Programme Specification
[Foundation Degree in Manufacturing Engineering]

Date of Publication to Students: September 2015

NOTE: This specification provides a concise summary of the main features of the course and the learning outcomes that a typical student might reasonably be expected to achieve and demonstrate if s/he takes advantage of the learning opportunities that are provided. More detail on the specific learning outcomes, indicative content and the teaching, learning and assessment methods of each module can be found (1) at [Faculty web site address], (2) in the Module Specifications and (3) in the Course Guide.

The accuracy of the information contained in this document is reviewed by the University and may be checked within independent review processes undertaken by the Quality Assurance Agency.

Awarding Institution / Body:	Birmingham City University
Teaching Institution:	Birmingham Metropolitan College
Interim Awards and Final Award:	**Final Award:** Fd Eng (Manufacturing Engineering) **Fall back Award:** Certificate of HE
Programme Title:	Foundation Degree in Manufacturing Engineering
Main fields of Study:	Manufacturing principles and technology
Modes of Study:	Part-time, block,
Language of Study:	English
UCAS Code:	
JACS Code:	

Professional Status of the programme (if applicable):

Recognition of the programme through a professional body will be sought.

Relevant subject benchmark statements and other external reference points used to inform programme outcomes:

The programme is benchmarked against standards for Foundation Degrees in Engineering.

Programme philosophy and aims

Explain the overall approach adopted by the programme and how it leads to the aims shown below

The Foundation Degree in Manufacturing Engineering has been developed to meet the training needs of those employed or interested in a career in the manufacturing industry. At Level 4 and Level 5, students will study a range of modules totalling 240 credit points and is equivalent to Stage 1 and Stage 2 of a university honours degree. The programme will provide progression directly to Stage 3 of an honours degree programme in engineering.

A similar programme has been running at this institution since 2007 and has continuously attracted a good number of students employed in a range of industries such as vehicle manufacture, food and drink production, rail, aerospace, healthcare, and general engineering.

The College has excellent relationships with a range of major local, national and international companies who each year send their trainees to study on our foundation degree programmes in engineering. It is expected that over 90% of the students studying on the programme will be employed in the industry and sponsored by their employer.

Having completed their foundation degree, a good number of students have traditionally progressed and completed a top-up to full honours degree at local universities. A number of students have also achieved first class honours and gone on to complete a Masters degree. It is expected that with this programme with Birmingham City University, progression on to honours degree and further will be more attractive to students, particularly due to the close alignment of the proposed content with the university's degree programme and the location of the university being very accessible to students who reside and are employed locally.

The content of the programme has been influenced by a range of employers.

The course modules have been chosen to be relevant to a wide range of disciplines within the industry, these include Computer Aided Design, Sustainable Design, Manufacturing Technology, PLCs in Automation, Robotics and Engineering Management. Supplementary to these are a range of modules that provide underpinning knowledge and skills such as Mathematics, Mechanical Science and Electrical Science. All modules will have direct application in the workplace and in Stage 2 students will undertake a personal Work-Based Project of some commercial significance to their employer.

The College has for many years been well-equipped with practical resources to support the study of manufacturing including Computer-Aided Design suites, a range of CNC machines and programming environment, rapid prototyping facilities, and a manufacturing control environment consisting of hydraulic and pneumatic laboratories with PLC control. This is supplemented by a well equipped engineering workshop. The campus also has a number of general IT rooms and a good Learning and Resource Centre.

In the Spring of 2015, the College invested heavily in resources to support electronics, control, robotics and manufacturing, adding to the existing provision. It has recently developed new laboratories for the study of electronic, control, robotics, automation, and manufacturing. The new resources include a simulated manufacturing environment consisting of a conveyor with a number of stations with pick and place robotic elements, sensors, actuators, controlled by programmable logic controllers. A separate robotics laboratory houses industrial standard robots where students can carry out simulated robotic control and send their programmes to a robot to carry out actions. These new resources will well support the needs of the students studying on the programme, giving them access to world class resources.

The aims of the programme are to:

- Provide relevant, high quality training and education for those employed (or seeking employment) in the wider field of manufacturing engineering and related industries.
- Provide a recognised qualification at advanced technician level that will support student progression in their field of employment.
- Provide a progression route on to honours degree, masters and chartered engineer status.
- Enable the student to develop a range of skills in manufacturing engineering and generic skills such as analytical, evaluative and communication, ensuring they can become an effective practitioner in their field and are able to take on more advanced programmes of study.
- To ensure that the wider community has access to employment opportunities by means of good-quality training.
- To ensure that local, national and international companies have access to training that continues to meet their needs.
- To continue to support industry by maintaining and developing partnerships.

Intended learning outcomes and the means by which they are achieved and demonstrated:

Learning Outcomes[1]

1. Explain and apply the processes involved in designing for manufacture.

2. Apply design and evaluative skills to develop, implement and evaluate manufactured products, taking into account sustainable outcomes and communicate effectively.

3. Explain the principles of manufacturing control using PLCs, and program and implement a control system.

4. Explain the principles of operation of a range of robots used in manufacturing and apply programming techniques and microprocessor control for manufacturing applications.

Knowledge and Understanding of:

KU1 Scientific principles and theories that underpin manufacturing engineering disciplines;

KU2 Engineering materials and components;

KU3 Design processes and methods;

KU4 Analytical and mathematical modelling techniques used to create solutions to manufacturing engineering problems;

KU5 Computer aided techniques for modelling, simulation and design of mechanical and manufacturing systems;

KU6 Business, organisational, teamwork and management practices in industries based on manufacturing engineering;

KU7 Commercial, ethical, regulatory and environmental factors that influence the choice of solutions to engineering problems.

Intellectual Skills

IS1 Argue rationally and draw independent conclusions based on a rigorous, analytical and critical approach;

IS2 Critically appraise the usefulness of new technologies and changes in engineering practice;

IS3 Design a system, component or process to meet a specification;

[1] Guidance on the specification of learning outcomes is available from the Centre for the Enhancement of Learning and Teaching.

IS4 Develop innovative designs and solutions based on a broad range of scientific principles taking into account commercial risks and constraints, intellectual property rights and contractual issues, and environmental impact;

IS5 Apply mathematical and/or computer based modelling to analyse new designs and generate solutions to manufacturing engineering problems;

IS6 Critically appraise the results of mathematical and computer based analyses

Practical Skills

PS1 Demonstrate practical engineering skills to use appropriate laboratory and workshop equipment;

PS2 Use computer based systems for modelling and design of mechanical systems, recognising their limitations and having some awareness of their future development;

PS3 Apply primary and secondary research methods using a wide range of sources of information and appropriate methodologies in the management of engineering projects taking into account of a range of commercial and industrial constraints;

PS4 Apply industry codes of practice and standards.

Transferrable Skills

TS2 Manage time and prioritise workloads showing high levels of independent learning;

TS3 Integrate a wide range of data from a variety of sources to; solve a range of engineering problems, apply understandings to challenging situations and be aware of the limitations of the solution;

TS4 Integrate presentational techniques and the information to be presented for maximum effect;

TS5 Access and make appropriate use of numerical and statistical information and develop a deeper understanding and/or greater impact;

TS6 Make effective use of information and communications technologies, including word and data processing packages, the internet and electronic information retrieval systems;

Learning teaching, and assessment methods used

Teaching methods

The following teaching methods will be used:

1. Formal Lecture with student participation, group tutorials, one-to-one tutorials, practical experimentation, problem solving, computer aided design and simulation, case studies, design workshops, project, guided self-study and research.

2. The vast majority of students will be employed in the industry and will also benefit from work-based learning and putting skills and practices gained on the programme into action, directly in their job role. A particular vehicle for this is the Work-Based Project. In this module students will agree a suitable project of some commercial significance and benefit to their employer and carry out research, analyse information, evaluate implementation methods, produce a professional report and deliver an oral presentation to staff and peers.

Summative Assessment Methods

A range of summative assessments will be used including assignments, written examination, project report, oral presentation, and viva.

Many modules have several types of summative assessment such as assignment and written examination, while some of the highly practical modules are assessed entirely by coursework. The assessment strategy provides a balance between the different assessment methods.

Formative Assessment Methods

Students will undertake range of activities throughout the course and receive tutor feedback both verbally and in writing. This will include; practical experimentation, computer aided design and simulation, completion of worksheets, case studies and directed study.

Programme structure and requirements, levels, modules, credits and awards

Programme Modules, Level and Credit Values

Stage 1

Module	Level	Credit Value	ECTS	Prerequisite
BMCF401 Mathematics for Engineering	4	20	10	None
BMCF407 Mechanical Science	4	20	10	None
BMCF408 Electrical Science	4	10	5	None
BMCF415 Manufacturing Services	4	10	5	None
BMCF409 Computer Aided Design	4	20	10	None
BMCF410 Planning and Scheduling	4	20	10	None
BMCF416 Engineering Management	4	20	10	None
Total		**120**	**60**	

Stage 2

Module	Level	Credit Value	ECTS	Prerequisite
BMCF509 Sustainable Design	5	30	15	
BMCF512 PLCs in Automation	5	20	10	
BMCF513 Robotics	5	20	10	
BMCF510 Operations Systems	5	15	7.5	
BMCF511 Manufacturing Technology	5	10	5	
BMCF515 Applied Mathematics for Mechanical Engineers	5	10	5	
BMCF507 Work-Based Project	5	15	7.5	
Total		**120**	**60**	

Total Credit required for Award of Foundation Degree = 240

Course Structure

<table>
<tr><td colspan="6"></td><td>Semester</td><td>Level</td></tr>
<tr><td colspan="6">Stage 2 Study</td><td></td><td></td></tr>
<tr><td rowspan="2">Sustainable Design (30 Credits)</td><td rowspan="2">PLCs in Automation (20 Credits)</td><td rowspan="2">Robotics (20 Credits)</td><td rowspan="2">Operations Systems (15 Credits)</td><td rowspan="2">Work-Based Project (15 Credits)</td><td>Applied Mathematics for Mechanical Engineering (10 Credits)</td><td>2</td><td>5</td></tr>
<tr><td>Manufacturing Technology (10 Credits)</td><td>1</td><td>5</td></tr>
<tr><td colspan="8">Stage 1 Study</td></tr>
<tr><td rowspan="2">Mathematics for Engineering (20 Credits)</td><td rowspan="2">Mechanical Science (20 Credits)</td><td rowspan="2">Computer Aided Design (20 Credits)</td><td rowspan="2">Planning and Scheduling (20 Credits)</td><td rowspan="2">Engineering** Management (20 Credits)</td><td>Manufacturing Services (10 Credits)</td><td>2</td><td>4</td></tr>
<tr><td>Electrical Science (10 Credits)</td><td>1</td><td>4</td></tr>
</table>

***** The Work-Based project will be delivered mainly by research and development in the student's place of work, supported by formal group tutorials and one to one tutorials with their personal tutor or mentor. Students who are not employed will agree a suitable project with their tutor.

****** The Engineering Management module will be delivered partly through taught sessions, but also by students undertaking research around case studies and in particular, those applied to their own place of employment.

Support for Learning including Personal Development Planning (PDP)

Students are encouraged to identify and, with guidance, to reflect on their own learning needs and are offered the following support as appropriate to meet those needs:

- An induction programme providing dissemination of essential information.
- A Learning and Resource Centre providing access to a variety of learning resources, with support from staff
- A Student Handbook containing important information including tutors, staff responsibilities, contacts and regulations and requirements of the course.
- Access to the College IT facilities
- Access to the College Student Services and Careers Advisor
- Access to a Student Counsellor
- Regular group tutorial sessions
- One-to-one tutorials arranged on request
- Consultation with tutor by email, telephone, VLE and other electronic sources

Students will produce their own Personal Development Plans and have periodic reviews with their Personal Tutor.

Criteria for admission

Candidates must satisfy the general admissions requirements of the programme, which are as follows:

Candidates should have ONE of the following:

- A relevant level 3 qualification in Engineering, Science or IT such as BTEC Level 3 Diploma or Extended Diploma with grades at MP, MPP or above
- One A level preferably in Mathematics or Physics, with a supporting GCSE in English
- A pass on an Access to Higher Education programme recognised by the College

International candidates for which English is not a first language should have an IELTS score of 6.0 or higher in addition to the above entry requirements.

Equivalent qualifications to the above are acceptable and industrial experience will be taken into account. Successful application is subject to an Entry Interview.

Methods for evaluation and enhancement of quality and standards including listening and responding to views of students

The quality of the programme will be closely monitored by all staff involved in its delivery. The Course Director/ Departmental Manager is the local Manager who will oversee the delivery of the programme, the Director for Higher Education and the College Director of Quality, monitor the overall effectiveness and quality through a robust College-wide quality control process. The programme will also adhere to the University's regulations and processes.

The College quality process applied to this programme includes:

- Regular teaching observations and reviews
- Staff skills updating as required
- Regular delivery team meetings
- Standardisation meetings and thorough internal verification process
- Programme consultative meetings involving student representatives and course delivery team
- Seeking of student views during group tutorials, one to one tutorials and by formal College survey completion and national surveys.
- Termly Review Boards to review course performance on a regular basis.
- Production of programme Annual Monitoring Reports which detail the performance of the students and programme.
- End of module/programme Examination Boards, attended by an External Examiner.
- A robust system for dealing with complaints or issues, should they arise.

Students will have regular opportunity to present their views to subject tutors during taught sessions, during tutorials and during one-to-one tutorials (by appointment). They will also be able to express their views to the Course Director (by arranged appointment) and also express their views via the student Course Representative who will convey views to the course team, at termly Programme Consultative Meetings.

The Programme Consultative Meetings are attended by the course team, student representatives and where possible the university link tutor. Meetings are minuted and action plans are devised in response to student views.

Students are expected to complete regular quality surveys, both internal and external Higher Education Surveys.