PROGRAMME SPECIFICATION

Part 1: Basic Data		
Awarding Institution	University of the West of England, Bristol	
Teaching Institution	University of the West of England, Bristol City of Bristol College	
Delivery Location	Frenchay Campus, Bristol City of Bristol College	
Faculty responsible for programme	Faculty of Environment and Technology	
Department responsible for programme	Department of Engineering Design and Mathematics	
Modular Scheme Title		
Professional Statutory or Regulatory Body Links	IMechE	
Highest Award Title	MEng Mechanical Engineering	
Default Award Title	n/a	
Interim Award Titles	BEng(Hons) Mechanical Engineering BEng Mechanical Engineering Diploma of Higher Education Mechanical Engineering Certificate of Higher Education Engineering	
UWE Progression Route		
Mode(s) of Delivery	SW, Full Time /Part Time	
Codes	**UCAS: H300/301** **ISIS2: H301** **H301 (SW),** **H30113 (FT),** **H30A43 (PT)**	**JACS:** **HESA:**
Relevant QAA Subject Benchmark Statements	Engineering	
CAP Approval Date	July 2015 v2; Feb 2016 v2.1; June 2016 v2.2; Jan 2017 v3	
Valid From	September 2012	
Revised version valid from	September 2017	
Valid until Date	September 2018	
Version	3	

Part 2: Educational Aims of the Programme

The aims of the programme are:

The aim of the Faculty's MEng programmes is to respond to the need for effective engineering practitioners by offering programmes that are an intellectually challenging mix of taught engineering science and experiential learning. The practitioner approach is intended to produce engineers with a strong orientation towards problem solving, underpinned by theoretical knowledge.

The aim of the Mechanical Engineering programme is to produce graduates with a broad understanding of mechanical analysis and design, combined with awareness of engineering practice, information technology, project management and business issues. The MEng course is distinguished by a greater emphasis upon critical appraisal of existing ideas and practice, original thought and creative ability. This is demonstrated through the higher performance level of MEng students on the part of the course which is common with the BEng(Hons), together with accelerated development in the parts of the course which are specific to MEng students, notably the level M work.

This programme will produce graduates with a wide range of expertise relevant to industry in general and in particular industries related to mechanical design, operations and manufacture. The programme covers a broad range of disciplines such as Mechanical Analysis, Mathematics, Electronics, Business and Manufacture. Evidence from local industries indicates a solid demand for graduates with a broad-based 'systems' approach to engineering problem solving. It is anticipated that graduates from the course will play a major role in the design, management and co-ordination of multi-disciplinary projects.

The aims are that graduates shall be able to:

1. apply established and novel Mechanical Analysis concepts to the solution of engineering problems involving Design, Operations and Manufacture.;
2. use systems incorporating digital hardware, software, communication, processing algorithms, interfacing circuits and parameter sensing and actuating devices;
3. model mechanical engineering systems so as to be able to specify and assess the technical design;
4. understand the manufacturing, financial and marketing implications of design proposals;
5. identify the links between design, manufacturing and production management and assess the capabilities of manufacturing systems software packages which are used for the design, modification, maintenance and control of manufacturing facilities;
6. operate effectively either as individuals or as members of a multi-disciplinary team;
7. communicate effectively both orally and in written form;
8. make considered judgements and decisions on complex engineering issues in which not all facts and consequences are accurately known;
9. pursue independent study, undertake enquiry into novel and unfamiliar concepts and implement change in an Engineering environment.
10. be equipped with strategic management and leadership skills together with broader engineering knowledge that goes beyond those of the BEng(Hons) degree.

Part 3: Learning Outcomes of the Programme

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

Learning Outcomes	**Teaching, Learning and Assessment Strategies**
A Knowledge and Understanding	
A Knowledge and understanding of 1. The principles governing the behavior of mechanical components and systems. 2. Mathematical methods appropriate to Mechanical engineering and related fields. 3. The properties, characteristics and selection	**Teaching/learning methods and strategies:** Acquisition of 1 to 7 is through a combination of formal lectures, tutorials, laboratory work, guided project work, group assignments, independent projects and case studies. The programme of study is designed to introduce basic knowledge and understanding of the

Part 3: Learning Outcomes of the Programme	
of materials used in mechanical components and systems. 4. A sound understanding of core engineering science and technologies with greater depth in areas pertinent to mechanical systems. 5. The principles of information technology and data communications from a user's perspective. 6. Social, environmental, ethical, economic and commercial factors 7. The complexity of large-scale engineering systems and projects, with particular emphasis upon mechanical systems.	technologies underpinning engineering, design and product development through a range of level 1 modules. This basic knowledge developed through a range of taught modules at levels 2, 3 and M is integrated through group design and individual project work at levels 3 and M. Throughout the student is encouraged to undertake independent reading both to supplement and consolidate what is being taught/learnt and to broaden their individual knowledge and understanding of the subject. In addition, graduates with MEng will be equipped to solve multi-disciplinary problems and lead future developments in industry. This will be particularly true with regard to the use of numerical analysis in Design through extended study of this specialist subject area.
	Assessment: Testing of the knowledge base is through assessed course work, through tasks undertaken under examination conditions, through oral presentations and assessed practical work done in various laboratories. Project work involves both presentation and inquisition.
B Intellectual Skills	
Intellectual Skills 1. The ability to produce solutions to problems through the application of engineering knowledge and understanding. 2. The ability to use scientific principles in the modelling and analysis of engineering systems, processes and products. The ability to select and apply appropriate mathematical methods for modelling and analysing relevant problems. 3. The ability to use a broad spectrum of technologies/techniques to solve complex engineering problems. 4. The ability to select and apply appropriate computer based methods for modelling and analysing problems in fields relating to the design, manufacture and control of Mechanical components and systems. 5. Adoption of a creative and innovative approach to solving problems and design.	**Teaching/learning methods and strategies:** At all levels students are required to bring together knowledge and skills acquired in several modules and hence determine new ways of working. As the student progresses, the need to synthesise ever-greater volumes of information and approaches into a coherent approach is developed and consequently so is their critical thinking. At level 1 analysis, evaluation and problem solving are developed on small-scale problems in various programming activities in a number of modules. Here the focus is on understanding the problem and then solving it free from the environmental implications of real- world problems and without the need to examine alternatives and to balance conflicting goals. At level 2 there is a move away from small-scale problems to the design of larger scale systems. With this comes the need to evaluate alternative methods and designs and to balance conflicting objectives. Level 3 sees the move to specific application examples and with it the need to appreciate problem contexts is developed as well as

Part 3: Learning Outcomes of the Programme	
6. Comprehension of the broad picture and demonstration of of a professional attitude to the responsibilities of engineering practitioners. 7. The ability to apply theory in unfamiliar applications and to assimilate new theory.	striking the right balance when facing conflicting objectives. At level M, students study in areas where theory is less well established and alternative approaches need to be compared, both within the analytical modules and those involving project work.
	Assessment: The development of engineering solutions requires demonstration of all of the intellectual skills. At level 1 the focus is on the skills of Analysis, Evaluation and Problem Solving. At levels 2 and 3 this branches out to include all the remaining skills. Level M examinations are more demanding using open ended elements to some questions allowing students to demonstrate their higher level of understanding. The application of engineering theory to the solution of real engineering problems is the focus of assessments. Some modules make use of open book examinations ~~and~~ pProject work is open-ended, with key decisions to be made by students. Independent reading is used to enable students to focus on their own areas of interest and in the process ass's skills in submitted reports, assignments and exam answers. Mechanical Engineering work requires demonstration of a very wide range of skills (1 - 7). These skills are assessed through a combination of coursework assessments, projects and examinations.
C Subject, Professional and Practical Skills	
C Subject, Professional and Practical Skills 1. Appropriate skills including safe working in experimental work in laboratories and workshops. 2. Demonstrate practical testing of engineering ideas through laboratory work or simulation with supporting technical analysis and critical evaluation of results 3. Understanding and execution of the design process. 4. Use of a range of computer software for design, analysis and control. 5. Execution and management of multi-disciplinary projects, both individually and as a member of a group. 6. Understanding individual roles in teams and the responsibilities of leadership	**Teaching/learning methods and strategies:** Throughout the program, the skills listed are developed through a combination of theoretical discussion, practical laboratory based work, classroom based tutorial exercises and directed self-study. The majority of modules delivered underpin theoretical work with practical sessions. Many of the skills listed are introduced at level 1 and then drawn into sharper focus at levels 2 and 3. A consistent design methodology is delivered throughout the Programme. The general teaching/learning method is to impart these practical/professional skills by a process of moving from an overview of what is required to a specific application of an individual skill at a higher level. Some very specific skills are introduced at level 3. These are underpinned by the more generalized capabilities that are practised throughout the levels in

Part 3: Learning Outcomes of the Programme	
	most of the modules that contribute to the award. At Level M students build on their introduction to industry software working on real problems. Strategic management and leadership is emphasized at level M through careful management and assessment of the level M group project.
	Assessment: The possession of these skills is demonstrated by the development of practical laboratory work, coursework, presentations and examinations. The practical nature of the skills to be acquired means that some are specifically addressed by particular modules, whilst the more generic skills are assessed across a range of modules.
D Transferable Skills and other attributes	
D Transferable Skills and other attributes 1. Communication skills: to communicate orally or in writing, including, for instance, the results of technical investigations, to peers and/or to "problem owners". 2. Self-management skills: to plan and manage time, to meet deadlines and to work with others. 3. IT Skills in Context (to use software in the context of problem-solving investigations, and to interpret findings) 4. Problem formulation and solution. 5. Progression to self learning: To gain experience of and to develop skills independently of structured class work. 6. Comprehension of professional literature: to read and to use literature sources appropriate to the discipline to support learning activities. 7. Ability to critically appraise and adjust plans to changing circumstances. 8. Ability to think independently and self-manage the work environment	Teaching/learning methods and strategies: 1 is developed through a variety of methods and strategies including the following: • Students maintain laboratory log books • Students participate in electronic conferences, workshops, and group work sessions. • Students participate in discussion tutorials • Students present research topic findings in tutorials • Students participate in individual tutorials 2 is developed through a variety of methods and strategies including the following: • Students conduct self-managed practical work • Students participate in practically-oriented tutorial laboratory sessions • Students work through practical work-sheets in teams • Students practice design and programming 3 is developed widely throughout the programme. 4 is developed through a variety of methods and strategies including the following: • Students develop problem solving programs • Students practice design and programming • Students sketch designs of larger systems 5 is developed through a variety of methods and strategies including the following: • Students are encouraged to practice programming to extend their skills • Students develop problem-solving programs • Students are encouraged to research relevant topics • Students are encouraged to use online facilities to discover information

Part 3: Learning Outcomes of the Programme	
	6 is developed through a variety of methods and strategies including the following: • Students are encouraged to access online material 7 is dealt with through the level M Group project in which circumstances and constraints are changed, requiring students to adapt their approach. Critical appraisal of research literature and assessment of alternative views are inherent to the individual project at level M. 8 is most exercised at level M, where debate is encouraged, mainly within project work, but also in other modules where appropriate.
	Assessment: These skills are demonstrated in a variety of contex including • examination • poster presentation. • individual and group projects • practical assignments • portfolio of exercises In addition skill two is assessed by both peers and tutors.

Part 4: Programme Structure

This structure diagram demonstrates the student journey from Entry through to Graduation for a typical **full time student**, including: level and credit requirements; interim award requirements; module diet, including compulsory and optional modules

PLEASE NOTE THAT SOME LEVEL 1 MODULES MAY ALSO BE DELIVERED AT CITY OF BRISTOL COLLEGE FOR PART TIME STUDENTS

ENTRY

	Compulsory Modules	Optional Modules	Interim Awards
Year 1	UFMFJ9-30-1 Engineering Mathematics UFMFN3-30-1 Design, Materials & Manufacturing UFMFH3-30-1 Stress & Dynamics UFMFF3-15-1 Energy and Thermodynamics UFMFG3-15-1 Fluid Dynamics		CertHE Engineering 120 credits at appropriate level
Year 2	UFMF88-30-2 Design and Electromechanical Systems UFMFW8-30-2 Heat Transfer, Power and the Environment UFMFK9-15-2 Engineering Mathematics 2 UFMFL8-15-2 Dynamics UFMFQA-15-2 Stress Analysis UFMFHA-15-2 Project Management		DipHE Mechanical Engineering 240 credits at appropriate level

Year Out: We recommend that students take this opportunity to do a year-long placement in industry or research. However, this is not necessary and students can enter the third year immediately after year 2.

	Year 3	**Compulsory Modules** UFMFU7-15-3 Computational Methods UFMFY8-30-3 Individual Project MEng Part A The MEngA module is the default but the BEng module can be accepted by agreement with the programme leader, subject to the student meeting progression criteria from Level 2 UFMFX8-30-3 Individual Project BEng	**Optional Modules** **Choose 60 credits from:** UFMFU6-15-3 Composite Engineering **OR** UFMFP9-15-3 Mechanics of Materials UFMF7K-15-3 Materials and Structures for Special Applications UFMFD7-15-3 Energy Technologies **OR** UFMFTA-15-3 Thermofluid Systems UFMFSL-15-3 Integrated Electro-Mechanical Systems UFMFXJ-15-3 Vibrational Dynamics UFMFYJ-15-3 Control Engineering (No more than 75 credits in total in one semester) **Choose one from:** UFMFM7-15-3 Business Environment UFMF89-15-3 Industrial Placement	**Awards:** BEng Mechanical Engineering 300 credits at appropriate level BEng(Hons) Mechanical Engineering 360 credits at appropriate level

Masters	**Compulsory Modules** UFMERY-30-M Individual Project MEng Part B UFMFXC-15-M Masters Group Project UMMC9U-15-M Innovations in Operations Management	**Optional Modules** **Choose 60 credits from:** UFMEBP-15-M Structural Integrity in Design UFMENU-15-M Design of Fluid Systems UFMFCC-15-M Industrial Applications of Vision and Automation UFMFTL-15-M Advanced Mechatronics UFMFUL-15-M Advanced Control Engineering UFMFVL-15-M Mechanics of Composites UFMFWL-15-M Computational Fluid Dynamics UFMEEC-15-M Concurrent Engineering and Design for Manufacture (No more than 75 credits in TOTAL in one semester)	**Highest Award:** MEng Mechanical Engineering 480 credits at appropriate level

GRADUATION

PART TIME

ENTRY				
	Part -time Level 1.1	**Compulsory Modules** UFMFN3-30-1 Design, Materials & Manufacturing	**Optional Modules**	**Interim Awards** CertHE Engineering 120 credits at appropriate level DipHE Mechanical Engineering 240 credits at appropriate level
	Part -time Level 1.2	UFMFJ9-30-1 Engineering Mathematics UFMFH3-30-1 Stress & Dynamics UFMFG3-15-1 Fluid Dynamics		
	Part -time Level 2.1	UFMFF3-15-1 Energy &Thermodynamics UFMF88-30-2 Design and Electromechanical Systems UFMFK9-15-2 Engineering Mathematics 2 UFMFL8-15-2 Dynamics		
	Part -time Level 2.2	UFMFW8-30-2 Heat Transfer, Power & the Environment UFMFQA-15-2 Stress Analysis UFMFHA-15-2 Project Management	**Choose 15 credits from:** UFMF7K-15-3 Materials and Structures for Special Applications UFMFYJ-15-3 Control Engineering	

	Part -time Level 3.1	UFMFU7-15-3 Computational Methods **Choose one from:** UFMFM7-15-3 Business Environment UFMF89-15-3 Industrial Placement	**Choose 45 credits from:** UFMFTA-15-3 Thermofluid Systems **OR** UFMFD7-15-3 Energy Technologies UFMFU6-15-3 Composite Engineering **OR** UFMFP9-15-3 Mechanics of Materials UFMFXJ-15-3 Vibrational Dynamics UFMFSL-15-3 Integrated Electro-Mechanical Systems	**Awards:** BEng Mechanical Engineering 300 credits at appropriate level BEng(Hons) Mechanical Engineering 360 credits at appropriate level
	Part -time Level 4.1	UFMFY8-30-3 Individual Project MEng Part A UMMC9U-15-M Innovations in Operations Management	**Choose 30 credits from:** UFMENU-15-M Design of Fluid Systems UFMFTL-15-M Advanced Mechatronics UFMFWL-15-M Computational Fluid Dynamics UFMEEC-15-M Concurrent Engineering and Design for Manufacture	

Part -time Level 4.2	UFMFXC-15-M Masters Group Project UFMERY-30-M Individual Project MEng Part B	**Choose 30 credits from:** UFMFUL-15-M Advanced Control Engineering UFMFVL-15-M Mechanics of Composites UFMEBP-15-M Structural Integrity in Design UFMFCC-15-M Industrial Applications of Vision and Automation	**Highest Award:** MEng Mechanical Engineering

Part 5: Entry Requirements

The university's minimum requirements for entry to a degree apply to this programme. In addition entrants are required to have evidence of achievement equivalent to Mathematics at A2 Level (at grade B or above), plus evidence of achievement equivalent to A2 Level in another scientific discipline (for example, physics, chemistry, engineering, design and technology). The normal offer is listed on the UWE website

Progression to MEng is dependent upon the achievement of a 60% average across 120 credits at level 2 due to professional body requirements. Direct Entry students wishing to enrol on the MEng at UWE should demonstrate the equivalent 60% average on their level 2 modules.

Part 6: Assessment

Approved to a variant of the University Regulations and Procedures.

The 480 credit integrated Bachelor / Masters degree (or 600 credit integrated Bachelor / Masters with foundation year) is not classified, but may be awarded with merit or distinction.

The award of merit or distinction in Mechanical Engineering is determined as follows:

Distinction
An overall average of 70% has been achieved across 210 credits at level 3 or above (FHEQ level 6). This average will be calculated based upon the marks for all of the level M modules (FHEQ level 7) **and at level 3, must include the marks and whole credit for the project followed by** the marks for the best remaining level 3 modules (FHEQ level 6) which are then required to make up the credit total.

Merit
An overall average of 60% has been achieved across 210 credits at level 3 or above (FHEQ level 6). This average will be calculated based upon the marks for all of the level M modules (FHEQ level 7) **and at level 3, must include the marks and whole credit for the project followed by** the marks for the best remaining level 3 modules (FHEQ level 6) which are then required to make up the credit total.

Part 7: Student Learning

Teaching, learning and assessment strategies to enable learning outcomes to be achieved and demonstrated

At UWE, Bristol there is a policy for a minimum average requirement of 12 hours/week contact time over the course of the full undergraduate programme. This contact time encompasses a range of face toface activities as described below. In addition a range of other learning activities will be embedded within the programme which, together with the contact time, will enable learning outcomes to be achieved and demonstrated.

In Engineering it is recognised that a higher contact time is desirable and so some laboratory-based modules have an extra factor included in the time calculation which provides more hours. In addition the level 1 and 2 students have timetabled Peer-Assisted Learning hours, where trained level 2 and 3 students (as appropriate) work with groups.

Class Activities
The mode of delivery of a module is determined by its Module Leader, and typically involves a combination of one or more lectures, tutorials, 'lectorials', laboratory classes, group activities and individual project work. Modules on the Foundation Programme which require laboratory classes are commonly delivered by means of a combination of lecture and practicals or tutorials.

Academic Support
Academic advice and support is the responsibility of the staff delivering the module in question. Staff are expected to be available outside normal timetabled hours, either by appointment or during published "surgery" hours, in order to offer advice and guidance on matters relating to the material being taught and on its assessment.

Peer Assisted Learning (PAL) is used to support learning at level 1. Each student has access to at least one PAL session per week, run by a second year student, trained as a PAL leader to assist students on problems of understanding they face in any of the module they are studying.

Pastoral Care
The University divides responsibilities for pastoral care between academic personal tutors who look after the academic well-being of students and Student Advisors who provide comprehensive, full-time student support on a range of issues including funding, academic regulations, personal and health issues. The service operates on a drop-in basis or by appointment.

Progression to Independent Study
Many modules require students to carry out independent study, such as research for projects and assignments, and a full range of facilities are available at all sites to help students with these. The philosophy is accordingly to offer students both guided support and opportunities for independent study. Guided support, mainly in the form of timetabled sessions, takes the form of lectures, tutorials, seminars and practical laboratory sessions. Students are expected to attend all sessions on their timetable, and this is especially important because of the high content of practical work in the programme.

The progression to independent study will also be assisted by the nature of the support offered in individual modules. Typically, module leaders will provide a plan for the module indicating the activities to be carried out and the forms of learning to be undertaken during the delivery of the module, with a view to encouraging students to plan ahead and to take responsibility for managing their time and resources.

Computing Facilities

Part 6: Assessment

The Faculty offers a specialised computing facility alongside the general University provision. There are a number of general PC computing laboratories of 20 plus seats all running Windows, along with four Unix based laboratory and 10 specialist computing labs. The specialist laboratories are equipped with the specific software; including Software Design Tools development environment, CAD, finite element analysis, computational fluid dynamics, mathematics and statistics packages to support the taught program. The specialist Computing laboratories are designed to target the discipline taught in that area.

One of the most popular areas within the Faculty is the Open Access laboratory which provides 24 hour opening and gives students the opportunity to access machines at all times during opening hours. This is a mixed environment consisting of PCs and Unix workstations. Due to the extensive computing facility provided within the Faculty, and the specialist nature of this facility, the need for user support is necessary. The Faculty provides a user support Helpdesk, staffed every week day during normal working hours.

Description of Distinctive Features and Support

Design and Engineering Lab Facilities
Students on Engineering programmes can access a suite of specialist laboratories. These include Structures, Material Science, Dynamics, Thermofluids, Aero (with sub sonic and supersonic wind tunnels and a programmable flight simulator with hydraulic motion platform), plus manufacturing workshops including CNC machines, laser cutting and rapid prototyping. A driving simulator is also available.

Students have 24/7 access to industry standard Computational Engineering software such as Ansys-CFX for Computational Fluid Dynamics and Abaqus for Mechanics of Composites.

Technology Enhanced Learning
Staff in the department are keen adopters of technology to support and enhance student learning. This includes

- computer based e-assessment implemented in a number of modules, so that students can take regular short tests with automated computer generated feedback.
- Recordings of some lectures (audio and video) which are made available after classes via the university's Virtual Learning Environment.

The Placement Year
An optional placement year provides opportunities for real-world, industrially based final year projects. The student will in most cases be on a formal contract in which they are paid for their employment. He or she will have the opportunity to explore career possibilities, make new business contacts for the future and prepare for the final year at University. Students are responsible for finding their own placement, however, many opportunities are published through the University Placements Office, and the process of finding a placement is supported in year 2 of the Graduate Development sessions. Once on placement, students retain access to the support network of the University and will be visited in their place of work at least once by a Visiting Tutor. Placement students gain credit for their work through submitting a portfolio, which reduces the amount of credit required to be taken in their final year by 15 credits.

Mathematics Support

- EspressoMaths: provides drop-in one-to-one tuition each day in the student canteen and a web-site that provides a portal to a variety of on-line resources in mathematics and statistics.

Part 8: Reference Points and Benchmarks

Description of ***how*** the following reference points and benchmarks have been used in the design of the programme:

This programme has been prepared with reference to a number of external benchmarks, including the QAA Subject Benchmark Statement for Engineering, the QAA Framework for HE Qualifications, the university's Learning & Teaching Strategy, and a number of more specialised publications relating to mechanical engineering.

The Subject Benchmark Statement for Engineering outlines a set of skills expected of a graduate in an engineering discipline (Section 4 of the Statement refers), while noting that they should be interpreted in the context of the particular engineering discipline which is being studied. These skills map closely to the skills contained in the learning outcomes for this programme, and hence we have confidence that the programme is in accordance with the precepts of the Statement.

The university's Learning & Teaching Strategy has informed the faculty's policy for the delivery of its programmes, whose main features are described in section 7.

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 he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of individual modules can be found in module specifications, available on the University's website.

ACADEMIC SERVICES

PROGRAMME SPECIFICATION

Part 1: Basic Data		
Awarding Institution	University of the West of England, Bristol	
Teaching Institution	University of the West of England, Bristol City of Bristol College	
Delivery Location	UWE, Frenchay, Bristol City of Bristol College	
Faculty responsible for programme	Faculty of Environment and Technology	
Department responsible for programme	Department of Engineering Design and Mathematics	
Modular Scheme Title		
Professional Statutory or Regulatory Body Links	IMechE (accreditation being sought for top-up structure shown in appendix 1)	
Highest Award Title	BEng(Hons) Mechanical Engineering	
Default Award Title		
Interim Award Titles	BEng Mechanical Engineering Diploma of Higher Education, Mechanical Engineering Certificate of Higher Education, Engineering	
UWE Progression Route		
Mode(s) of Delivery	SW, Full Time /Part Time	
Codes	**UCAS: H300/301** **ISIS2: H300** **H300 (SW)** **N30013 (FT)** **H30043 (PT)**	**JACS:** **HESA:**
Relevant QAA Subject Benchmark Statements	Engineering	
CAP Approval Date	Jan 2017 v3	
Valid From	September 2017	
Valid until Date	September 2018	
Version	4	

Part 2: Educational Aims of the Programme

The aims of the programme are:

The aim of the Faculty's B.Eng (Hons) programmes is to respond to the need for effective engineering practitioners by offering programmes that are an intellectually challenging mix of taught engineering science and experiential learning. The practitioner approach is intended to produce engineers with a strong orientation towards problem solving, underpinned by theoretical knowledge.

The aim of the Mechanical Engineering programme is to produce graduates with a broad understanding of mechanical analysis and design, combined with awareness of engineering practice, information technology, project management and business issues.

This programme will produce graduates with a wide range of expertise relevant to industry in general and in particular industries related to mechanical design, operations and manufacture. The programme covers a broad range of disciplines such as Mechanical Analysis, Mathematics, Electronics, Business and Manufacture. Evidence from local industries indicates a solid demand for graduates with a broad-based 'systems' approach to engineering problem solving. It is anticipated that graduates from the course will play a major role in the design, management and co-ordination of multi-disciplinary projects.

The aims are that graduates shall be able to:

1. apply established and novel Mechanical Analysis concepts to the solution of engineering problems involving Design, Operations and Manufacture.;
2. use systems incorporating digital hardware, software, communication, processing algorithms, interfacing circuits and parameter sensing and actuating devices;
3. model mechanical engineering systems so as to be able to specify and assess the technical design;
4. understand the manufacturing, financial and marketing implications of design proposals;
5. identify the links between design, manufacturing and production management
6. operate effectively either as individuals or as members of a multi-disciplinary team;
7. communicate effectively both orally and in written form;
8. make considered judgements and decisions on complex engineering issues in which not all facts and consequences are accurately known;

Part 3: Learning Outcomes of the Programme

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

Learning Outcomes	**Teaching, Learning and Assessment Strategies**
A Knowledge and Understanding	
A Knowledge and understanding of 1. The principles governing the behavior of mechanical components and systems. 2. Mathematical methods appropriate to Mechanical engineering and related fields. 3. The properties, characteristics and selection of materials used in mechanical components and systems. 4. A sound understanding of core engineering science and technologies with greater depth in areas pertinent to mechanical systems. 5. The principles of information technology and data communications from a user's	**Teaching/learning methods and strategies:** Acquisition of 1 to 7 is through a combination of formal lectures, tutorials, laboratory work, guided project work, group assignments, independent projects and case studies. The programme of study is designed to introduce basic knowledge and understanding of the technologies underpinning engineering, design and product development through a range of level 1 modules. This basic knowledge is developed through a range of taught modules at level 2, and integrated through group design and project work at levels 3. Advanced tools and technologies are studied in the final years of the programmes, and the programme as a whole

Part 3: Learning Outcomes of the Programme	
perspective. 6. Social, environmental, ethical, economic and commercial factors 7. The complexity of large-scale engineering systems and projects, with particular emphasis upon mechanical systems.	is integrated through the B.Eng individual project at level 3. Throughout the student is encouraged to undertake independent reading both to supplement and consolidate what is being taught/learnt and to broaden their individual knowledge and understanding of the subject. **Assessment:** Testing of the knowledge base is through assessed course work, through tasks undertaken under examination conditions, through oral presentations and assessed practical work done in various laboratories.
B Intellectual Skills	
Intellectual Skills 1. The ability to produce solutions to problems through the application of engineering knowledge and understanding. 2. The ability to use scientific principles in the modelling and analysis of engineering systems, processes and products. The ability to select and apply appropriate mathematical methods for modelling and analysing relevant problems. 3. The ability to use a broad spectrum of technologies/techniques to solve complex engineering problems. 4. The ability to select and apply appropriate computer based methods for modelling and analysing problems in fields relating to the design, manufacture and control of Mechanical components and systems. 5. Adoption of a creative and innovative approach to solving problems and design. 6. Comprehension of the broad picture and demonstration of of a professional attitude to the responsibilities of engineering practitioners.	**Teaching/learning methods and strategies:** At all levels students are required to bring together knowledge and skills acquired in several modules and hence determine new ways of working. As the student progresses, the need to synthesise ever-greater volumes of information and approaches into a coherent approach is developed and consequently so is their critical thinking. At level 1 analysis, evaluation and problem solving are developed on small-scale problems in various programming activities in a number of modules. Here the focus is on understanding the problem and then solving it free from the environmental implications of real- world problems and without the need to examine alternatives and to balance conflicting goals. At level 2 there is a move away from small-scale problems to the design of larger scale systems. With this comes the need to evaluate alternative methods and designs and to balance conflicting objectives. Level 3 sees the move to specific application examples and with it the need to appreciate problem contexts is developed as well as striking the right balance when facing conflicting objectives. **Assessment:** The development of engineering solutions requires demonstration of all of the intellectual skills. At level 1 the focus is on the skills of Analysis, Evaluation and Problem Solving. At levels 2 and 3 this branches out to include all the remaining skills. Independent reading is used to enable students to focus on their own areas of interest and in the process ass's skills in submitted reports, assignments and exam answers.

Part 3: Learning Outcomes of the Programme	
	Mechanical Engineering work requires demonstration of a very wide range of skills (1 - 6). These skills are assessed through a combination of coursework assessments, projects and examinations.
C Subject, Professional and Practical Skills	
C Subject, Professional and Practical Skills 1. Appropriate skills including safe working in experimental work in laboratories and workshops. 2. Demonstrate practical testing of engineering ideas through laboratory work or simulation with supporting technical analysis and critical evaluation of results. 3. Understanding and execution of the design process. 4. Use of a range of computer software for design, analysis and control. 5. Execution and management of multi-disciplinary projects, both individually and as a member of a group.	**Teaching/learning methods and strategies:** Throughout the program, the skills listed are developed through a combination of theoretical discussion, practical laboratory based work, classroom based tutorial exercises and directed self-study. The majority of modules delivered underpin theoretical work with practical sessions. Many of the skills listed are introduced at level 1 and then drawn into sharper focus at levels 2 and 3. A consistent design methodology is delivered throughout the Programme. The general teaching/learning method is to impart these practical/professional skills by a process of moving from an overview of what is required to a specific application of an individual skill at a higher level. Some very specific skills are introduced at level 3. These are underpinned by the more generalized capabilities that are practised throughout the levels in most of the modules that contribute to the award.
	Assessment: The possession of these skills is demonstrated by the development of practical laboratory work, coursework, presentations and examinations. The practical nature of the skills to be acquired means that some are specifically addressed by particular modules, whilst the more generic skills are assessed across a range of modules.
D Transferable Skills and other attributes	
D Transferable Skills and other attributes 1. Communication skills: to communicate orally or in writing, including, for instance, the results of technical investigations, to peers and/or to “problem owners”. 2. Self-management skills: to plan and manage time, to meet deadlines and to work with others. 3. IT Skills in Context (to use software in the context of problem-solving investigations, and to interpret findings)	Teaching/learning methods and strategies: 1 is developed through a variety of methods and strategies including the following: • Students maintain laboratory log books • Students participate in electronic conferences ,workshops, and group work sessions. • Students participate in discussion tutorials • Students present research topic findings in tutorials • Students participate in individual tutorials 2 is developed through a variety of methods and strategies including the following:

Part 3: Learning Outcomes of the Programme	
4. Problem formulation and solution. 5. Progression to independent learning: To gain experience of and to develop skills independently of structured class work. 6. Comprehension of professional literature: to read and to use literature sources appropriate to the discipline to support learning activities.	• Students conduct self-managed practical work • Students participate in practically-oriented tutorial laboratory sessions • Students work through practical work-sheets in teams • Students practice design and programming 3 is developed widely throughout the programme. 4 is developed through a variety of methods and strategies including the following: • Students develop problem solving programs • Students practice design and programming • Students sketch designs of larger systems 5 is developed through a variety of methods and strategies including the following: • Students are encouraged to practice programming to extend their skills • Students develop problem-solving programs • Students are encouraged to research relevant topics • Students are encouraged to use online facilities to discover information 6 is developed through a variety of methods and strategies including the following: • Students are encouraged to access online material
	Assessment: These skills are demonstrated in a variety of contex including • examination • poster presentation. • individual and group projects • practical assignments • portfolio of exercises In addition skill two is assessed by both peers and tutors.

Part 4: Programme Structure

This structure diagram demonstrates the student journey from Entry through to Graduation for a typical **full time student**, including: level and credit requirements, interim award requirements, module diet, including compulsory and optional modules

PLEASE NOTE THAT SOME LEVEL 1 MODULES MAY ALSO BE DELIVERED AT CITY OF BRISTOL COLLEGE FOR PART TIME STUDENTS

ENTRY

	Compulsory Modules	Optional Modules	Interim Awards
Year 1	UFMFJ9-30-1 Engineering Mathematics UFMFN3-30-1 Design, Materials & Manufacturing UFMFH3-30-1 Stress & Dynamics UFMFF3-15-1 Energy and Thermodynamics UFMFG3-15-1 Fluid Dynamics		CertHE Mechanical Engineering 120 credits at appropriate level
Year 2	UFMF88-30-2 Design and Electromechanical Systems UFMFW8-30-2 Heat Transfer, Power and the Environment UFMFK9-15-2 Engineering Mathematics 2 UFMFL8-15-2 Dynamics UFMFQA-15-2 Stress Analysis UFMFHA-15-2 Project Management		DipHE Mechanical Engineering 240 credits at appropriate level

Year Out: We recommend that students take this opportunity to do a year-long placement in industry or research. However, this is not necessary and students can enter the third year immediately after year 2.

	Year 3	**Compulsory Modules** UFMFU7-15-3 Computational Methods UFMFX8-30-3 Individual Project BEng The BEng module is the default but the MEngA module can be accepted by agreement with the programme leader UFMFY8-30-3 Individual Project MEng Part A	**Optional Modules** **Choose 60 credits ~~one~~ from:** UFMFU6-15-3 Composite Engineering **OR** UFMFP9-15-3 Mechanics of Materials UFMF7K-15-3 Materials and Structures for Special Applications UFMFD7-15-3 Energy Technologies **OR** UFMFTA-15-3 Thermofluid Systems UFMFSL-15-3 Integrated Electro-Mechanical Systems UFMFXJ-15-3 Vibrational Dynamics UFMFYJ-15-3 Control Engineering (No more than 75 credits in TOTAL in one semester) **Choose one from:** UFMFM7-15-3 Business Environment UFMF89-15-3 Industrial Placement	**Awards:** BEng Mechanical Engineering 300 credits at appropriate level BEng (Hons) Mechanical Engineering 360 credits at appropriate level

GRADUATION

PART TIME

ENTRY ↓	Part -time Level 1.1	**Compulsory Modules** UFMFN3-30-1 Design, Materials & Manufacturing	**Optional Modules**	
	Part -time Level 1.2	UFMFJ9-30-1 Engineering Mathematics UFMFH3-30-1 Stress & Dynamics UFMFG3-15-1 Fluid Dynamics		**Interim Awards**

	Part -time Level 2.1	UFMFF3-15-1 Energy &Thermodynamics UFMF88-30-2 Design and Electromechanical Systems UFMFK9-15-2 Engineering Mathematics 2 UFMFL8-15-2 Dynamics		CertHE Mechanical Engineering 120 credits at appropriate level DipHE Mechanical Engineering 240 credits at appropriate level
	Part -time Level 2.2	UFMFW8-30-2 Heat Transfer, Power & the Environment UFMFQA-15-2 Stress Analysis UFMFHA-15-2 Project Management	**Choose 15 credits from:** UFMF7K-15-3 Materials and Structures for Special Applications UFMFYJ-15-3 Control Engineering	
	Part -time Level 3.1	UFMFU7-15-3 Computational Methods **Choose one from:** UFMFM7-15-3 Business Environment UFMF89-15-3 Industrial Placement	**Choose 45 credits from:** UFMFTA-15-3 Thermofluid Systems **OR** UFMFD7-15-3 Energy Technologies UFMFU6-15-3 Composite Engineering **OR** UFMFP9-15-3 Mechanics of Materials UFMFXJ-15-3 Vibrational Dynamics UFMFSL-15-3 Integrated Electro-Mechanical Systems	**Awards:** BEng Mechanical Engineering 300 credits at appropriate level BEng (Hons) Mechanical Engineering 360 credits at appropriate level
	Part -time Level 3.2	UFMFX8-30-3 Individual Project BEng		

Part 5: Entry Requirements

The university's minimum requirements for entry to a degree apply to this programme. In addition entrants are required to have evidence of achievement equivalent to Mathematics at A2 Level (at grade C or above), plus evidence of achievement equivalent to A2 Level in another scientific discipline (for example, physics, chemistry, engineering, design and technology). The normal offer is listed on the UWE website

Part 6: Assessment

Approved to a variant of the University Regulations and Procedures.

The degree classification for the 360 credit honours degree BEng (Hons) Mechanical Engineering (or 480 credit honours degree with an integrated foundation year) is based upon the best marks for 100 credits at level 3 and the best marks achieved for the next 100 credits at level 2 or above. The calculation at level 3 must always use the full credit and mark for the level 3 project followed by the best marks associated with the remaining level 3 credits. Where the credit size of the best marks associated with the remaining level 3 credits would give a credit total greater than 100, only the relevant portion of credit is counted. The unused credit may be counted towards the set of best marks at level 2 or above. Marks achieved for the 100 level 3 credits are weighted three times the value of the marks for the 100 credits at level 2 or above.

Due to professional body requirements, the classification method for direct entrants to the BEng in Mechanical Engineering will include the marks and whole credit for the project.

Part 7: Student Learning

Teaching, learning and assessment strategies to enable learning outcomes to be achieved and demonstrated

At UWE, Bristol there is a policy for a minimum average requirement of 12 hours/week contact time over the course of the full undergraduate programme. This contact time encompasses a range of face to face activities as described below. In addition a range of other learning activities will be embedded within the programme which, together with the contact time, will enable learning outcomes to be achieved and demonstrated.

In Engineering it is recognized that a higher contact time is desirable and so some laboratory-based modules have an extra factor included in the time calculation which provides more hours. In addition the level 1 and 2 students have timetabled Peer-Assisted Learning hours, where trained level 2 and 3 students (as appropriate) work with groups.

Class Activities

The mode of delivery of a module is determined by its Module Leader, and typically involves a combination of one or more lectures, tutorials, 'lectorials', laboratory classes, group activities and individual project work. Modules on the Foundation Programme which require laboratory classes are commonly delivered by means of a combination of lecture and practicals or tutorials.

Academic Support

Academic advice and support is the responsibility of the staff delivering the module in question. Staff are expected to be available outside normal timetabled hours, either by appointment or during published "surgery" hours, in order to offer advice and guidance on matters relating to the material being taught and on its assessment.

Part 7: Student Learning

Peer Assisted Learning (PAL) is used to support learning at levels 1 and 2. Each student has access to at least one PAL session per week to assist them on problems of understanding they face in any of the modules they are studying.

Pastoral Care

The University divides responsibilities for pastoral care between academic personal tutors who look after the academic well-being of students and Student Advisors who provide comprehensive, full-time student support on a range of issues including funding, academic regulations, personal and health issues. The service operates on a drop-in basis or by appointment.

Progression to Independent Study

Many modules require students to carry out independent study, such as research for projects and assignments, and a full range of facilities are available at all sites to help students with these. The philosophy is accordingly to offer students both guided support and opportunities for independent study. Guided support, mainly in the form of timetabled sessions, takes the form of lectures, tutorials, seminars and practical laboratory sessions. Students are expected to attend all sessions on their timetable, and this is especially important because of the high content of practical work in the programme.

The progression to independent study will also be assisted by the nature of the support offered in individual modules. Typically, module leaders will provide a plan for the module indicating the activities to be carried out and the forms of learning to be undertaken during the delivery of the module, with a view to encouraging students to plan ahead and to take responsibility for managing their time and resources.

Computing Facilities

The Faculty offers a specialised computing facility alongside the general University provision. There are a number of general PC computing laboratories of 20 plus seats all running Windows, along with four Unix based laboratory and 10 specialist computing labs. The specialist laboratories are equipped with the specific software; including Software Design Tools development environment, CAD, finite element analysis, mathematics and statistics packages to support the taught program. The specialist Computing laboratories are designed to target the discipline taught in that area.

One of the most popular areas within the Faculty is the Open Access laboratory which provides 24 hour opening and gives students the opportunity to access machines at all times during opening hours. This is a mixed environment consisting of PCs and Unix workstations.
Due to the extensive computing facility provided within the Faculty, and the specialist nature of this facility, the need for user support is necessary. The Faculty provides a user support Helpdesk, staffed every week day during normal working hours.

Description of Distinctive Features and Support

Design and Engineering Lab Facilities
Students on Engineering programmes can access a suite of specialist laboratories.These include Structures, Material Science, Dynamics, Thermofluids, Motorsport and Aero (with sub sonic and supersonic wind tunnels and a programmable flight simulator with hydraulic motion platform), plus manufacturing workshops including CNC machines, laser cutting and rapid prototyping. A driving simulator is also available.

Part 7: Student Learning

Students have 24/7 access to industry standard Computational Engineering software such as Ansys-CFX for Computational Fluid Dynamics and Abaqus for Mechanics of Composites.

Technology Enhanced Learning
Staff in the department are keen adopters of technology to support and enhance student learning. This includes

- computer based e-assessment implemented in a number of modules, so that students can take regular short tests with automated computer generated feedback.
- Recordings of some lectures (audio and video) which are made available after classes via the university's Virtual Learning Environment.

The Placement Year
An optional placement year provides opportunities for real-world, industrially based final year projects. The student will in most cases be on a formal contract in which they are paid for their employment. He or she will have the opportunity to explore career possibilities, make new business contacts for the future and prepare for the final year at University. Students are responsible for finding their own placement, however, many opportunities are published through the University Placements Office, and the process of finding a placement is supported in year 2 of the Graduate Development sessions. Once on placement, students retain access to the support network of the University and will be visited in their place of work at least once by a Visiting Tutor. Placement students gain credit for their work through submitting a portfolio, which reduces the amount of credit required to be taken in their final year by 15 credits.

Mathematics Support

- EspressoMaths: provides drop-in one-to-one tuition each day in the student canteen and a web-site that provides a portal to a variety of on-line resources in mathematics and statistics.

Part 8: Reference Points and Benchmarks

This programme has been prepared with reference to a number of external benchmarks, including the QAA Subject Benchmark Statement for Engineering, the QAA Framework for HE Qualifications, the university's Learning & Teaching Strategy, and a number of more specialised publication relating to mechanical engineering.

The Subject Benchmark Statement for Engineering outlines a set of skills expected of a graduate in an engineering discipline (Section 4 of the Statement refers), while noting that they should be interpreted in the context of the particular engineering discipline which is being studied. These skills map closely to the skills contained in the learning outcomes for this programme, and hence we have confidence that the programme is in accordance with the precepts of the Statement.

The university's Learning & Teaching Strategy has informed the faculty's policy for the delivery of its programmes, whose main features are described in section 7.

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 he/she takes full advantage of the learning opportunities that are provided. More detailed information on the learning outcomes, content and teaching, learning and assessment methods of individual modules can be found in module specifications, available on the University's website.

Appendix 1

Part 4: Programme Structure: BEng(Hons) Mechanical Engineering level 3 top-up to complete the knowledge qualification for the level 6 degree apprenticeship standard Manufacturing Engineer
This structure diagram demonstrates the student journey from Entry through to Graduation for a typical part time student, including: level and credit requirements, interim award requirements, module diet, including compulsory and optional modules Progression to this level 3 top-up is via the FdSc Mechanical Engineering delivered at University Centre Weston. Note that the module Engineering and Society UFMFCL-15-3 has been added at the request of an employer as it provides the opportunity for STEM outreach by their employees. This option is not available on the standard FT and PT pathways.

Entry: On completion of FdSc Mechanical Engineering at University Centre Weston

	Part -time Level 3.1	UFMFU7-15-3 Computational Methods **Choose one from:** UFMFM7-15-3 Business Environment UFMFCL-15-3 Engineering and Society UFMF89-15-3 Industrial Placement	**Choose 45 credits from:** UFMFTA-15-3 Thermofluid Systems **OR** UFMFD7-15-3 Energy Technologies UFMFU6-15-3 Composite Engineering **OR** UFMFP9-15-3 Mechanics of Materials UFMFXJ-15-3 Vibrational Dynamics UFMFSL-15-3 Integrated Electro-Mechanical Systems	
	Part -time Level 3.2	UFMFX8-30-3 Individual Project BEng	**Choose 15 credits from:** UFMF7K-15-3 Materials and Structures for Special Applications UFMFYJ-15-3 Control Engineering	**Interim Awards:** BEng Mechanical Engineering 300 credits at appropriate level BEng (Hons) Mechanical Engineering 360 credits at appropriate level

FOR OFFICE USE ONLY

First CAP Approval Date	23rd January 2013			
Revision CAP Approval Date	31 January 2017	Version	3	(ID 4160)
	August 2017		4	Link to APT (ID 4382)
Next Periodic Curriculum Review due date				
Date of last Periodic Curriculum Review				