PROGRAMME SPECIFICATION

Part 1: Basic Data		
Awarding Institution	University of the West of England, Bristol	
Teaching Institution	University of the West of England, Bristol	
Delivery Location		
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 Automotive Engineering	
Default Award Title		
Interim Award Titles	BEng(Hons) Automotive Engineering BEng Automotive Engineering Diploma of Higher Education, Automotive Engineering Certificate of Higher Education, Automotive Engineering	
UWE Progression Route		
Mode(s) of Delivery	Full Time /Part Time/Sandwich	
Codes	**UCAS: H335**	**JACS:**
	ISIS2:	**HESA:**
Relevant QAA Subject Benchmark Statements	Engineering	
CAP Approval Date	5 February 2015 v1.2, June 2015 v1.3; July 2015 V2; Jan 2016 v2.1; June 2016 v2.2, Jan 2017 v3; 16 Jan 2018 v4	
Valid From	September 2013	
Revised with effect from	September 2018	
Valid until Date		
Version	4	

Part 2: Educational Aims of the Programme

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 Automotive Engineering programme is to produce graduates with a broad understanding of mechanical analysis and design, combined with awareness of engineering practice, information technology, assembly and manufacture, project management and business issues, all contextualised to the automotive environment. Graduates with MEng will be equipped to solve multi-disciplinary problems and lead future developments in industry. 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 development of the award was undertaken with reference to the QAA Subject Benchmark in Engineering (2010) with particular reference to the learning outcomes and ethos of the MEng degree.
The engineering provision at UWE is entirely in alignment with the subject benchmark statements, and the design of this MEng properly reflects the QAA in its statement regarding MEng degrees: **"Crucially, they will have the ability to integrate their knowledge and understanding…….to solve a substantial range of Engineering problems…..through involvement in individual and group design projects, …."**

The aims of the programme are:

1. To prepare students for careers in automotive engineering and related disciplines. The content of the programme ensures that students will have the appropriate level of knowledge and understanding of mechanical engineering so that they will also be suitable for employment in the wider engineering domain and not be restricted only to the automotive environment.

2. To provide knowledge and understanding of scientific principles and methods necessary to underpin the students' education in engineering. To provide .insight into, and practical skills in, the creation of complex engineering products, particularly in relation to automotive engineering. This involves understanding the opportunities provided by vehicle power trains, chassis configurations, various materials, aerodynamics assembly and manufacture; all considered within the constraints imposed by the relevant regulations. In addition, issues relating to efficient and effective use of resources within the power train and the reduction of environmental impact will be explored.

3. To provide the students with the ability to integrate their knowledge and understanding of core subject material in order to solve a substantial range of engineering problems, including ones of a complex nature.

4. To prepare students for progression to study for higher degrees in appropriate engineering subjects.

5. To continue the development of those general study skills that will enable students to become independent, lifelong learners.

6. Pursue independent study, undertake enquiry into novel and unfamiliar concepts and implement change in an Engineering environment.

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. Automotive and Mechanical Engineering principles and design. 2. Generic engineering topics, plus additional specialist subjects relating to automotive engineering (such as vehicle dynamics, aerodynamics and power train systems). 3. Structures, materials and safety. 4. Integration of mechanical and non-mechanical elements in complex engineering systems. 5. Business issues relating to automotive engineering products and manufacture. 6. Social, environmental, ethical, economic and commercial factors and their influence on engineering practice. The effect of legislation. 7. The complexity of large-scale engineering systems and projects, with particular emphasis upon automotive systems.	**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 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 and solve complex engineering problems. 4. Adoption of a creative and innovative approach to solving problems and design and manage conflicting objectives and constraints. 5. Comprehension of the broad picture and demonstration of of a professional attitude to the responsibilities of engineering practitioners. 6. Critical Thinking: The ability to select and apply appropriate mathematical and computer based methods for modelling and analysing problems in fields relating to the design, manufacture and control of automotive components and systems 7. The ability to apply theory in unfamiliar applications and to assimilate new theory.	**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. 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 and project 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 assimilate skills in submitted reports, assignments and exam answers.

<table>
<tr><th colspan="2">C Subject, Professional and Practical Skills</th></tr>
<tr><td>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</td><td>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.

Many of the skills listed are introduced at level 1 and then drawn into sharper focus at levels 2 and 3.

The general teaching/learning method is therefore 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.

Point 6 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.</td></tr>
<tr><th colspan="2">D Transferable Skills and other attributes</th></tr>
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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</td><td>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</td></tr>
</table>

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	• Students participate in individual tutorials • Students present technical work in written reports. 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 6 is developed through a variety of methods and strategies including the following: • Students are encouraged to access online material and academic literature available from the professional institutions. 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 context including • examination • poster presentation. • individual and group projects • practical assignments • portfolio of exercises • Individual project levels 3 and M. In addition skill 2 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

		Compulsory Modules	Optional Modules	Interim Awards
ENTRY ↓	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 Automotive Engineering 120 credits at appropriate level

Year 2	**Compulsory Modules** UFMF88-30-2 Design and Electromechanical Systems UFMFMC-30-2 Automotive Technology UFMFKP-15-2 Engineering Maths 2 (PBL) UFMFLP-15-2 Dynamics (PBL) UFMFMP-15-2 Stress Analysis (PBL) UFMFHA-15-2 Project Management	**Optional Modules**	**Interim Awards** DipHE Automotive Engineering 240 credits at appropriate level
Year Out: Students on the Sandwich route take spend a year on a work or study placement after year 2. Students on the sandwich route will undertake UFMF89-15-3 Industrial Placement			
Year 3	**Compulsory Modules** UFMFU7-15-3 Computational Methods UFMFXJ-15-3 Vibrational Dynamics 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 one from:** UFMFM7-15-3 Business Environment UFMF89-15-3 Industrial Placement UFMFCL-15-3 Engineering and Society **Choose one from:** UFMFNC-30-3 Automotive Manufacturing UFMFT9-30-3 Motorsport Performance **Choose one from:** UFMFYJ-15-3 Control Engineering UFMF7K-15-3 Materials and Structures for Special Applications UFMFU6-15-3 Composite Engineering	**Awards:** BEng Automotive Engineering 300 credits at appropriate level BEng(Hons) Automotive Engineering 360 credits at appropriate level

	Masters	**Compulsory Modules** UFMERY-30-M Individual Project MEng (Part B) UFMFVL-15-3-M Mechanics of Composites UFMFWL-15-3-M Computational Fluid Dynamics (CFD) UFMFXC-15-M Masters Group Project UFMEVE-15-M Advanced Chassis UFMF8E-15-M Advanced Powertrain Technologies	**Optional Modules** **Choose one from:** UFMEBP-15-M Structural Integrity in Design UFMFCC-15-M Industrial Applications of Vision and Automation UFMEEA-15-M Electromechanical Systems Integration	**Highest Award:** MEng Automotive Engineering 480 credits at appropriate level

GRADUATION

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. It should be noted that years 1, 2 and 3 of the MEng Automotive Engineering are common with the BEng Automotive Engineering. **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 Automotive 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

Part 7: Student Learning

Teaching, learning and assessment strategies to enable learning outcomes to be achieved and demonstrated
At UWE 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 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 are predominantly delivered by means of large group lectures, supported by smaller 'lectorials': classes for groups of 20-30 students to allow a closer interaction and discourse with staff.

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.

Pastoral Care
The faculty offers pastoral care through two routes:

- Academic Personal Tutors: All level 1 students are assigned a Personal Academic Tutor, who is an academic member of staff in their department. Students meet individually with their tutor at least twice a year and also participate in group sessions with the Personal Academic Tutor's tutor group (max size 15) during years 1 and 2. In year 3 project supervisors take on the role of Personal Academic Tutor.

- Student Advisers, a team of administrative staff who provide comprehensive, full-time student support service on a drop-in basis or by appointment. Advisers are trained to provide advice on matters commonly of concern, including regulatory and other matters; the Adviser will, when necessary, advise the student to seek advice to from other professional services including the university's Centre for Student Affairs or from members of academic staff.

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 Windows7, two 40 seater PC labs, two Unix based laboratories and 10 specialist computing labs. All computer laboratories are available to students up until midnight, seven days per week, and many are on 24 hour access. The specialist laboratories are equipped with the specific software for Engineering students; 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.

Due to the extensive computing facilities provided within the Faculty, and the specialist nature of this facility, the need for user support is high. The Faculty provides a user support Helpdesk. The Helpdesk provides first line support, uniquely supported by both permanent staff and students that are in their second or final year of study (employed on a part time basis) during normal working hours.

Description of Distinctive Features and Support

Automotive Engineering

To distinguish this award from other engineering awards in the faculty, students on the Automotive Engineering award will study discipline specific modules, as seen from this programme specification, as well as modules shared with other awards. Shared modules are normally cohort streamed, which enables the use of discipline focused examples in the delivery of general engineering material.

Modules will be supported by appropriate discipline relevant laboratory exercises, including engine dynamometry, combustion chemistry and chassis dynamics, to name but a few.

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

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 social learning areas and a web-site that provides a portal to a variety of on-line resources in mathematics and statistics.
- Mathematical software used in the programme is available for home use free of charge.

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 motorsport education as referenced below.

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

Part 8: Reference Points and Benchmarks
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.

STUDENT AND ACADEMIC SERVICES

FOR OFFICE USE ONLY

<table>
<tr><td colspan="2">First CAP Approval Date</td><td colspan="3"></td></tr>
<tr><td rowspan="9">Revision CAP Approval Date
Update this row each time a change goes to CAP</td><td></td><td rowspan="9">Version</td><td>1</td><td></td></tr>
<tr><td></td><td>1.1</td><td></td></tr>
<tr><td></td><td>1.2</td><td></td></tr>
<tr><td></td><td>1.3</td><td></td></tr>
<tr><td></td><td>2</td><td></td></tr>
<tr><td></td><td>2.1</td><td></td></tr>
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<tr><td></td><td>3</td><td></td></tr>
<tr><td>16 Jan 2018</td><td>4</td><td>Link to RIA (ID 4582)</td></tr>
<tr><td>Next Periodic Curriculum Review due date</td><td colspan="4">Academic year in which next Periodic Curriculum Review due (6 years from initial approval or last Periodic Curriculum Review)</td></tr>
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Highest Award Title	BEng(Hons) Automotive Engineering	
Default Award Title		
Interim Award Titles	BEng Automotive Engineering Diploma of Higher Education, Automotive Engineering Certificate of Higher Education, Automotive Engineering	
UWE Progression Route		
Mode(s) of Delivery	Full Time /Part Time/ Sandwich	
Codes	**UCAS: H331**	**JACS:**
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Relevant QAA Subject Benchmark Statements	Engineering	
CAP Approval Date	February 2015 v1.2, June 2015 v1.3; July 2015 v2; Feb 2016 v2.1, Jan 2017 v3; 16 Jan 2018 v4	
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The development of the award was undertaken with reference to the QAA Subject Benchmark in Engineering (2010) with particular reference to the learning outcomes and ethos of the BEng(Hons) degree.

The aims of the programme are:

7. To prepare students for careers in automotive engineering and related disciplines. The content of the programme ensures that students will have the appropriate level of knowledge and understanding of mechanical engineering so that they will also be suitable for employment in the wider engineering domain and not be restricted only to the Automotive environment.

8. To provide knowledge and understanding of scientific principles and methods necessary to underpin the students' education in engineering. To provide insight into, and practical skills in, the creation of complex engineering products, particularly in relation to automotive engineering. This involves understanding the opportunities provided by vehicle power trains, chassis configurations, various materials, aerodynamics, assembly and manufacture; all considered within the constraints imposed by the relevant regulations. In addition, issues relating to efficient and effective use of resources within the power train and the reduction of environmental impact will be explored.

9. To provide the students with the ability to integrate their knowledge and understanding of core subject material in order to solve a substantial range of engineering problems, including ones of a complex nature.

10. To prepare students for progression to study for higher degrees in appropriate engineering subjects.

11. To continue the development of those general study skills that will enable students to become independent, lifelong learners.

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:

A Knowledge and Understanding

Knowledge and understanding of:	**Teaching/learning methods and strategies:**
8. Automotive and Mechanical Engineering principles and design. 9. Generic engineering topics, plus additional specialist subjects relating to automotive engineering (such as vehicle dynamics, aerodynamics and power train systems). 10. Structures, materials and safety. 11. Integration of mechanical and non-mechanical elements in complex engineering systems. 12. Business issues relating to automotive engineering products and manufacture. 13. Social, environmental, ethical, economic and commercial factors and their influence on engineering practice. The effect of legislation.	Acquisition of 1 to 6 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 developed through a range of taught modules at levels 2, 3 and is integrated through individual project work 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. Project work involves both presentation and inquisition.

B Intellectual Skills

Intellectual Skills	**Teaching/learning methods and strategies:**
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	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.

Part 3: Learning Outcomes of the Programme	
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 and solve complex engineering problems. 4. Adoption of a creative and innovative approach to solving problems and design and manage conflicting objectives and constraints. 5. Comprehension of the broad picture and demonstration of of a professional attitude to the responsibilities of engineering practitioners. 6. Critical Thinking: The ability to select and apply appropriate mathematical and computer based methods for modelling and analysing problems in fields relating to the design, manufacture and control of automotive components and systems	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 remaining skills. Independent reading is used to enable students to focus on their own areas of interest and in the process, assess skills in submitted reports, assignments and exam answers.
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	**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. Many of the skills listed are introduced at level 1 and then drawn into sharper focus at levels 2 and 3. The general teaching/learning method is therefore 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

Part 3: Learning Outcomes of the Programme	
design, analysis and control. 5. Execution and management of multi-disciplinary projects, both individually and as a member of a group.	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) 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.	**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 • Students present technical work in written reports. 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

Part 3: Learning Outcomes of the Programme	
	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 and academic literature available from the professional institutions.
	Assessment: These skills are demonstrated in a variety of context including • examination • poster presentation. • individual and group projects • practical assignments • portfolio of exercises • individual project at level 3 In addition skill 2 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 requirement; interim award requirements module diet, including compulsory and optional modules

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 Automotive Engineering 120 credits at appropriate level
Year 2	UFMF88-30-2 Design and Electromechanical Systems UFMFMC-30-2 Automotive Technology UFMFKP-15-2 Engineering Maths 2 (PBL) UFMFLP-15-2 Dynamics (PBL) UFMFMP-15-2 Stress Analysis (PBL) UFMFHA-15-2 Project Management		DipHE Automotive Engineering 240 credits at appropriate level

Year Out: Students on the Sandwich route take spend a year on a work or study placement after year 2. Students on the sandwich route will undertake UFMF89-15-3 Industrial Placement

	Year 3	**Compulsory Modules** UFMFXJ-15-3 Vibrational Dynamics 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 one from:** UFMFM7-15-3 Business Environment UFMF89-15-3 Industrial Placement UFMFCL-15-3 Engineering and Society **Choose one from:** UFMFNC-30-3 Automotive Manufacturing UFMFT9-30-3 Motorsport Performance **Choose one from:** UFMFYJ-15-3 Control Engineering UFMF7K-15-3 Materials and Structures for Special Applications UFMFU6-15-3 Composite Engineering	**Awards:** BEng Automotive Engineering 300 credits at appropriate level BEng (Hons) Automotive Engineering 360 credits at appropriate level

GRADUATION

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 classification for the 360 credit honours degree (or 480 credit honours degrees with an integrated foundation year) is based upon the best marks achieved 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.

Part 7: Student Learning

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

At UWE 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 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 are predominantly delivered by means of large group lectures, supported by smaller 'lectorials': classes for groups of 20-30 students to allow a closer interaction and discourse with staff.

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.

Pastoral Care

The faculty offers pastoral care through two routes:

- Academic Personal Tutors: All level 1 students are assigned a Personal Academic Tutor, who is an academic member of staff in their department. Students meet individually with their tutor at least twice a year and also participate in group sessions with the Personal Academic Tutor's tutor group (max size 15) during years 1 and 2. In year 3 project supervisors take on the role of Personal Academic Tutor.

- Student Advisers, a team of administrative staff who provide comprehensive, full-time

Part 7: Student Learning

student support service on a drop-in basis or by appointment. Advisers are trained to provide advice on matters commonly of concern, including regulatory and other matters; the Adviser will, when necessary, advise the student to seek advice to from other professional services including the university's Centre for Student Affairs or from members of academic staff.

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, two 40 seater PC labs, two Unix based laboratories and 10 specialist computing labs. All computer laboratories are available to students up until midnight, seven days per week, and many are on 24 hour access. The specialist laboratories are equipped with the specific software for Engineering students; 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.

Due to the extensive computing facilities provided within the Faculty, and the specialist nature of this facility, the need for user support is high. The Faculty provides a user support Helpdesk. The Helpdesk provides fist line support to the user base, uniquely supported by both permanent staff and students that are in their second or final year of study (employed on a part time basis) until 20.00hrs every day.

Description of Distinctive Features and Support

Automotive Engineering
To distinguish this award from other engineering awards in the faculty, students on the automotive engineering award will study discipline specific modules, as seen from this programme specification, as well as modules shared with other awards. Shared modules are normally cohort streamed, which enables the use of discipline focused examples in the delivery of general engineering material.

Modules will be supported by appropriate discipline relevant laboratory exercises, including engine dynamometry, combustion chemistry and chassis dynamics, to name but a few.

Design and Engineering Lab Facilities
Students on Engineering programmes can access a suite of newly refurbished specialist

Part 7: Student Learning

laboratories benefiting from a recent and ongoing investment of £1.6m. These include Automotive Engineernig, 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.

Students have 24/7 access to industry standard Computational Engineering software such as Ansys-CFX for Computational Fluid Dynamics and Abaqus for Finite Element analysis.

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 social learning spaces 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 automotive education as referenced below.

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.

Part 8: Reference Points and Benchmarks

STUDENT AND ACADEMIC SERVICES

FOR OFFICE USE ONLY

First CAP Approval Date				
Revision CAP Approval Date *Update this row each time a change goes to CAP*		Version	1	
			1.1	
			1.2	
			1.3	
			2	
			2.1	
			3	
	16 Jan 2018		4	Link to RIA (ID 4582)
Next Periodic Curriculum Review due date	*Academic year in which next Periodic Curriculum Review due (6 years from initial approval or last Periodic Curriculum Review)*			
Date of last Periodic Curriculum Review				