University of the West of England
BRISTOL

CORPORATE AND ACADEMIC SERVICES

PROGRAMME SPECIFICATION

Part 1: Basic Data			
Awarding Institution	University of the West of England		
Teaching Institution	University of the West of England		
Delivery Location	UWE, Frenchay Campus		
Study abroad / Exchange / Credit recognition	N/A		
Faculty responsible for programme	Faculty of Environment and Technology		
Department responsible for programme	Engineering, Design and Mathematics		
Modular Scheme Title			
Professional Statutory or Regulatory Body Links	Application for accreditation by one or more of IET, IMechE or RaeS after one year		
Highest Award Title	Masters in Research (MRes) Engineering		
Default Award Title			
Fall-back Award Title			
Interim Award Titles	PG Certificate (Engineering)		
UWE Progression Route			
Mode(s) of Delivery	FT / PT		
Codes	**UCAS: H1011**	**JACS:**	
	ISIS2:	**HESA:**	
Relevant QAA Subject Benchmark Statements	Engineering		
First CAP Approval Date	June 2015	Valid from	September 2015
Revision CAP Approval Date		Revised with effect from	
Version	1		
Review Date	September 2021		

Part 2: Educational Aims of the Programme
The aim of the Department's Masters programmes are 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

Part 2: Educational Aims of the Programme

theoretical knowledge. The Masters course is distinguished by a greater emphasis upon critical appraisal of existing ideas and practice, original thought and creative ability.

Engineering at UWE has a history of industry based collaboration and research through a variety of different schemes including industry based undergraduate projects and knowledge transfer partnerships. This collaboration has been undertaken through formalised methods such as the aerospace Networking for Innovation initiative (iNet) or through more informal means (e.g. links maintained with industry by individual academics).

This Masters in Research (MRes) Engineering programme (180 credits) contains both taught (60 credits) and research components (120 credits). Thus, this programme will produce graduates who are intending to specialise in a particular engineering topic area (e.g. supersonic aerospace design, robotics systems, vehicle aerodynamic design, wireless sensor networks etc.). Students will have the opportunity to study a research topic in depth during their project dissertation whilst working closely with experts in the related field and within a research/industry based environment. Students will be able to select from a list of available research projects or propose a research topic of their choice (if a suitable supervisor is available). Projects aim to focus on challenging current issues in current and future engineering systems through novel concepts and system level approaches whilst linking social-economic demands (e.g. resource efficiency), environmental impacts (e.g. disassembly and reuse) as well as leveraging new and emerging technologies such as additive manufacturing, 3D printing, smart materials and cutting edge modelling and simulation techniques.

The programme structure also provides students with the flexibility of strategically selecting modules from a wide range of existing postgraduate awards to further enhance their understanding of the topic area (subject to Programme Leader approval to ensure that the intended programme learning outcomes are met). Thus a Masters in Research (MRes) Engineering programme provides a solid platform for students who wish to pursue higher postgraduate degrees such as a PhD.

Alternatively UWE Engineering's strong industry and international academic links provides students with the opportunity to tailor their degrees to gain additional industrial experience through an industry linked project (as a possible industry based project).

Programme requirements for the purposes of the Higher Education Achievement Record (HEAR)

The Masters in Research (MRes) Engineering provides a flexible framework for engineering graduates intending to specialise in a particular engineering area of interest. There is a strong focus on independent research skills, developing additional technical specialization in their field of interest at a post-graduate level. Graduates completing this programme will be able to demonstrate their capability to independently undertake significant engineering research projects where the capacity to critically evaluate complex streams of current information, development of innovative solutions and rigorous validation of their proposed solutions are essential.

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:

(D) Knowledge and Understanding (subject specific)
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 enhance basic knowledge and understanding of the technologies underpinning engineering, design and product development through a range of modules. Advanced tools and technologies are used and the programme as a whole is integrated through the Masters in Research (MRes) Engineering research project.

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. Students on the Masters in Research (MRes) Engineering programme are required to demonstrate in-depth understanding and analysis of technical topics, and to carry out a comprehensive literature review in their project work.

Testing of the knowledge base is conducted through assessed course work, through tasks undertaken under examination conditions, through oral presentations and assessed practical work done in various laboratories. Assessment type applied is dependent on the modules selected by the student.

B. Intellectual Skills (generic)
Work at level M requires independent thinking, information gathering and analysis. This is delivered through a combination of specialist taught modules and individual project work.

In the taught modules the learning outcomes are achieved through a range of teaching and learning strategies include; practical based learning, team work, case studies and problem based learning. Students will be given specific application examples and will develop an appreciation of problem contexts as well as striking the right balance when facing conflicting objectives.

The individual research project addresses, problem definition, project design, planning, research and implementation.

The development of engineering solutions requires demonstration of a wide range of intellectual skills, covering analysis, evaluation and problem solving. Skills 1-7 are assessed through a combination of coursework assessments and examinations within the optional modules.

Part 3: Learning Outcomes of the Programme

C. Subject/Professional/Practical Skills (subject specific)

Throughout the programme, the skills listed are developed through a combination of theoretical discussion; practical laboratory based work, classroom-based tutorial exercises and directed self-study. 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.

Skills 1-6 are acquired through the development of practical laboratory work, coursework, presentations and examinations. Additionally, skills 1 and 2 are assessed in the project dissertation.

D. Transferable Skills and other attributes (generic)

An indication of the generic skills which successful completion of the programme is likely to enhance, e.g. key skills of numeracy, communication, ability to use information technology and learning to learn.

Where work-based or work-place learning is an intended part of the proposed programme, the team will need to ensure that the learning outcomes are clearly articulated and contribute to the overall aims of the programme.

The ESD guidance (available here) has been considered and will be include in the programme delivery where appropriate.

Learning Outcomes:	**UFMFEH-120-M**	**UFMFYA-15-M**	Module No:	Module No:	Module No:	Module No:	Module No:	Module No:	Module No:	Module No:	Module No:	Module No:	Module No:	Module No:	Module No:	Module No:	Module No:	Module No:	Module No:	Module No:	Module No:	Module No:	Module No:
A) Knowledge and understanding																							
1. The principles governing the behaviour of systems (e.g. mechanical, electronic, robotic etc.).	✓																						
2. The properties, characteristics and selection of materials used in mechanical components and systems.																							
3. The application of numerical methods in the modelling and	✓																						

Part 3: Learning Outcomes of the Programme

	analysis of engineering systems, processes and products.																							
4.	The complexity of large-scale engineering systems and projects																							
5.	The use of research and practice-based inquiry to create, interpret and apply knowledge in the context of engineering systems.	✓	✓																					
6.	The role of research and development in furthering knowledge and understanding	✓	✓																					
(B) Intellectual Skills																								
1.	The ability to produce solutions to problems through the application of engineering knowledge and understanding.	✓																						
2.	Be able to use scientific principles in the modelling and analysis of engineering systems, processes and products.	✓																						
3.	The ability to select and apply appropriate methods of modelling and analysing relevant problems.	✓	✓																					
4.	Critically review available literature on topics related to engineering.	✓	✓																					
5.	Engage in learning through reflection on practice and experience.	✓	✓																					
6.	A professional attitude to the responsibilities of engineering practitioners.	✓																						
7.	The ability to use independent thinking and analysis in the development of engineering solutions.	✓																						

Part 3: Learning Outcomes of the Programme

Subject/Professional/Practical Skills																							
1. Demonstrate an in-depth understanding of research methods and the ability to apply them to identify key avenues for further research.	✓	✓																					
2. Plan, execute and present a significant piece of work, in which skills such as time management, problem solving and interdependence are evident	✓																						
3. Demonstrate practical testing of engineering ideas through laboratory work or simulation with technical analysis and critical evaluation of results.	✓																						
4. Use relevant design, test and measurement equipment experimental methods in the laboratory relating to engineering design and test.	✓																						
5. Gather, critically analyse and present experimental data.	✓																						
6. Use a wide range of specialised simulation software, hardware and computing resources	✓																						
(D) Transferable skills and other attributes																							
1. Communication skills: to communicate effectively orally and in writing in a range of contexts (e.g. academic, industrial), including, for instance, publishing the results of technical investigation, to peers and/or to “problem owners”.	✓	✓																					
2. Self-management skills: to manage one’s own time; to	✓																						

Part 3: Learning Outcomes of the Programme

	meet deadlines; to work with others having gained insights into the problems of team-based system development.																							
3.	IT skills in context: to use relevant and industry standard software in professional and technical practice	✓	✓																					
4.	Demonstration of independent learning: Use of self-directed learning for continuing professional development and problem solving.	✓																						
5.	Comprehension of professional literature: to read and to use literature sources appropriate to the discipline to support learning activities.	✓	✓																					
6.	Working with others: to be able to work as a member of a team; to be aware of the benefits and problems that teamwork can bring.																							

Part 4: Student Learning and Student Support

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

Contact time as part of this programme encompasses a range of face-to-face activities as described below. In addition, a range of other learning activities are embedded within the programme, which, together with the contact time, will enable the learning outcomes to be achieved and demonstrated. On the Masters in Research (MRes) Engineering programme, teaching is a mix of scheduled learning, independent learning and project-based learning.

Scheduled learning includes lectures, tutorials, project supervision, demonstration, practical classes and workshops; and field work. Scheduled sessions may vary slightly depending on the module choices made. Module selection is subject to approval by the research project supervisor or Programme Leader.

Independent learning includes hours engaged with essential reading, case study preparation, assignment preparation and completion etc.

Project based learning: Dissertation work may be carried out at the University or at a company (e.g. a student may continue employment at a company while completing this programme part-time). University based dissertation projects will be carried out under the supervision of a member of the academic team and in the case of a company project, there will be an additional industrial supervisor. For the latter case, student time may be split between working at UWE and working in industry (subject to company approval).

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, laboratory classes, group activities and individual project work.

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 its Student Advisers 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.

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.

Part 4: Student Learning and Student Support

Description of the teaching resources provided for students

Computing Facilities
The Faculty offers a specialised computing facility alongside the general University provision. There are a number of general PC computing laboratories with Windows and Unix based operating systems as well as a range of specialist computing labs. The specialist laboratories are equipped with the specific software; including Software Design Tools development environment, CAD, Computational Fluid Dynamics, finite element analysis, Simulation, mathematics and statistics packages to support the taught program. The specialist Computing laboratories are designed to target the discipline taught in that area. This includes the Computer Systems Architecture and Linux laboratory. The Unix labs offer the latest web development and programming tools.

One of the most popular areas within the Faculty are the open access laboratories which provides 24 hour access to students. This is a mixed environment consisting of PCs and Unix workstations. The Faculty also provides a user support Helpdesk.

Access to Specialist Facilities
We have extensive Mechanical, Aerospace and Automotive and Electronics Engineering laboratories at UWE; ranging from industrial robotics and mechatronics to state of the art rapid prototyping and modelling, including advanced workstations for computational fluid dynamics and kinematic modelling/simulation. These laboratories were initially developed for our undergraduate programmes in Engineering and, more recently, updated and expanded to meet the needs of students on MEng programmes. Recent accreditation panels from the professional institutions (IMechE, RAeS and IET) praised the level and quality of laboratory provision in these areas. Although these laboratories are in regular and frequent use by undergraduate students during teaching blocks 1 and 2, the main period during which Masters in Research (MRes) Engineering projects will be undertaken coincides with periods when UG students are making little or no use of laboratory facilities. Thus, there is adequate capacity to facilitate access for Masters in Research (MRes) Engineering students.

Design and Engineering Lab Facilities
Students on Engineering programmes can access a suite of newly refurbished specialist laboratories benefiting from a recent and ongoing investment of £1.6m. These include Structures, Material Science, Dynamics (with a racing car simulator), Thermofluids, Aero (with sub- 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/Fluent for Computational Fluid Dynamics, Abaqus for Finite Element analysis and MATLAB/Simulink for Simulation and Modelling.

Technology Enhanced Learning
Staff in the department are keen adopters of technology to support and enhance student learning. This may include computer-based e-assessment, so that students can take regular short tests with automated computer generated feedback. In addition, recordings of some lectures (audio and video) are made available after classes via the university's Virtual Learning Environment.

Mathematics Support
EspressoMaths: provides drop-in one-to-one tuition each day in social learning spaces and a website that provides a portal to a variety of on-line resources in mathematics and statistics.

Part 4: Student Learning and Student Support

Programming Support
EspressoProgramming: provides drop-in one-to-one tuition in social learning spaces and a website that provides a portal to variety of on-line resources for popular programming languages.

Part 5: Assessment

Approved to University Regulations and Procedures

Assessment Strategy
Assessment strategy to enable the learning outcomes to be achieved and demonstrated:

Students will experience a range of assessment modes. Within the compulsory modules assessment includes a dissertation, portfolio and written assignment. Optional modules also include but not limited to assessment in the form of unseen written exams, practical exams, individual and group presentations. Problem solving, reflection and applied learning are also important to fulfilling the programme learning outcomes.

Assessment Map

The programme encompasses a range of **assessment methods** including; written exams, written assignments, projects, portfolios, practical exams and a dissertation. These are detailed in the following assessment map:

Assessment Map for Masters in Research (MRes) Engineering

		Type of Assessment*									
		Unseen Written Exam	Open Book Written Exam	In-class Written Test	Practical Exam	Practical Skills Assessment	Oral assessment and/or presentation	Written Assignment	Report / Project	Dissertation	Portfolio
Compulsory Modules Level M	**UFMFEH-120-M**									A2 (80)	A1 (20)
	UFMFYA-15-M							A (100)			

*Assessment should be shown in terms of either Written Exams, Practical exams, or Coursework as indicated by the colour coding above.

Part 6: 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
Full Time ENTRY	Year 1	UFMFEH-120-M Project Dissertation UFMFYA-15-M Research Investigation, Planning and Methods for Change	Students must choose, in association and agreement with their supervisory team, 45 credits from UWE M-level engineering and research modules from within FET and running in that particular academic year.	**PG Cert Engineering** Minimum 60 credits **Highest Award:** **Masters in Research (MRes) Engineering** (180 M level credits)

GRADUATION

Part time: The following structure diagram demonstrates the student journey from Entry through to Graduation for a typical **part time student.**

		Compulsory Modules	Optional Modules	Interim Awards
Part Time ENTRY	Year 1	UFMFYA-15-M Research Investigation, Planning and Methods for Change	Students must choose, in association and agreement with their supervisory team, 45 credits from UWE M-level engineering and research modules from within FET and running in that particular academic year.	**PG Cert Engineering** Minimum 60 credits
	Year 2	UFMFEH-120-M Project Dissertation	None	**Highest Award:** **Masters in Research (MRes) Engineering** (180 M level credits)

GRADUATION

Part 7: Entry Requirements

The University's Standard Entry Requirements. In addition to the University's general requirements for entry to a postgraduate programme, an Honours degree in Mechanical Engineering, Aerospace Engineering, Motorsport Engineering, Electronics Engineering, Robotics Engineering or a similar subject will normally be required. Applicants with first degrees in other disciplines will be considered if they have relevant professional experience and an in-depth understanding of degree level engineering mathematics

Part 8: Reference Points and Benchmarks

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 many of the skills contained in the learning outcomes for the proposed programme of study. The Masters in Research (MRes) Engineering programme has been designed to enhance and develop these skills to postgraduate level. In particular this programme requires students to demonstrate skills at a postgraduate level relating to the specification, management and solution of engineering problems. There is also considerable emphasis on the analysis and design of engineering solutions at postgraduate level, and the ability to research and critically evaluate alternative proposals. Consequently, we believe that this Masters award will build on and enhance the skills in the Subject Benchmark Statement for Engineering.

Research

UWE's 2020 Strategy aims to focus its efforts on; outstanding learning, ready and able graduates, research impact and civic engagement and leadership. Staff in the Faculty of Environment and Technology are research and consultancy active. Some modules are based in the Bristol Robotics Laboratory which now includes our Machine Vision Lab and some of the academics teaching on the course are also members of the newly established Engineering Modelling and Simulation research group. Consequently the programme development, formal teaching and project work are underpinned and informed by current research. Staff contributing to the programme have an established record in supervising postgraduate research-based projects Masters, Masters in Research, PhD level, and students may have the opportunity to carry out their projects working alongside research staff at post-doctorate level.

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.