Programme Specification

Mechanical Engineering [Sep][SW][Frenchay][5yrs]

Version: 2018-19, v1.0, Validated

Contents

Section 1: Key Programme Details

Part A: Programme Information

Programme title: Mechanical Engineering [Sep][SW][Frenchay][5yrs]

Highest award: MEng Mechanical Engineering

Interim award: BEng (Hons) Mechanical Engineering

Interim award: BEng Mechanical Engineering

Interim award: DipHE Mechanical Engineering

Interim award: CertHE Engineering

Awarding institution: UWE Bristol

Teaching institutions: UWE Bristol

Study abroad: No

Year abroad: No

Sandwich year: Yes

Credit recognition: No

School responsible for the programme: FET Dept of Engineering Design & Mathematics, Faculty of Environment & Technology

Professional, statutory or regulatory bodies:

Institution of Mechanical Engineers (IMechE)

Modes of delivery: Sandwich

Entry requirements: For the current entry requirements see the UWE public website.

For implementation from: 01 September 2018

Programme code: H301-SEP-SW-FR-H301

Section 2: Programme Overview, Aims and Learning Outcomes

Part A: Programme Overview, Aims and Learning Outcomes

Overview: 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.

Features of the programme:

Educational Aims: 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.

The aims are that graduates shall be able to:

Apply established and novel Mechanical Analysis concepts to the solution of engineering problems involving Design, Operations and Manufacture.;

Use systems incorporating digital hardware, software, communication, processing algorithms, interfacing circuits and parameter sensing and actuating devices;

Model mechanical engineering systems so as to be able to specify and assess the technical design;

Understand the manufacturing, financial and marketing implications of design proposals;

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;

Operate effectively either as individuals or as members of a multi-disciplinary team;

Communicate effectively both orally and in written form;

Make considered judgements and decisions on complex engineering issues in which not all facts and consequences are accurately known;

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

Be equipped with strategic management and leadership skills together with broader engineering knowledge that goes beyond those of the BEng (Hons) degree.

Programme Learning Outcomes:
On successful completion of this programme graduates will achieve the following learning outcomes.

Knowledge and Understanding

A1. The principles governing the behavior of mechanical components and systems

A2. Mathematical methods appropriate to Mechanical engineering and related fields

A3. The properties, characteristics and selection of materials used in mechanical components and systems

A4. A sound understanding of core engineering science and technologies with greater depth in areas pertinent to mechanical systems

A5. The principles of information technology and data communications from a user's perspective

A6. Social, environmental, ethical, economic and commercial factors

A7. The complexity of large-scale engineering systems and projects, with particular emphasis upon mechanical systems

Intellectual Skills

B1. The ability to produce solutions to problems through the application of engineering knowledge and understanding

B2. 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

B3. The ability to use a broad spectrum of technologies/techniques to solve complex engineering problems

B4. 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

B5. Adoption of a creative and innovative approach to solving problems and design

B6. Comprehension of the broad picture and demonstration of of a professional attitude to the responsibilities of engineering practitioners

B7. The ability to apply theory in unfamiliar applications and to assimilate new theory

Subject/Professional Practice Skills

C1. Appropriate skills including safe working in experimental work in laboratories and workshops

C2. Demonstrate practical testing of engineering ideas through laboratory work or simulation with supporting technical analysis and critical evaluation of results

C3. Understanding and execution of the design process

C4. Use of a range of computer software for design, analysis and control

C5. Execution and management of multidisciplinary projects, both individually and as a member of a group

C6. Understanding individual roles in teams and the responsibilities of leadership

Transferable Skills and other attributes

D1. Communication skills: to communicate orally or in writing, including, for instance, the results of technical investigations, to peers and/or to "problem owners"

D2. Self-management skills: to plan and manage time, to meet deadlines and to work with others

D3. IT Skills in Context (to use software in the context of problem-solving investigations, and to interpret findings)

D4. Problem formulation and solution

D5. Progression to self learning: To gain experience of and to develop skills independently of structured class work

D6. Comprehension of professional literature: to read and to use literature sources appropriate to the discipline to support learning activities

D7. Ability to critically appraise and adjust plans to changing circumstances

D8. Ability to think independently and self-manage the work environment

Assessment strategy: 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.

Knowledge and Understanding, Learning Outcomes:
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.

Intellectual Skills, Learning Outcomes:
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 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 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.

Subject, Professional and Practical Skills, Learning Outcomes:
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.

Transferable Skills and other attributes, Learning Outcomes:
Assessment:

These skills are demonstrated in a variety of contexts including:
Examination;
Poster presentation;
Individual and group projects;
Practical assignments;
Portfolio of exercises.

In addition skill two is assessed by both peers and tutors.

Student support: 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:

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.

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 B: Programme Structure

Year 1
The student must take 120 credits from the modules in Year 1.

Year 1 Compulsory Modules

Module Code	Module Title	Credit
UFMFN3-30-1	Design, Materials and Manufacturing 2018-19	30
UFMFF3-15-1	Energy and Thermodynamics 2018-19	15
UFMFJ9-30-1	Engineering Mathematics 2018-19	30
UFMFG3-15-1	Fluid Dynamics 2018-19	15
UFMFH3-30-1	Stress & Dynamics 2018-19	30

Year 2
The student must take 120 credits from the modules in Year 2.

Year 2 Compulsory Modules

Module Code	Module Title	Credit
UFMF88-30-2	Design and Electromechanical Systems 2019-20	30
UFMFL8-15-2	Dynamics 2019-20	15
UFMFK9-15-2	Engineering Mathematics 2 2019-20	15

UFMFW8-30-2	Heat Transfer, Power and the Environment 2019-20	30
UFMFHA-15-2	Project Management 2019-20	15
UFMFQA-15-2	Stress Analysis 2019-20	15

Year 3
The student must take 15 credits from the modules in Year 3.

Year 3 Compulsory Sandwich Year Module
We recommend that students take this opportunity to do a year-long placement in industry or research. Students on Sandwich take the following module:

Module Code	Module Title	Credit
UFMF89-15-3	Industrial Placement 2020-21	15

Year 4
The student must take 105 credits from the modules in Year 4.

Year 4 Compulsory Modules
The MEng A 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.

Module Code	Module Title	Credit
UFMFU7-15-3	Computational Methods 2021-22	15
UFMFY8-30-3	Individual Project MEng A 2021-22	30

Year 4 Optional Modules
Students take 60 credits from optional modules.

Year 4 Optional Modules A
Students must select 30-60 credits from Optional Modules A

Module Code	Module Title	Credit
UFMFYJ-15-3	Control Engineering 2021-22	15

UFMFSL-15-3	Integrated Electro-Mechanical Systems 2021-22	15
UFMF7K-15-3	Materials and Structures for Special Applications 2021-22	15
UFMFXJ-15-3	Vibrational Dynamics 2021-22	15

Year 4 Optional Modules B
Students must select 0-15 credits from Optional Modules B

Module Code	Module Title	Credit
UFMFU6-15-3	Composite Engineering 2021-22	15
UFMFP9-15-3	Mechanics of Materials 2021-22	15

Year 4 Optional Modules C
Students must select 0-15 credits from Optional Modules C

Module Code	Module Title	Credit
UFMFD7-15-3	Energy Technologies 2021-22	15
UFMFTA-15-3	Thermofluid Systems 2021-22	15

Year 5
Students take 60 credits from optional modules. Students must not take more than 75 credits in one semester.

Year 5 Compulsory Modules
The student must take 60 credits from the modules in Compulsory Modules.

Module Code	Module Title	Credit
UFMERY-30-M	Individual Project MEng B 2022-23	30
UMMC9U-15-M	Innovation in Operations Management 2022-23	15
UFMFXC-15-M	Masters Group Project 2022-23	15

Year 5 Optional Modules
The student must take 60 credits from the modules in Optional Modules.

Module Code	Module Title	Credit
UFMFUL-15-M	Advanced Control Engineering 2022-23	15
UFMFTL-15-M	Advanced Mechatronics 2022-23	15
UFMFWL-15-M	Computational Fluid Dynamics 2022-23	15
UFMEEC-15-M	Concurrent Engineering and Design for Manufacture 2022-23	15
UFMENU-15-M	Design of Fluid Systems 2022-23	15
UFMFCC-15-M	Industrial Applications of Vision and Automation 2022-23	15
UFMFVL-15-M	Mechanics of Composites 2022-23	15
UFMEBP-15-M	Structural Integrity in Design 2022-23	15

Part C: Higher Education Achievement Record (HEAR) Synopsis

MEng Mechanical Engineering will produce graduates with a broad understanding of mechanical analysis and design, combined with awareness of engineering practice, information technology, project management and business issues. They will have a wide range of expertise relevant to industry in general and in particular industries related to mechanical design, operations and manufacture.

Graduates of MEng Mechanical Engineering will be able to:

apply established and novel Mechanical Analysis concepts to the solution of engineering
problems involving Design, Operations and Manufacture.

use systems incorporating digital hardware, software, communication, processing

algorithms,
interfacing circuits, parameter sensing and actuating devices.

understand manufacturing, financial and marketing implications of design proposals.

make considered judgements and decisions on complex engineering issues in which not all facts and consequences are accurately known.

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

Part D: External 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 and 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 and Teaching strategy has informed the faculty's policy for the delivery of its programmes, whose main features are described in section 7.

Part E: Regulations

Approved to a variant of the University Regulations and Procedures.