Programme Specification

MEng 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 Student Handbook.

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 City University**
Interim Awards and Final Award:	**MEng Manufacturing Engineering** **BEng (Hons) Manufacturing Engineering**
Programme Title:	**MEng Manufacturing Engineering**
Main fields of Study:	***Manufacturing Engineering*** ***Operations Management***
Modes of Study:	**Full Time** **Part Time**
Language of Study:	**English**
UCAS Code:	
JACS Code:	**H700**

Professional Status of the programme:

This programme will be submitted to the Institution of Engineering and Technology (IET) for accreditation towards the status of Chartered Engineer.

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

This programme has been benchmarked against the standards required for progress towards Chartered Engineer status as defined by the Engineering Council's UK-SPEC UK Standard for Professional Engineering Competence, in consultation with academic and industrial partners.

Programme philosophy and aims

"UK manufacturing is going through a period of profound and irreversible change. The impact of national and global economic, technological and political trends is transforming the way we make things, along with where and how we make them."

- Steve Winder, RVP Manufacturing UK at Epicor, quoted in *The Manufacturer*, 19 Aug 2013.

The School of Engineering and the Built Environment (EBE) has strong, long-standing links with industry which allow us to naturally focus on practice so all students have Practice Intelligence (the capability to learn from experience and apply it to future practice). As with all our provision, the BEng/MEng Manufacturing Engineering course includes opportunities for practice, practical experience and learning through practice; we command credibility and respect from the professions and our curriculum anticipates their changing needs. Our research and knowledge development are applied to practice.

We promote the value and application of creativity and enterprise skills in all areas of study and activity of our staff and students, the study of management skills on engineering degrees being a requirement of our accrediting bodies. Creativity and enterprise skills and capabilities will continue to be distinguishing features of our graduates.

We are seeking high levels of student engagement in the design and development of this course, allowing our students have a real sense of 'ownership' in their University. Our focus is student success and we believe they have a major role to play in shaping what the School, Faculty and University does to ensure this.

Since the University is the main provider of higher education for the people from the Birmingham region, we are culturally inclusive and we significantly contribute to the economic, social, cultural prosperity and well-being of the city and region. Courses within EBE already enjoy high rates of graduate employability.

The Course has been developed to provide future graduates with a good knowledge of a range of manufacturing principles. The programme offers an exciting course of study that prepares graduate engineers for the rapidly developing field of manufacturing engineering and its supporting operational systems. The successful graduate will have the intellectual, creative and personal qualities necessary for undertaking a leadership role and a depth of knowledge that will enable the application of new and emerging technologies to the solution of manufacturing problems.

The programme aims to develop engineers who can apply the principles of systems management, engineering and information technology to the solution of operational problems in industry and commerce. Manufacturing engineers are employed in a

wide range of engineering, educational and commercial organisations. Graduates from the course are equipped to progress to positions of responsibility in senior management or further programmes of specialised study or research.

Manufacturing engineering is an essential feature in the vast arena that is manufacturing – an area that makes large contributions to the wealth of many countries throughout Europe and the rest of the world. It is a fast-changing scene where the competition between industrial organisations is keen and lean: only those companies prepared to apply modern philosophies and technologies will survive.

There are many challenges facing manufacturing industry. Companies now strive for competitive advantage and have to evaluate their performance more effectively in order to make best possible use of all resources: Talented, innovative, ambitious engineers are needed to give manufacturing organisations a competitive edge.

Aims of the Programme

The programme aims to provide learners with:

1. An understanding of the systems approach encompassing the themes of Industrial Systems, Manufacturing Systems, Manufacturing Processes and Engineering Design;
2. An integrated scheme of study from which the student can develop an overall perspective of manufacturing systems and acquire synthesis and analysis skills;
3. Training in engineering applications so that students will gain additional experience of the problems encountered by industrial engineers;
4. An understanding of new technologies and apply these to the solution of problems in manufacturing industry;
5. Experience of the techniques of management and business organisation;
6. Awareness of the economic, social and ecological implications of engineering decisions and to encourage a sense of responsibility to society;
7. Opportunity to develop personal investigative skills by means of a substantial individual project, and;
8. The basis for professional development and further study.

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

On completion of the programme the student should be able to demonstrate:

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 and the limitations thereof;

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;

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.

Transferable/Key Skills

TS1. Participate effectively in group working activities in a leadership role being able to undertake most of the technical functions within the group and managing the delivery of a plan under changing circumstances;

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;

TS7. Research and use new methods required for novel situations and adapt to specific purposes if required.

Learning teaching, and assessment methods used

Analytical skills are developed through coursework tasks that encourage creativity and problem solving using a range of systems and technologies relevant to the electronic industry. Practical applications are a key feature of the course and are emphasised in course design and delivery. Small-group tutorial and practical work comprise up to two-thirds of timetabled sessions.

Learners are assessed both formatively and summatively by a number of methods, the criteria for each module being published within each specified module guide and assessment briefs.

Formative assessment occurs in various ways throughout the programme and may involve feedback from peers, tutors and individual reflection during seminars, coursework exercises and presentations.

Summative assessment may include coursework exercises, examinations (seen and unseen, open- and closed- book), presentations, and practical assignments.

Assessment methods include laboratory and design reports, presentations and in-class demonstrations of working hardware and software or simulated designs, closely linked to practice-based scenarios and work-based problems. Methods of summative assessment are clearly defined within each assessment brief, along

with clearly defined criteria for grade achievement.

Learners develop research skills in module activities and assessments by undertaking small group projects, and a major individual project, and completing a related dissertation.

Learners are encouraged to plan their own work schedules and are required to meet deadlines. Reflection and self-awareness are fostered by keeping logbooks of laboratory and design activity and attending tutor interviews in support of personal performance. Emphasis is placed student directed and student centred learning.

1. Knowledge and Understanding

Knowledge and understanding are acquired through a variety of methods including formal lectures, tutorials and other directed independent learning activities and reinforced by laboratory tasks and seminars. Learning resources are made available on staff and module VLE pages, allowing for some flexibility in engagement with the materials.

Knowledge and understanding is assessed formatively by work based learning and problem solving, in-class tasks, seminar work, peer assessment and learning sets. Summative assessment is by way of assignments, projects, presentations, time-controlled assignments and end examinations, where appropriate to the individual module.

2. Intellectual Skills

Intellectual skills, particularly analytical and problem solving skills, are developed using a range of case-studies and problem / task based learning scenarios, promoting self-directed learning facilitated by problem-based learning centred upon industry practice and its inherent problems.

Assessment of such activities includes practical simulation and design exercises and individual and group projects, in addition to the methods mentioned above.

3. Practical Skills

The acquisition of appropriate practical skills is central to the learning strategy of the programme. All technical themes provide weekly timetabled practical laboratory or PC based sessions, supported by academic or other technically qualified staff. The content of these sessions evolves as the student progresses through the course from guided tasks to develop basic practical skills, through exercises to reinforce the understanding of fundamental principles and techniques, to open-ended mini-projects to give experience of practical modelling, simulation and design of complex manufacturing engineering systems.

Students are encouraged to plan their own work schedules, manage their time and extend their presentational skills in the application of their learning as they should be doing when working in industry.

4. Transferable/Key Skills

Transferable/key skills are core to the learning and assessment strategy of the programme. They are pervasive and are incorporated into modules and assessments as appropriate, e.g. team-working skills are fostered and assessed

via group, task-based practical projects.

Communication, team building skills, ICT and professional awareness within the manufacturing industry are demonstrated by the student throughout the course and across all subjects being studied.

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

The programme is available on a full and part-time study basis. Students may, in certain circumstances, move between full and part-time modes of attendance

The course is divided into study units called modules, and these are either 30 credits or 15 credits. Students complete 120 credits at each of Levels 3, 4, 5, 6 and 7. Each 15 credit module represents150 hours of student learning and assessment: 30 credits equates to 300 hours. Students follow a scheme of compulsory study with a choice of personal focus in the Project modules.

The structure of the course, the modules, levels and credit ratings, and the awards which can be gained are shown below.

Notes on the Course Structure Diagrams

1. Credit values shown are (BCU/ECTS).
2. Interim awards of DipHE, CertHE and FY are included for clarity, as is the optional Sandwich Placement Year.
3. Semesters when modules are expected to run are denoted by S1 and S2. Project Modules running all year are denoted by AYR.

Proposed course structure: MEng / BEng (Hons) Manufacturing Engineering (Full Time)

MEng Manufacturing Engineering

Level 7	ENG7032 Developing Financial Capabilities (15) S1	ENG7044 Product Lifecycle Management (15) S1	ENG7071 Project Management for Practice (15) S1	ENG7047 Knowledge Based Engineering (15) S2	ENG7042 Digital Design and Analysis (15) S2	ENG7058 Operations and Process Management (15) S2	ENG7083 Masters' Group Project (30) AYR

BEng (Hons) Manufacturing Engineering

Level 6	ENG6036 Design Management (15) S1	ENG6064 Manufacturing Systems Management (30) S1	ENG6063 Advanced Materials (15) S2	ENG6065 Advanced Manufacture (30) S2	ENG6044 Undergraduate Project (30) AYR
	Optional Sandwich Placement year				

DipHE Manufacturing Engineering

Level 5	ENG5066 Operations Systems (15) S1	ENG5053 Sustainable Design and Manufacture (30) S1	ENG5082 Management of Engineering and Technology Innovation (15) S2	ENG5067 Automation & Control (30) S2	ENG5068 Practice-Based Project (30) AYR

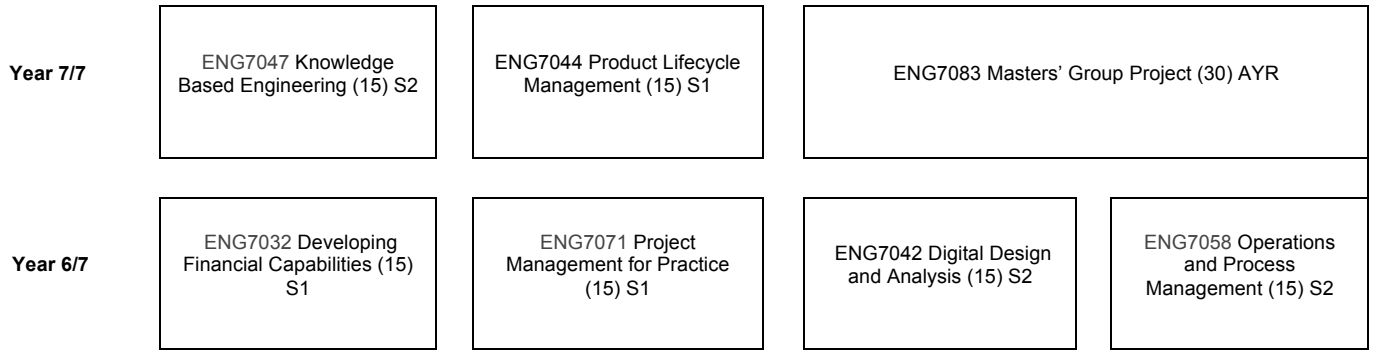
CertHE Manufacturing Engineering

Level 4	ENG4082 Mathematics and Mechanics (30) S1	ENG4079 Design Methods (15) S1	ENG4066 Materials and Processes (15) S1	ENG44080 Digital Design (15) S2	ENG4064 Applied Thermodynamics (15) S2	ENG4083 Mathematics and Dynamics (30) S2

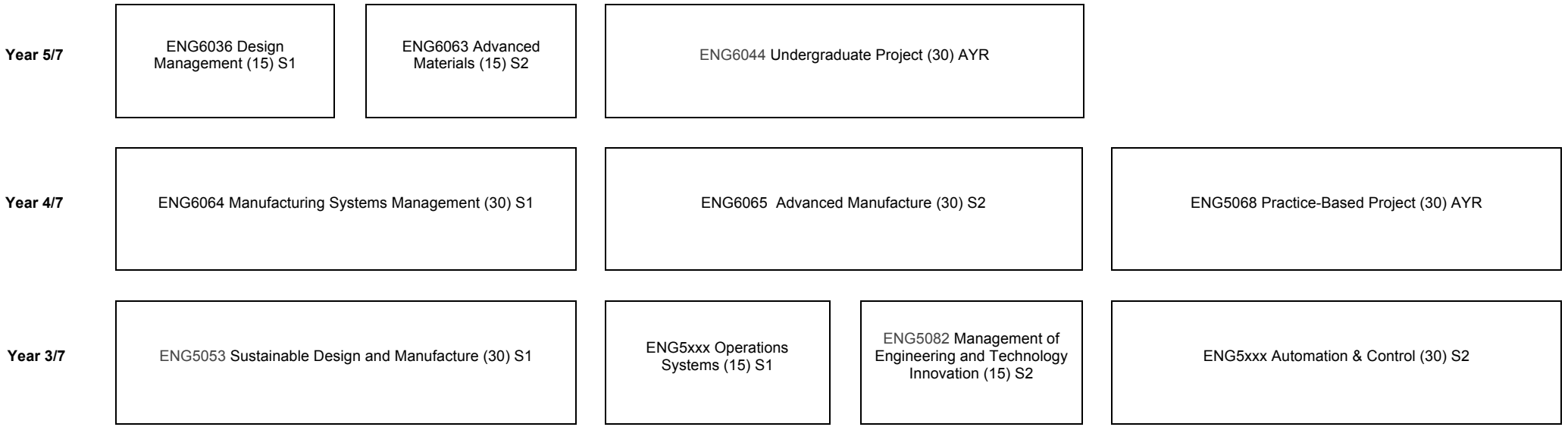
Foundation Year in Engineering

Level 3	ENG3007 Mathematics for Engineering 1 (30) S1	CMP3004 Electrical Science (30) S1	CMP3009 Information and Communication	ENG3003 Mechanical Science (30) S2	ENG3008 Mathematics for Engineering 2 (15)

Additional modules for MEng Manufacturing Engineering (Part Time)



BEng (Hons) Manufacturing Engineering (Part Time)



Support for Learning including Personal Development Planning (PDP)

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

- an induction programme dealing with orientation and the dissemination of essential information, including an introduction to PDP;
- a dedicated Learning Centre with open access learning materials, resources and full-time staff specialising in a variety of support areas;
- a Student Handbook, containing information relating to the University, Faculty, course and modules;
- access to administrative staff and to academic staff, including the Tutors, Programme Leader and Programme Manager, at reasonable times;
- support staff to advise on pastoral and academic issues, and to offer support and assistance;
- access to Faculty resources, including a range of IT equipment and the services of, and guidance from, IT support staff;
- access to the University's Student Services, including those offered by the careers service, financial advisers, medical centre, disability service, crèche, counselling service and chaplaincy;
- resources for Professional Development Planning (PDP) to enable reflection on learning, performance and achievement and to plan personal, educational and career development. The university offers a range of on-line courses (www.moodle.bcu.ac.uk) to support PDP topics including: Reflection, Career and Employability, Action Planning, Self-awareness and Self-employment.

Criteria for admission

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

Applicants must:

- normally be at least 18 years of age by 31st December of the entry year to the programme
- satisfy the Programme Leader that they have the potential to cope successfully with, and benefit from the course of study. This may be through details provided in the Application Form or, in some cases, through an interview.
- obtained minimum grade C in GCSE Mathematics and English plus Grade C AS Level in Mathematics

For alternative qualifications including those from Ireland or Scotland and International Baccalaureates, please refer to the BCU website.

Accreditation of Prior Learning & Accreditation of Prior Experiential Learning

Candidates may be given credit for prior learning **for specific modules** providing they can demonstrate that their prior learning is current and meets the learning outcomes of the units in question. The prior learning of a candidate will be assessed by interview and certification or other tests of competence as appropriate and in accordance with the Faculty scheme and university regulations.

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

The following Faculty committees are involved in evaluation and enhancement of quality, standards and student experience:

- Student Feedback Forums,
- Student Academic Boards,
- Faculty Academic Board, and the
- University's Academic Board.

These are supported by the

- Student Experience, Learning and Teaching Committee,
- Student Voice Committee,
- Technology Enhanced Learning and Teaching Committee,
- Student Complaints, Appeals and Discipline Committee,
- Academic Standards and Quality Enhancement Committee, including sub-Boards and Panels.

The complete structure can be seen below.

Review and evaluation processes in which students are involved include annual course and module reviews, course review and re-approval events, professional body accreditation visits and external examiner visits.

Mechanisms for student input include meetings with course tutors, feedback questionnaires, faculty and university student satisfaction surveys and representation on the faculty committees referred to above.

External examiners are members of examination boards and their remit includes meeting students and monitoring and reporting on academic standards.

THE ACADEMIC BOARD (FORMERLY SENATE) COMMITTEE STRUCTURE – (V16 – 13.11.14)