Faculty of
Computing, Engineering
and Mathematical Sciences

City of Bristol College

FdSc Aerospace Engineering Manufacturing

Approval Document

2006

Contents

Programme Specification

Section 1: Basic Data

Awarding institution/body	University of the West of England
Teaching institution	City of Bristol College
Faculty responsible for programme	Computing, Engineering and Mathematical Sciences
Programme accredited by	
Highest award title	Foundation Degree - Aerospace Engineering Manufacturing
Default award title	
Interim award title	Certificate of Higher Education
Modular Scheme title (if different)	
UCAS code (or other coding system if relevant)	
Relevant QAA subject benchmarking group(s)	Engineering
On-going/valid until* (*delete as appropriate/insert end date)	
Valid from (insert date if appropriate)	

Authorised by… **Date:…**

Version Code

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 aims of the programme are:

1. To provide education and training for engineers and technicians who are employed in aerospace engineering and related disciplines.

2. To provide learners with opportunities to focus on the development of higher level skills in a technological and management context.

3. To develop a range of skills, techniques and attributes essential for successful performance in working life.

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

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

6. To provide a vocationally specific scheme to enable learning within an industrial context.

7. To provide a programme that is directly linked to business and industry, reflecting their requirements.

8. To provide a vocationally specific scheme to enable learning within a Aerospace Engineering environment.

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. Basic mathematical techniques to analyse model and solve Engineering problems. *2.* The essential scientific principles, which underpin the design and operation of engineering systems and the application of these in different contexts. *3.* The role of design as developed in an engineering context and the essential principles and elements of the design process. *4.* The process used to calculate costs associated with engineered products and services, including the calculation of contingency costs. *5.* The theory and practice related to specific technical operations encountered in the Engineering discipline, including codes of practice, the regulatory framework and requirements for safe operation.	Learning takes place through a mixture of teacher-led lectures, practical work, individual assignment work, group work, case studies and computer-based learning. The wealth of professional experience and knowledge within the student group is drawn on to supplement the teaching of the full and part-time staff. There are occasional inputs by visiting lecturers and one or two visits to factories or exhibitions. Some units of the course such as 'Engineering Science' are taught exclusively through lecturer-led classroom-based sessions complemented by assignments. Case studies and assignments are used to cover the 'Business Management for Engineers' and the 'Engineering Design' unit while the 'Engineering Design' unit also involves a high proportion of computer-based learning. The 'Industrial Project' unit involves individual or small group work supported by tutorials. Assessment and the constructive comments from	Knowledge and understanding are often assessed through unseen written examinations. Each unit of the programme is assessed separately by a mix of written examinations and assignment. Some assignment work will be presented and assessed in report form, some in part by a presentation.

6. The ability to explain how information and communications technology (ICT) is used in an engineering discipline and to critically identify the most appropriate application in different contexts.	staff on your work is part of the learning process. On all modules, students are encouraged to undertake independent reading both to supplement and consolidate what is being taught/learnt and to broaden their knowledge of the subject.	

B. Intellectual Skills

Intellectual Skills	Teaching/Learning Methods and Strategies	Assessment
1. Plan, conduct and critically report on an investigation into a work-based engineering issue, by undertaking an individual project with limited advice from tutors and work supervisors. *2.* Analyse, solve and critically evaluate the solution to engineering problems through the use and application of engineering knowledge and understanding. This includes the use of appropriate mathematical methods and the application of scientific principles to produce solutions to relevant problems. *3.* Synthesise parameters, which affect an engineering design solution and be able to coherently justify these as the basis for the design criteria. Include the cost constraints and evaluate critically the appropriateness of different approaches to solving the problem.	Students are encouraged to bring together knowledge and skills acquired in several modules and to determine new ways of working. As the student progresses, the need to synthesise ever-greater volumes of information and approaches into a coherent output is developed. Analysis, Evaluation and Problem Solving are developed using problems in various engineering activities in a number of modules and in work-based learning environments. The focus is on understanding the problem and then producing realistic solutions. The need to evaluate alternative solutions and designs and to balance conflicting objectives is practised through active learning processes involving projects, group work, tutorials and work-based projects.	Engineering of complex products requires demonstration of many intellectual skills. Intellectual skills are assessed through independent project work, assignments, assessed presentations and reports. Independent reading is encouraged to enable students to focus on their own areas of interest.

C. Subject, Professional and Practical Skills

Subject/Professional/Practical Skills	Teaching/Learning Methods and Strategies	Assessment
. 1. Plan and execute safely a series of experiments. 2. Use laboratory and workshop equipment to generate data. 3. Analyse experimental results and determine their strength and validity. 4. Use computer-aided design software and other computational tools and packages. 5. Give technical presentations both individually and as a member of a group. 6. Use engineering test and measurement equipment effectively. 7. Apply Engineering principles to the solution of practical engineering problems including the use of appropriate mathematical methods.	Throughout the programme, the skills listed are developed through a combination of theoretical discussion, practical laboratory based work, and classroom based tutorial exercises and directed self-study. Opportunities are provided to practise practical skills in appropriate learning contexts, including laboratories, workshops and the workplace. .	The possession of these skills is demonstrated both by practical laboratory work, coursework and by examination. This will include both individual and group projects. The assessment of practical skills will include the demonstration of the relevant skill.

D. Transferable Skills and Other Attributes

Transferable Skills and Other Attributes	**Teaching/Learning Methods and Strategies**	**Assessment**
1. Communication skills**:** to communicate orally, in writing and through drawings, including for instance, the results of technical investigations.	Communication Skills are developed through a variety of methods and strategies including the following, workshop and laboratory exercises, assignments, group design case studies, library and other research, work-based investigations, using CAD software and personal development planning.	These skills are demonstrated in a variety of contexts including • examinations • presentations • individual and group projects or assignments • laboratory work
2. Self-management skills: to manage own time; achieve objectives to meet deadlines; to work with others having gained insights into the problems of team-based systems development.	Self and Time management skills are encouraged and developed through a range of methods and strategies including those listed above.	
3. IT Skills in Context (to use software in the context of problem-solving investigations, and to interpret findings)	Computer skills are used and developed widely throughout the programme.	

4. Problem formulation: To express problems in appropriate notations.	Problem solving is encouraged and developed throughout the programme. Students learn problem solving techniques and are encouraged to respond proactively to issues raised in projects and assignments.	
5. Progression to independent learning: To gain experience of, and to develop skills in, learning independently.	Students are encouraged to become independent learners using the library, the internet, professional technical literature, books and other relevant sources, to support learning. Students are encouraged to develop judgement about the relative worth of material from different sources.	
6. Working with Others**:** to be able to work as a member of a team; to be aware of the benefits and problems which teamwork can bring.	Teachers use a range of methods to encourage active participation in learning. Students develop team working skills through a variety of group based projects and assignments	

Programme Outcomes within the Modules

	Module	Code	Knowledge & Understanding						Intellectual Skills			Subject/ Professional / practical Skills							Transferable Skills and other Attributes					
			A1	A2	A3	A4	A5	A6	B1	B2	B3	C1	C2	C3	C4	C5	C6	C7	D1	D2	D3	D4	D5	D6
Level one	Mathematics for Engineers 1		X							X	X											X		
	Engineering Science 1			X						X		X	X	X								X		
	Materials for Engineering		X	X								X	X	X			X							
	Engineering Design				X	X	X	X							X			X	X		X			
	Work based Learning								X							X			X	X				X
	Mechanical Principles 1									X		X	X				X	X						
	Business management for Engineers					X		X			X									X	X			X
Level two	Aircraft Structures			X			X			X			X		X			X				X	X	
	Flight Systems			X			X			X				X	X			X				X	X	
	Further Mathematics for Engineers									X		X	X										X	X
	Industrial Project		X		X			X	X							X		X	X	X			X	
	Mechanical Principles 2									X	X	X	X	X				X					X	

Knowledge and Understanding

A1 Understanding of basic mathematical techniques.
A2 Essential Scientific principles.
A3 The role of design development.
A4 Costs associated with engineering products and services.
A5 Scientific operations encounter in engineering.
A6 Use of ICLT in engineering.

Intellectual Skills

B1 Plan and report a work based investigations.
B2 Analyse and evaluate solutions to engineering problems.
B3 Synthesise information into engineering solutions

Subject, Professional and Practical Skills

C1 Plan and execute safely a series of experiments.
C2 Use laboratory equipment to generated data.
C3 Analyse experimental results.
C4 Use computer aided design and other software effectively.
C5 Give technical presentations
C6 Use engineering test equipment effectively.
C7 Apply engineering principles to the solution of practical problems.

Transfe4rable Skills and other Attributes.

D1 Communicate effectively, including the results of investigations.
D2 Self manage own time to achieve objectives and deadlines.
D3 use IT n a problem solving context
D4 Express problems in appropriate notation.
D5 Progress to independent learning.
D6 Working with others as part of a team

Section 4: Programme Structure

Award Structure for Foundation Degree in Engineering (Aerospace)

Full Time

Year 1

Mathematics for Engineers 1 CR 20 - L1	Engineering Science 1 CR 20 - L1	Materials Engineering CR 20 - L1	Business Management for Engineers CR 20 - L1	Mechanical Principles 1 CR 20 - L1	Engineering Design CR 20 – L1

Work Based Learning CR 20 - L1	Industrial Placement at the end of year one provides work-based learning opportunities

Year 2

Further Mathematics for Engineers CR 20 – L2	Mechanical Principles 2 CR 20 – L2	Industrial Project CR 20 – L2	Aircraft Structures CR 20 – L2	Flight Systems CR 20 – L2

Part Time

Year 1

Industrial Placement throughout programme provides work-based learning opportunities

Mathematics for Engineers 1 CR 20 - L1	Engineering Science 1 CR 20 - L1	Materials Engineering CR 20 - L1	Engineering Design CR 20 – L1

Year 2

Mechanical Principles 1 CR 20 - L1	Business Management for Engineers CR 20 - L1	Aircraft Structures CR 20 – L2	Work Based Learning CR 20 - L1

Year 3

Further Mathematics for Engineers CR 20 – L2	Mechanical Principles 2 CR 20 – L2	Industrial Project CR 20 – L2	Flight Systems CR 20 – L2

FOUNDATION DEGREE IN ENGINEERING (AEROSPACE)

PART- TIME MODE OF STUDY

Module Code	***Module Title***	***Term***	***Level***	***Credits***
Year 1	*Mathematics for Engineers 1*	*1-3*	*1*	*20*
	Engineering Science 1.	1-3	1	20
	Materials Engineering	1-3	1	20
	Engineering Design	1-3	1	20
TOTAL CREDITS		***80***		
Year 2	Work Based Learning	1-3	1	20
	Mechanical Principles 1	1-3	1	20
	Aircraft Structures	1-3	2	20
	Business Management for Engineers	1-3	1	20
TOTAL CREDITS		***80***		
Year 3	Further Mathematics for Engineers.	1-3	2	20
	Industrial Project	1-3	2	20
	Mechanical Principles 2	1-3	2	20
	Flight Systems	1-3	2	20
TOTAL CREDITS		***80***		

PLEASE NOTE: REFER TO THE FACULTY ON-LINE INFORMATION SYSTEM FOR UP-TO-DATE STRUCTURE INFORMATION:

http://www.cems.uwe.ac.uk/exist/index.xql

Section 5: Entry Requirements

Awards Required for Entry to the Foundation Degree	**Comments**

Candidates must have:

5 GCSEs required at Grade C and above, or equivalent	GCSE Mathematics and English or equivalent *(*e.g. Keys Skills Application of Number and Communications) – required.

Plus at least one of the following:

A Levels required: AS/A2/UCAS Points Tariff	One physical science or mathematics subject at both AS & A2 level. Minimum UCAS points score of 80.
BTEC National Certificate/Diploma.	Engineering or technology related area, which includes mathematics.
HNC/D.	HNC/D demonstrating appropriate mathematical skills.
Access to HE.	Access to Higher Education certificate in a subject demonstrating appropriate mathematical skills
Irish/Scottish Highers/Advanced Highers.	*Irish/Scottish Advanced Higher Certificate including one physical science or mathematics.*
Other non-standard awards or experiences.	If candidates hold other awards or have appropriate experience they will be consider for entry. A judgement will be made in light of an interview, an assessment of mathematical ability and

	If candidates have non standard entry requirements they will be invite for a selection interview and assessment of mathematical ability..	If you ha requirem selection think you succeedi

Section 6: Assessment Regulations

The Modular Assessment Regulations apply to this programme.

Section 7: Student Learning: Distinctive Features, Academic and Pastoral Support

- The staff team teaching on the foundation degree are appropriately qualified and have strong experience of successfully delivering this level of course over a significant number of years.
- A programme which gives access for Aerospace Engineering technicians to access professional development opportunities that complement those available at the city's universities.
- A mature atmosphere within the student cohort as many students are returning to study after starting their careers.
- Additional support to develop mathematical and other skills is available to assist the transition to higher education study.
- A strong context of practical Engineering applications.
- A good level of current examples brought by students from major blue chip companies such as Rolls Royce and Airbus UK.
- Progression opportunities to complete a degree while still studying part-time in Bristol.

Virtual Learning Environment

The City of Bristol College's Virtual Learning Environment (VLE) holds some materials posted by lecturers to support the courses they teach and provide students with access to lecture material, additional reading, and supporting material for assignments. The VLE is accessed via the Intranet.

At induction students will be given a user ID for the college computer network including the Virtual Learning Environment. This gives access to the college Intranet that holds information on recent news, union activities, and college services including Learner Services and college procedures. Students will be given an electronic mail address to use for college business.

Students will also have access University of West of England intranet and VLE in the usual way.

Pastoral Care

Students on a course delivered at City of Bristol College, but validated by the University of the West of England, are able to use all the facilities of the college and some of the facilities of the university.

The main facilities offered by the college are: Learner Services; Student Union; Learning Resource Centres; College Intranet and Electronic Mail Address;. Refectories and Graduation Ceremonies.

Learner Services have offices at all the college sites. They are particularly careful to provide impartial and independent support. They provide good support to deal with barriers to learning such as dyslexia and to improve such things as note taking skills. The counselling service is independent of the college so appointments can be arranged in total confidence. Full details are available from Learner Services offices.

Full details of academic and pastoral support available to all students, are provided in the Student Handbook, and presented to all students at induction.

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 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.

Engineering Facilities

The Faculty of Engineering is based at the Ashley Down Centre of the college. A new Engineering Centre was created in 1999 by remodelling part of the building. This provides a large, modern, purposeful environment in which the higher education mechanical and manufacturing cohorts undertake much of their practical work. The mechanical and electrical/electronics laboratories and the associated computer suites have been refurbished to a good standard.

Aeronautical Engineering is located at the Parkway Technology Centre. It is housed in a purpose-built two-floor building with six classrooms, two sheet metal workshops and an aircraft hangar. Four more classrooms and an electronic workshop are shared within the Transport Technology faculty..

Equipment

Much of the science and manufacturing equipment for practical work is satisfactory. The faculty is well provided for with computing facilities housed in three specialist suites.

The hangar at parkway is equipped with two twin-turbine engine aircraft, two jet engines, propellers and aircraft main structures panels, mainly sets of flaps and wings A large jet aircraft maintenance simulator is also housed in this area, together

with computer suites

Aero facilities also include an aircraft hangar at Staverton Gloucester Airport, equipped with a Lear jet aircraft, a turboprop twin-engine aircraft, an aircraft engine workshop equipped with four large jet engines including a large fan CF6 type of Boeing 747, a helicopter airframe and a fully equipped avionics workshop.

Learning Resources

The text-based learning resources are being improved, reflecting the increasing interest in higher education provision in engineering. Key texts and journals are available complemented by subscriptions to on-line resources. Students employed by the larger companies such as Airbus UK have access to good in-house technical libraries. The new Learning Resources Centre at the Ashley Down Centre occupies a purpose-designed area in the remodelled campus. It contains a range of high specification computers equipped with relevant software and a good range of books and specialist technical publications. It also provides an excellent area for to complete research and other scholarly activity.

Students will also have access University of West of England library and learning resources, together will the usual student facilities such as the student union

External Facilities

The Employers Forum supports the proposed foundation degree. The employers are currently or have in the recent past supported employees to undertake the higher education awards.

Section 8 Reference Points/Benchmarks

In designing this programme, the Faculty has drawn upon the following external reference points:

1. The QAA Foundation degree qualifications benchmarks.
2. The QAA Guidelines for preparing programme specifications.
3. The QAA Framework for Higher Education Qualifications in England, Wales and Northern Ireland
4. The QAA Benchmark Statement for Engineering
5. UWE's Learning & Teaching Strategy

The QAA Foundation degree qualifications benchmarks describe the distinctive features of a qualification at this level, its purpose, general characteristics and generic outcomes. In particular the following characteristics of the Foundation degree have been considered, employer involvement, accessibility, progression, flexibility, partnership, assessment and monitoring/review.

The QAA Guidelines for preparing programme specification are intended to prescriptive but do offer a framework around which to write the programmes specification. In many instances there are differences between these guidelines and

the exemplar specifications provided by UWE. This specification attempts to form a working amalgamation of the two.

The QAA Framework for Higher Education Qualifications in England, Wales and Northern Ireland describes the attributes and skills expected of graduates. Care has been taken to equate the level of individual modules, the programme of study at each year and the level of the Foundation Degree to the criteria in the Framework for Higher Education Qualifications (FHEQ).

The QAA 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 QAA subject benchmarks for engineering were first used by the Faculty of Engineering in the preparation of its first programme specifications for the City of Bristol Higher National Awards in engineering in 2001/02 and the self-evaluation document that underpinned the successful QAA subject review visit in April 2002. The benchmark statements have continued to inform curriculum delivery and review and have been applied in the development of the proposed foundation degree.

The proposed foundation degree has as its primary target group, people employed in the engineering industry seeking flexible, accessible intermediate level qualifications closely related to industrial practice. It provides progression to further study including higher level degree awards. These aims fully reflect the defining characteristics of foundation degrees set out in paragraphs 24 to 52 of the QAA Foundation Degree Benchmark Statement[1].

A significant, relevant employer will be involved in considering the content of the programme, contributing to the assessment of workplace learning, monitoring and reviewing the programme. Although open to all applicants, the programme has been designed to form part of the new Higher Apprenticeship scheme. This scheme not only involves students achieving a foundation degree, but also requires them to undertake a significant amount of practical engineering, which is focused on dexterity and manual skill. Additionally as part of the Higher Apprenticeship scheme students are required to complete a competence based assessment programme within their workplace. Employers generally play a significant role in the assessment of this component.

The Foundation degree therefore forms a part of a portfolio of qualifications that contribute to the whole apprentice framework, which is undertaken while being employed.