Faculty of
Computing, Engineering
and Mathematical Sciences

Faculty of Computing, Engineering & Mathematical Sciences

BSc(Hons) Engineering

Programme Specification

May 2006

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Part 1: Programme Specification

Section 1: Basic Data

Awarding institution/body	University of the West of England
Teaching institution	University of the West of England
Faculty responsible for programme	Computing, Engineering and Mathematical Sciences
Programme accredited by	Not accredited
Highest award title	BSc(Hons) Engineering
Default award title	
Interim award title	Diploma of Higher Education, Certificate of Higher Education
Modular Scheme title (if different)	
UCAS code (or other coding system if relevant)	H110
Relevant QAA subject benchmarking group(s)	Engineering
On-going	
Valid from (insert date if appropriate)	
Authorised by…	**Date:…**

Version Code 1

For coding purposes, a numerical sequence (1, 2, 3 etc.) should be used for successive programme specifications where 2 replaces 1, and where there are no concurrent specifications. A sequential decimal numbering (1.1; 1.2, 2.1; 2.2 etc) should be used where there are different and concurrent programme specifications

Section 2: Educational Aims of the Programme

The aim of the BSc(Hons) Engineering programme is similar to that of the BEng(Hons) Engineering programmes, i.e. 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.

Graduates from this programme will be generalists, with a wide range of expertise relevant to industries related to design, operations and manufacture. Many large engineering companies have indicated a need for graduates with a firm understanding of engineering principles, design tools and transferable skills, without the need for the specialist knowledge that a BEng degree gives.

The programme has three pathways, in mechanical, materials and manufacturing, but students do not choose between these until the end of the first year. All programmes offer study of Materials and Manufacturing Techniques, CAD/CAM Applications, Integrated Manufacturing Systems and Operations & Quality Management

The aims are that graduates shall be able to:

1. apply established engineering concepts to the solution of problems involving the design and operation of manufacturing systems;
2. understand the manufacturing, financial and marketing implications of design proposals;
3. identify the links between design, materials selection, manufacturing and production management;
4. assess the capabilities of manufacturing systems software packages which are used for the design, modification, maintenance and control of manufacturing facilities;
5. operate effectively either as individuals or as members of a multi-disciplinary team;
6. communicate effectively both orally and in written form;
7. effectively pursue independent study

Section 3: Learning Outcomes of the Programme

The award route provides opportunities for students to develop and demonstrate knowledge and understanding, intellectual skills, subject-specific skills and transferable skills, as shown below.

A. Knowledge and Understanding

Knowledge and Understanding of:	*Teaching/Learning Methods and Strategies*	*Assessment*
1 A sound understanding of core engineering science and manufacturing technologies. 2 The principles of information technology and data communications from a user's perspective. 3 Management principles and business practices. 4 The complexity of large-scale manufacturing systems and projects,. 5 Mathematical and statistical methods appropriate to engineering and related fields. 6 The properties, characteristics and selection of materials used in components and systems.	Acquisition of knowledge and understanding 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 manufacturing systems design and product development through a range of level 1 modules. This basic knowledge is developed through a range of taught modules at level 2, and integrated through group design and project work at 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.	Testing of the knowledge base is through assessed course work, through tasks undertaken under examination conditions, through oral presentations and assessed practical work done in various laboratories.

B. Intellectual Skills

Intellectual Skills	*Teaching/Learning Methods and Strategies*	*Assessment*
1 The ability to produce solutions to problems through the application of engineering knowledge and understanding. 2 Be able to use scientific principles and techniques in analysis of manufacturing systems, processes and products, and in the development of engineering solutions to practical problems. 3 Use problem solving strategies in programming and mathematical sciences applications 4 The ability to understand issues relating to the marketing of products and the management processes associated with their design and manufacture. 5 A professional attitude to the responsibilities of engineering practitioners. 6 The ability to use independent thinking and analysis in the development of engineering solutions. 7 Critically review available literature on topics related to manufacturing engineering	At level 1 analysis, evaluation and problem solving are developed on small-scale problems in a number of modules. Here the focus is on understanding problems in a theoretical manner, and examples are introduce in tutorial classes. Professional and Communication Skills are introduced and developed through project work, in groups and individual work. Ability to use logic and problem solving is the basis of programming, which is taught in practical tutorial sessions using a workbook which students can complete at their own pace. At level 2, teaching and learning shifts emphasis to developing students' ability to apply theory to real-world problems, and to evaluate alternative methods and designs and to balance conflicting objectives. Level 3 sees the move to the design of larger scale integrated manufacturing systems, and the application of operational and management issues. At all levels students are required to bring together knowledge and skills acquired in several modules. As the student progresses, the need to assimilate and integrate information and applications into a coherent whole is developed and consequently so is their critical thinking.	These skills are assessed through a combination of coursework assessments, projects and examinations, in various combinations depending on the nature of the module. Problem solving using software packages and programming may be developed using continuous assessment; groupwork projects are monitored using regular staff/student consultation; and many modules use some form of continuous assessment together with formal examinations. The development of engineering solutions requires demonstration of all of the intellectual skills. At level 1 the focus is on the skills of Analysis, Evaluation and Problem Solving. At levels 2 and 3 this branches out to include all the remaining skills. Independent reading is used to enable students to develop a professional approach, demonstrated in timely submitted reports and other assignments.

C. Subject, Professional and Practical Skills

Subject/Professional/Practical Skills	*Teaching/Learning Methods and Strategies*	*Assessment*
Students will be able to: 1 Communicate technical subjects effectively using methods appropriate to the subject e.g. reports, oral presentations, handbooks, sketches, posters, CAD drawings. 2 Participate in the execution and management of group projects, be able to work as an effective member of a team; be aware of the benefits and problems which teamwork can bring. 3 Use software in the context of problem-solving investigations, and to interpret findings 4 Decide upon appropriate methods for modelling and analysing problems. 5 Use experimental methods in the laboratory relating to design, test and measurement; apply technical analysis and critical evaluation of results. 6 Use a wide range of computing and information technology systems. 7 Demonstrate the ability to apply engineering techniques taking account of industrial and commercial concerns.	Throughout the programme, the skills listed are developed using a combination of methods. Communication skills introduced in a dedicated module at level one are applied throughout the course, with students increasingly taking responsibility for selection of the appropriate techniques. By the time they reach their individual final year project, it is hoped that they can demonstrate their ability in directed self-study, to work with minimal supervision. Groupwork skills, required of engineers in most companies, are practised at all levels, in most modules. Lectures are used to introduce theoretical concepts, which are then discussed and practised in tutorial exercises. In practical subjects, appropriate techniques are introduced in weekly lectures, then applied in project work with continuous staff support. Learning of practical laboratory skills is acquired during all three years of the course. Students are required to keep logbooks, completed as work is done, from which formal reports are later written up.	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

Transferable Skills	***Teaching/Learning Methods and Strategies***	***Assessment***
1 *Communication skills:* Communicate technical subjects effectively using methods appropriate to the subject; compile formal reports; prepare and give oral presentations; participate in group discussions; use handbooks, sketches, posters and CAD drawings. 2 *Self-management skills*: to manage one's own time; to meet deadlines. 3 *Progression to independent learning*: To gain experience of, and to develop skills in, learning independently of structured class work. 4 *Working with Others*: to be able to work as an effective member of a team; to be aware of the benefits and problems which teamwork can bring; develop recording skills for meetings and work in progress. 5 *IT Skills*: to use software in the context of problem-solving investigations, and to interpret findings 6 *Problem formulation and decision making*: To express problems in appropriate ways; to develop strategies for their solution and techniques for assessing the most appropriate. 7 *Comprehension of professional literature*: to read and to use literature sources appropriate to the discipline to support learning activities.	Skills are developed through a variety of methods and strategies: Ability to communicate effectively underpins all work on the course. Students are expected to take part in tutorial discussions, to present their research topic findings or experiments in tutorials, and to seek assistance in completion of their work when needed. Students are expected to show regular attendance at lectures and tutorials; to complete non-assessed work (individual and group research, tutorial worksheets, use of online facilities for research and self-managed practical work) in addition to that which is assessed and has to be handed in on time. Their final year project shows how well they can manage their work in a self-directed way, as independent learners. Groupwork forms an important part of many modules. At level one, this is largely staff-enabled or staff-supervised, but it becomes more student-led in later years. The remaining skills underpin all teaching and learning on the course, as detailed in the previous sections.	Without these transferable skills, a student cannot be successful on this course. They are demonstrated in a variety of contexts including • examination • poster presentation. • individual and group projects • practical assignments • portfolio of exercises Most of these skills are introduced at level 1 in the module *Professional and Communication Skills*. Students are assessed specifically on their skills, and subject content is used solely in the demonstration of the skills. In other modules, students are assessed on the content of their work. Their choice of appropriate and professional methods is paramount in the communication of this content, and in many cases work that is poorly presented is penalised. A first-class honours degree student will have demonstrated strengths in each skill in numerous ways. He or she will have a comprehensive Personal Development Portfolio.

Section 4: Programme Structures

Note: These structures are indicative and subject to change

Programme Structure for **BSc (Hons) Engineering – Mechanical route**
Valid from: 1st September 2006

Year 1					
UFEEHP-10-0 Programming in C	UFQEFH-20-1 Engineering Mathematics 1	UFPED8-30-1 Engineering Design 1	UFEE6S-20-1 Engineering Principles A	UFMEDB-20-1 Materials & Manufacturing Processes	UFPEB6-20-1 Professional and Communication Skills

Year 2					
UFMEQT-20-1 *Stress & Dynamics*	UFMEQU-20-1 *Thermodynamics and Fluids*	UFMEDH-20-2 Mechatronics	UFMEDC-20-2 CAD/CAM Applications	UFPENX-20-2 Group Project and Management	UFMEJS-20-2 Computational Mechanics

Year 2P
Option: Placement 0 - 120 CREDITS

Year 3				
UFMEAY-30-3 Individual Project	UFMED9-20-3 Integrated Manufacturing Systems	UFPEEL-20-3 Operations & Quality Management	Option: 1 30 CREDITS	Option: 2 20 CREDITS

Option: Placement choose from:	
UFPEJH-120-P	Industrial Placement

Option: 1 choose from:	
ILP	Institution Language Programme
UFEE5V-10-3	Software Engineering Management
UFMEB4-20-3	Alternative Energy
UFMEC8-10-3	Automated Manufacture
UFMEC9-20-3	Advanced CAD/CAM

Option: 2 choose from:	
UFMEEK-20-2	Motorsport Investigation
UFQEFB-20-2	Mathematics for Mechanical Engineering
Choose modules from	Option: 1

Please Note – Students are responsible for ensuring that their completed programme will contain the required number of credits at the appropriate levels.

Programme Structure for **BSc (Hons) Engineering - Materials and Manufacturing route**
Valid from: 1st September 2006

Year 1					
UFEEHP-10-0 Programming in C	UFPED8-30-1 Engineering Design 1	UFQEFH-20-1 Engineering Mathematics 1	UFEE6S-20-1 Engineering Principles A	UFMEDB-20-1 Materials & Manufacturing Processes	UFPEB6-20-1 Professional and Communication Skills

Year 2					
UFMEDY-30-2 Materials and Manufacture	UFMEDH-20-2 Mechatronics	UFMECL-10-2 Industrial Robotics	UFPENX-20-2 Group Project and Management	UFMEDC-20-2 CAD/CAM Applications	Option: 1 20 CREDITS

Year 2P
Option: Placement 0 - 120 CREDITS

Year 3			
UFMEAY-30-3 Individual Project	UFMED9-20-3 Integrated Manufacturing Systems	UFPEEL-20-3 Operations & Quality Management	Option: 2 50 CREDITS

Option: 1 choose from:	
UFIE9T-20-2	Creativity and Design
UFMEJS-20-2	Computational Mechanics
ILP	Institution Language Programme

Option: Placement choose from:	
UFPEJH-120-P	Industrial Placement

Option: 2 choose from:	
ILP	Institution Language Programme
UFMEB4-20-3	Alternative Energy
UFMECE-20-3	Advanced Materials
UFMEC9-20-3	Advanced CAD/CAM
UFEE5V-10-3	Software Engineering Management
UFMEC8-10-3	Automated Manufacture
UFMEJQ-20-3	Mechanical Design Simulation

Please Note – Students are responsible for ensuring that their completed programme will contain the required number of credits at the appropriate levels.

PLEASE NOTE: REFER TO THE FACULTY ON-LINE INFORMATION SYSTEM FOR UP-TO-DATE STRUCTURE INFORMATION
http://fold.cems.uwe.ac.uk:8080/exist/servlet/db/fold1/prod/index.xql

Section 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 in Mathematics at GCSE Grade C or equivalent. *Plus any additional award-specific requirements.*

Section 6: Assessment Regulations

The Modular Assessment Regulations apply to this programme

Section 7: Student Learning: Distinctive Features and 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. Other modules are often delivered by means of 'lectorials', classes for groups of 20-30 students with no distinction between lectures and tutorials, and this has proved to be an effective mechanism for modules at Level 0 and 1.

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's offers pastoral care through its Student Advisers, a team of staff who provide comprehensive, full-time student support service on a drop-in basis or by appointment. All students on the same route are allocated to the same Adviser, who is 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 along side the general University provisions. There are nine general PC computing laboratories of 20 plus seats all running Windows2000, along with four Unix based laboratory and 10 specialist computing labs. The specialist laboratories are equipped with the specific software for CEMS 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. Amongst these, is 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 is the Open Access laboratory. This area is never time-tabled 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. 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. These general purpose and specialist laboratories are available to students up until midnight, seven days per week.

Section 8 Reference Points/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 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 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 2: Module Specifications

(See Appendix A)

Part 3: Contextual Documentation

Contextual Documentation

1. Responsibility for Award Leadership
An Award Director for this award will be appointed from the staff of the School of Mechanical, Manufacturing and Aerospace Engineering.

2. CVs for Module Leaders
The structure of the programme means that all of the academic staff of the Schools of Computer Science and of Information Systems are potentially Module Leaders for modules on the programme. This being the case, CVs for all these staff are not included in this document.

3. Demand for the programme

4. Standards and Quality
UWE enjoys a high reputation for the quality of its taught programmes, confirmed through Subject Reviews, Teaching Quality Assessments and Institutional Audits carried out by the QAA. The faculty's honours degrees are accredited by a number of professional bodies including the British Computer Society, the Institution of Mechanical Engineers, the Institution of Electrical Engineers and the Association of Professional Recording Services.

The Faculty of Computing, Engineering & Mathematical Sciences at UWE has an international reputation for its research particularly in computing and in manufacturing engineering. Its research centres, including the Centre for Complex Cooperative Systems, the Intelligent Autonomous Systems Laboratory and the Aerospace Research Centre, carry out collaborative research and consultancy with a variety of industrial partners including Airbus UK (for whom the faculty has preferred supplier status), CERN and Motorola.

5. Staff development
Within the Faculty of Computing, Engineering & Mathematical Sciences, individual staff are responsible for their development within the context of the organisational strategies and priorities. These contexts include:

- UWE's expectation that all academic staff will contribute to teaching and research and/or professional practice, as articulated through the concept of the "UWE Academic";
- the Development Plan for each School, proposed during 2001-02 and now being implemented;
- the Faculty's Teaching & Learning Strategy, currently being developed;
- the Personal Scholarship Plan currently being developed by each member of academic staff;
- the outcomes of the annual cycle of reflection and analysis on the delivery of programmes, as expressed through annual reporting arrangements at Programme, Award, Field and Module level.

School Development Plans were endorsed by the Faculty Board during 2001-02 for each of the faculty's five schools. For each school, they set a context in respect of the strategy for research and for academic planning within which individual development may take place. At the time of writing, this is being followed through by the creation of a Personal Scholarship Plan by each member of staff, outlining his/her development plans over the coming years.

The Faculty's Teaching & Learning Strategy will provide an additional important context for individual and collective development. While the faculty is still developing its strategy in this respect, its aims are already declared, and are:
to enable independent learning;
to support a diversity of student backgrounds;
to contain staff workloads;
to minimise non-progression rates.
The faculty's Teaching & Learning Group is currently forming the strategy by which these aims will be met. The result is likely to have significant implications for future staff development

priorities, for instance in the increasing use of methods of module delivery which place greater reliance on students' ability to manage their own activities, including electronic delivery, and in new approaches to the assessment and to the management of tutorials and practicals.

6. Management and Quality Assurance
The programme will operate under the quality assurance procedures of the Faculty of Computing, Engineering & Mathematical Sciences as approved by the university's Academic Quality & Audit Committee from time to time and most recently in 2001. The aspects of the faculty's procedures which most directly relate to the delivery of taught programmes are those for Annual Monitoring and Faculty Academic Review.

Annual Monitoring involves the preparation of annual reports for each module, for each field, for each award and for the faculty's modular scheme. The production of the report is the responsibility of the Programme Management Committee, and it, along with the faculty management's response to it, is considered on behalf of the Faculty Board by the Faculty's Academic Review Committee. Each institution participating in the programme will contribute to the annual monitoring process using the faculty's normal procedures.

Faculty Academic Reviews: The faculty supports the university's requirement that each faculty should hold Academic Reviews of all taught provision over a six-year cycle, and is at present developing the processes by which this should take place. The first such review will be held in 2003, in advance of the QAA Developmental Engagement in computing scheduled for November 2003.

7. Institutional Policies, Mission & Strategy, Regulations, Procedures and Notes for Guidance
As far as the Faculty is aware, the proposed programme is consistent with all of these.