Programme Specification[1]

1. Programme Title(s) and Code(s):

Programme Title	*UCAS Code*	*GU Code*
MEng in Mechatronics	H731	H316-2204

2. Academic Session:

2018-19

3. SCQF Level (see Scottish Credit and Qualifications Framework Levels):

11

4. Credits:

600

5. Entrance Requirements:

Please refer to the current undergraduate prospectus at: http://www.gla.ac.uk/undergraduate/prospectus/

6. ATAS Certificate Requirement (see Academic Technology Approval Scheme):

ATAS Certificate not required

7. Attendance Type:

Full Time

8. Programme Aims:

Mechatronics is a fusion of mechanical, electrical, electronic and control engineering. Traditionally it was most obvious in the production line; now it pervades almost all technological products themselves. For example, a motor car was almost entirely a mechanical system in the past, with the minimum amount of electrical engineering to support the mechanics: nowadays a car may contain 100 computers and the direct connection between the driver and the road is replaced by electronic systems using powerful control algorithms implemented in software. Thus a purely mechanical system has been replaced by one that includes mechanical parts, electrical mechanisms, electronic hardware and software, designed to fulfil appropriate control laws. The

[1] This 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 full advantage is taken of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of each course can be found in course handbooks and other programme documentation and online at www.gla.ac.uk/

The accuracy of the information in this document is reviewed periodically by the University and may be checked by the Quality Assurance Agency for Higher Education.

engineering skills will be brought together via group design project in year 4 with industrial design project in year 5. The degree matches the requirements for accreditation and accreditation will be sought from the Institution of Mechanical Engineers and Institution of Engineering and Technology.

The MEng programme is an integrated Masters programme in Mechatronics designed as a preparation for professional practice. It provides an extended and enhanced programme of study beyond the BEng and is not simply a one year extension to the BEng. It is designed for the more able student. The programme of study is both broader and deeper than the corresponding BEng.

This degree programme aims to:

- present an integrated in depth multidisciplinary programme of study which will provide the student with knowledge and understanding of Mechatronics;
- provide opportunities for the student to study in depth a choice of specialist topics within the field of Mechatronics;
- provide an opportunity for students to develop transferable problem solving skills in Mechatronics in group and large scale individual project work;
- provide technical awareness in appropriate specialist applications of technology in the Mechatronics field;
- develop the student's mathematical rigour, accuracy and numerate skills appropriate for professional engineering;
- present and develop professional, ethical, economic and management issues relevant to the Mechatronics industry.

9. Intended Learning Outcomes of Programme:

The programme provides opportunities for students to develop and demonstrate knowledge and understanding, skills, qualities and other attributes in the following areas.

Knowledge and Understanding:

Graduates will be able to:

- Use their knowledge and understanding of the appropriate mathematical, scientific and computational tools that underpin Mechatronics, to solve, in depth, analytical, design or theoretical problems in the field of Mechatronics;
- Apply their knowledge and understanding of physical laws, mathematics, numerical analysis and other relevant information in order to model Mechatronics and similar systems;
- Draw on materials from a range of courses and wider reading in Mechatronics principles and in related disciplines in order to solve problems in Mechatronics including demonstrating depth and breadth to their learning;
- Apply business and management techniques that are relevant to Mechatronics and Mechatronic Engineers;
- Explain the role of Mechatronic Engineers in society and the constraints within which their engineering judgement will be exercised;
- Explain the professional and ethical responsibilities of Mechatronic Engineers;
- Consider the national and international role of the Mechatronic Engineer and the impact of engineering solutions in a global context.

Skills and Other Attributes:

Graduates will be able to:

Subject-specific/practical skills

- Plan and execute safely a series of experiments in Mechatronics;
- Design, from requirement, market need or specification, a Mechatronics device or system, up to the preliminary design stage, and present this design via a series of poster, written and oral presentations from both group and individual work;
- Use laboratory and workshop equipment to generate data from Mechatronics systems with appropriate rigour;
- Analyse experimental results in depth and determine their strength and validity;
- Assess the safety and potential efficacy of a device or system;
- Prepare technical drawings and technical reports;
- Give in depth technical presentations in oral form, as posters or in written form;
- Write up experimental methods, results and conclusions, and carefully and clearly plot experimental or

computational results and interpret experimental data by the use of regression, curve fitting and filtering, applying appropriate statistical analysis;
- Use scientific literature effectively and by drawing on their knowledge from lectures and wider reading around the subject be able to solve Mechatronics problems;
- Develop and update a research plan and adjust a work programme in order to conduct a major research project in academia or industry;
- Undertake a large scale supervised research project in academia or industry and present the results of this work in a written report and oral presentation to peers and staff;
- Work effectively in both individual and group projects;
- Explain in depth the managerial and economic factors facing a professional engineer;
- Document their solutions to Mechatronics problems so that others can follow and validate their work;
- Apply professional engineering practice and judgement in project work;
- Write computer programs and use computational tools and packages, selecting the appropriate "state of the art" tools to solve Mechatronics problems.

Intellectual skills

Graduates will be able to:

- Apply appropriate quantitative mathematical, scientific and engineering tools to the analysis of problems;
- Apply rigour in mathematics;
- Plan, conduct and report a programme of original research;
- Analyse and solve engineering problems;
- Design a Mechatronics system, component or process to meet a need;
- Be creative in the solution of problems and in the development of designs;
- Integrate knowledge and understanding of other scientific, mathematical, computational or engineering disciplines in order to support their engineering specialisation;
- Formulate and test hypotheses modifying the hypotheses depending on the data obtained;
- Evaluate designs, processes and products and make improvements;
- Integrate and evaluate information and data from a variety of sources;
- Take a holistic approach in solving problems and designing systems, applying professional judgements to balance risks, costs, benefits, safety, reliability, aesthetics and environmental impact.

Transferable/key skills

The skill set of the Mechatronic Engineer graduating from the MEng programme will be of use in a wide range of applications because of the multi-disciplinary nature of the subject. Their skills will be, by definition, transferable.

Graduates will be able to:

- Apply in depth problem solving and analytical thinking to a diverse range of problems;
- Use appropriate multi-disciplinary skills to solve Mechatronics problems, combining the breadth of knowledge gained through the degree;
- Demonstrate numeracy and literacy in written reports, project work and examinations;
- Work in a group project environment and contribute effectively to the group project, including working as a member of an interdisciplinary team;
- Work on an individual project involving self-directed research;
- Communicate effectively (in writing, verbally and through drawings);
- Apply mathematical skills (algebra, geometry, modelling, analysis);
- Transfer techniques and solutions from one field of engineering to another and to the Mechatronic field;
- Use information and communications technology;
- Manage resources and time effectively;
- Exercise team leadership;
- Learn independently in familiar and unfamiliar surroundings with open-mindedness and in the spirit of critical enquiry;
- Learn effectively for the purpose of continuing professional development and in a wider context throughout their career.

10. Typical Learning and Teaching Approaches:

Staff involved in the degree programme utilise a wide range of teaching methods that they deem the most appropriate for a particular course. These include:

- Lectures where the students write information presented to them via slide show, overhead or written by the lecturer;
- Lectures where the students have some printed notes/handouts and may annotate, or expand these during a spoken lecture;
- Lecture material placed on web-pages or other e-learning environment;
- External lectures from industry or clinicians;
- Feedback given to students during tutorials;
- Small group and large group tutorial sessions;
- Question and answer sessions during lectures or staff Office Hours;
- Guided reading of texts, journal articles etc., for individual and group projects;
- Completion of web-based exercises or computer based laboratory sessions;
- Laboratory sessions.

11. Typical Assessment Methods:

Assessment Methods to be used are:

- Written examinations (Summative assessment);
- Oral presentations of individual and group work;
- Individual written project report(s) of both individual and group projects;
- Group written project report(s) of group projects;
- Interview of group project manager and assessment of group project minutes;
- Poster presentation of group project work;
- Practical skills will be assessed through laboratory experiments, write-ups, coursework reports, project reports and presentations;
- Experimental, research and design skills will be assessed through laboratory experiments write-ups, coursework reports, project reports and presentations;
- Presentation skills through group presentations and poster presentations.

12. Programme Structure and Features:

MEng H316-2204

MEng Year 1

Compulsory Courses

Course Code	Course	Credits	Semester
ENG1003	Analogue Electronics 1	10	1
ENG1015	Design and Manufacture 1	10	2
ENG1026	Engineering Skills 1	10	1 & 2
ENG1033	Materials 1	10	1
ENG1062	Dynamics 1	10	2
ENG1063	Engineering Mathematics 1	40	1 & 2
ENG1064	Microelectronic Systems 1	10	2
ENG1065	Statics 1	10	1
ENG1066	Thermodynamics 1	10	2
		120	

MEng Year 2

Compulsory Courses

Course Code	Course	Credits	Semester
ENG2004	Analogue Electronics 2	10	2
ENG2015	Design and Manufacture 2	10	2
ENG2016	Mechanical Design 2	10	2
ENG2025	Electronic Design Project 2	10	2
ENG2029	Embedded Processors 2	10	2
ENG2045	Power Electronics 2	10	1

ENG2081	Mechanics of Structures 2A	10	1
ENG2083	Introductory Programming 2	10	1
ENG2084	Dynamics 2	10	2
ENG2085	Fluid Mechanics 2	10	1
ENG2086	Engineering Mathematics 2	20	1
		120	

MEng Year 3

Compulsory Courses

Course Code	Course	Credits	Semester
COMPSCI3005	Software Engineering M3	10	2
ENG3015	Control 3	10	2
ENG3023	Electromagnetic Compatibility 3	10	2
ENG3026	Electronic System Design 3	10	1
ENG3034	Instrumentation and Data Systems 3	10	2
ENG3035	Design and Manufacture 3	10	2
ENG3036	Simulation of Engineering Systems 3	10	1
ENG3037	Mechanics of Solids 3	10	1
ENG3039	Dynamics 3	10	1
ENG3041	Power Engineering 3	10	2
ENG3043	Real Time Computer Systems 3	10	1
ENG3071	Mechatronic Team Project 3	10	1 & 2
		120	

MEng Year 4

Compulsory Courses

Course Code	Course	Credits	Semester
ENG4042	Control 4	20	1
ENG4053	Digital Signal Processing 4	20	1
ENG4085	Integrated System Design Project 4	20	1 & 2
ENG4118	Robotics 4	20	2
ENG4153	Mechatronic Team Project 4	20	1 & 2
		100	

Optional Courses (choose 20 credits)

Course Code	Course	Credits	Semester
ENG4004	Materials Engineering 4	10	2
ENG4025	Finite Element Analysis 4	10	1
ENG4088	Lasers and Electro-Optic Systems 4	20	1
ENG4094	Mechanics of Solids 4	20	1
ENG4104	Power Systems 4	20	2
ENG4137	Vibration 4	20	2
ENG4175	Autonomous Vehicle Guidance Systems 4	10	2
ENG4187	Power Electronics and Drives 4	20	1
LAW1011	Elements of Law for Engineers	10	2

MEng Year 5

Compulsory Courses

Course Code	Course	Credits	Semester
ENG5009	Robust Control 5	10	2
ENG5017	Autonomous Vehicle Guidance Systems	10	2
ENG5031	Fault Detection, Isolation and Reconfiguration	10	2
ENG5041P	Individual Project 5	60	1
ENG5299	Dynamics 5	10	2
MGT5068	Professional Practice 5	20	2

	120

Regulations

This programme will be governed by the relevant regulations published in the University Calendar. These regulations include the requirements in relation to:

(a) Award of the degree

(b) Progress

(c) Early exit awards

http://www.gla.ac.uk/services/senateoffice/calendar/

13. Programme Accredited By:

Accreditation will be sought from the Institution of Engineering and Technology (IET) and the Institution of Mechanical Engineers (IMechE)

14. Location(s):

Glasgow

15. College:

College of Science and Engineering

16. Lead School/Institute:

Engineering [REG30300000]

17. Is this programme collaborative with another institution:

No

18. Awarding Institution(s):

University of Glasgow

19. Teaching Institution(s):

University of Glasgow

20. Language of Instruction:

English

21. Language of Assessment:

English

22. Relevant QAA Subject Benchmark Statements (see Quality Assurance Agency for Higher Education) and Other External or Internal Reference Points:

This Programme Specification is informed by the QAA Benchmark Statement for Engineering

http://www.qaa.ac.uk/en/Publications/Documents/Subject-benchmark-statement-Engineering-.pdf

It is also informed by the Engineering Council Publication “UK Standard for Professional Engineering Competence (UK-SPEC)”

http://www.engc.org.uk/engcdocuments/internet/Website/UK-SPEC third edition (1).pdf

and the requirements of the Institution of Mechanical Engineers (http://www.imeche.org.uk/) and the Institution of Engineering and Technology (http://www.theiet.org/)

23. Additional Relevant Information (if applicable):

Support for students is provided by the Postgraduate/Undergraduate Adviser(s) of Studies supported by University resources such LEADS (www.gla.ac.uk/myglasgow/leads/), Counselling & Psychological Services (www.gla.ac.uk/services/counselling/), the Disability Service (www.gla.ac.uk/services/studentdisability/) and the Careers Service (www.gla.ac.uk/services/careers/).

24. Online Learning:

No

25. Date of approval:	07/08/2018