intelligence	O*	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	EL3007	Robotics and Autonomous Systems	O*	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	ER3201	Electromechanical Systems	O*	✓			✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	ER3202	Programmable Logic Controllers	O*	✓			✓		✓		✓	✓		✓	✓	✓	✓	✓	✓	
	EL3250	Microcontroller Systems	O*	✓			✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	EL3243	Embedded Real Time Systems	O*	✓			✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
	MP3604	Advanced Computer Aided Design	O*	✓	✓				✓		✓				✓		✓	✓	✓	
	MP3672	Engineering Simulation	O*	✓	✓				✓		✓		✓	✓	✓		✓	✓	✓	
	MP3680	Fundamental of engineering Simulation	O*	✓	✓				✓		✓		✓	✓	✓		✓	✓	✓	
	ER3801	Advanced Engineering Portfolio	O	Learning Outcomes addressed depends on specific topic(s) covered with the module																
	EL3996	Engineering Professionalism	O*					✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
	MP3703	Project Management	O*					✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
	MP3732	Operations Management B	O*					✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
	MP3704	Maintenance Management	O*					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	EI3999	Industrial placement	O	✓	✓	✓	✓	✓	✓	✓		✓				✓	✓			✓
	EI3998	Work Placement (Engineering)	O	✓	✓	✓	✓	✓	✓	✓		✓				✓	✓			✓
-	SC2153	Further Eng Math and Sim	O		✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

	MP2714	Computer Aided Design & Simulation	O		✓				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	MP2721	Ops Management A	O		✓			✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓
	MP2570	Engineering Design & Development (40)	COMP				✓	✓	✓		✓	✓	✓	✓	✓	✓		✓	✓	
	MP2590	Dyn Mod of Engg Sys	O				✓		✓				✓		✓	✓		✓	✓	
	MP2576	Thermo-fluids	O	✓	✓			✓	✓	✓	✓		✓	✓	✓			✓	✓	
	MP2899	Industrial Placement	O	✓	✓		✓	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓
	EL2104	Instrumentation & Control	O	✓	✓	✓	✓		✓				✓		✓	✓		✓	✓	
	EL2241	Electronic Systems	O	✓		✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Level 4	ER1020	Engineering Design	COMP	✓			✓		✓				✓		✓				✓	
	ER1030	Engineering Science	COMP	✓	✓			✓	✓	✓			✓	✓		✓				
	ER1010	Engineering Analysis	COMP	✓	✓				✓	✓			✓	✓			✓			
	ER1730	Electronics and Electronic Engineering Practice	COMP	✓	✓				✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓

Note: **** Pre-requisite(s) or equivalent may apply***

- Only one module could be chosen from: MP3604, MP3672, MP3680.

- Only one module could be chosen from: EL3996, MP3732, MP3704, MP3703; If EL3995 is chosen as the project module, EL3996 must be chosen.

19. LEARNING OUTCOMES FOR EXIT AWARDS:

Learning outcomes for the award of: BEng

Knowledge and understanding of features, limitations and principles, and also much of:

mechatronics, electromechanical systems and programmable logic controllers.

systems simulation.

operations management.

the role of engineering in an industrial and commercial context.

engineering science.

To be able to:

apply appropriate design, analysis and synthesis skills in engineering.

plan, develop, manage, evaluate and prioritise factors associated with engineering projects in the context of the product design cycle.

have the capacity and confidence to independently develop technical proficiencies and skills to solve engineering problems.

consider and prioritise relevant factors, including health, safety, environmental issues and risk, in the context of product engineering and the product design cycle.

To be able to:

apply knowledge skills and competences in an engineering context.

formulate and produce creative and innovative technical solutions to problems by applying engineering principles to real situations.

undertake and develop engineering work encompassing all aspects of the product cycle.

evaluate alternative solutions to engineering problems.

recognise the broader aspects of engineering in the business and industrial environment.

To be able to:

communicate ideas accurately, persuasively and succinctly in writing, orally and in a variety of media.

work independently on processes associated with the product design cycle and demonstrate a high level of professional and ethical conduct.

perform effectively in a team, and identify team characteristics and mechanics.

locate and critically use information from a variety of sources.

manage resources and time effectively.

undertake lifelong learning for continued professional development appropriate.

Learning outcomes for the award of: DipHE

Knowledge and understanding of many features, limitations and principles, and also many aspects of:

- computer aided engineering.
- systems simulation.
- operations management.
- the role of engineering in an industrial and commercial context.
- engineering science.

To (much extent) be able to:

- apply appropriate design, analysis and synthesis skills in engineering.
- plan, develop, manage, evaluate and prioritise factors associated with engineering projects in the context of the product design cycle.
- have the capacity and confidence to independently develop technical proficiencies and skills to solve engineering problems.
- consider and prioritise relevant factors, including health, safety, environmental issues and risk, in the context of product engineering and the product design cycle.

To (much extent) be able to:

- apply knowledge skills and competences in an engineering context.
- formulate and produce creative and innovative technical solutions to problems by applying engineering principles to real situations.
- undertake and develop engineering work encompassing all aspects of the product cycle.
- evaluate alternative solutions to engineering problems.
- recognise the broader aspects of engineering in the business and industrial environment.

To be able to (with confidence):

- communicate ideas accurately, persuasively and succinctly in writing, orally and in a variety of media.
- work independently on processes associated with the product design cycle and demonstrate a high level of professional and ethical conduct.
- perform effectively in a team, and identify team characteristics and mechanics.
- locate and critically use information from a variety of sources.
- manage resources and time effectively.
- undertake lifelong learning for continued professional development appropriate.

Learning outcomes for the award of: CertHE

Knowledge and understanding of some features, limitations and principles, and also some aspects of:

- computer aided engineering.
- systems simulation .
- the role of engineering in an industrial and commercial context.

engineering science.

To some extent be able to:

apply appropriate design, analysis and synthesis skills in engineering.

plan, develop, manage, evaluate and prioritise factors associated with engineering projects in the context of the product design cycle.

To some extent be able to:

apply knowledge skills and competences in an engineering context.

formulate and produce creative and innovative technical solutions to problems by applying engineering principles to real situations.

evaluate alternative solutions to engineering problems.

recognise the broader aspects of engineering in the business and industrial environment.

To some extent be able to:

communicate ideas accurately, persuasively and succinctly in writing, orally and in a variety of media.

work independently on processes associated with the product design cycle and demonstrate a high level of professional and ethical conduct.

locate and critically use information from a variety of sources.

8.2 Examples for IMME Labs and Resources