

## Course Specification

Course Summary Information				
1	Course Titles		BEng (Hons) Manufacturing Engineering BEng (Hons) Manufacturing Engineering with Professional Placement Year MEng Manufacturing Engineering MEng Manufacturing Engineering with Professional Placement Year	
2	BCU Course Codes	UCAS Codes	BEng (Hons) US0724 MEng UM0031	1012 1013
3	Awarding Institution		Birmingham City University	
4	Teaching Institution(s) (if different from point 3)			
5	Professional Statutory or Regulatory Body (PSRB) accreditation (if applicable)			
6	Course Description			
	<p>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.</p> <p>BEng (Hons) / MEng Manufacturing Engineering has been developed to provide you with a good knowledge of a range of manufacturing principles.</p> <p>This course offers an exciting course of study that will prepare you for the rapidly developing field of manufacturing engineering and its supporting operational systems. Upon your graduation you 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.</p> <p>This degree 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 into positions of responsibility in relevant industry, or further courses of specialised study or research.</p> <p>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.</p> <p>On completion of this course you will be able to analyse, synthesise and evaluate those engineering factors that are required to produce engineering solutions. You will explore the themes of:</p> <ul style="list-style-type: none"><li>• Use of general and specialist engineering knowledge and understanding.</li><li>• Application of appropriate theoretical and practical methods to appropriate application.</li><li>• Technical and commercial leadership and management at all levels.</li></ul>			

- Effective interpersonal and communication skills using various media means and resources.
- Commitment to professional standards and recognition of obligations to society and environment in accordance with the latest benchmarks.

Specifically this course will develop your skills in the key areas of:

- Manufacturing technology including manufacturing methodologies, methods, techniques and current/developing theories and conceptual ideas.
- Engineering science and applied mathematics.
- Management, including current management techniques and theories, risk management, supplier relations and financial controls.
- IT which will include developing your skills in the areas of CAD, CAM, spreadsheets, Internet usage and general IT skills.
- Transferable communication skills, including written, verbal and new media presentation skills.
- The role of engineers in creating a sustainable and ethical environment.

The above scope of skills were identified as being critical for the development of modern high technology manufacturing organisations, such as Toyota, Rolls Royce and Bombardier, which must have personnel skilled in these areas in order to successfully compete in today's global market place.

#### **Course Aims:**

The content and structure of the Manufacturing Engineering Course is designed to provide you with an academically challenging and vocationally relevant degree, which encompasses all of the issues involved in successfully entering and maintaining your career within the manufacturing and production engineering industries. Furthermore, the courses have clearly identifiable core themes (with significant elements of practical based learning), in which capability skills and competencies can be fostered, demonstrated and further developed. This Manufacturing Engineering Course Aims are to:

- Provide a challenging undergraduate course in Manufacturing Engineering and to meet the needs of the relevant industries and professional bodies in these areas.
- Provide you with a flexible supportive learning environment to cater for your broad range of backgrounds, in order to enable you to become lifelong independent learner and thinker.
- Develop an awareness of the relationship between theory and practice and the ability to adapt their approach to solve complex technical problems quickly and competently with known technology and to design creatively a product, process or system to meet a defined need
- Provide you with the knowledge and skills that enables you to engage with continuing professional development and further study in the disciplines of Manufacturing and Production Engineering on graduation.
- Enable you to develop an applied approach, underpinned by theory, to the evaluation and resolution of production engineering requirements and problems.
- Provide you with an academic education focusing on the technology, design, project management, manufacture and health and safety pertaining to the relevant industries.
- Enable you to exercise critical evaluation and application of manufacturing and production engineering and its impact on a business's bottom line.
- Enable you to fulfil the role of a competent manufacturing / production engineer by being able to tackle engineering needs and problems associated with products systems, processes and components. To achieve this you need the ability to perform the analysis required and apply the results to improve systems and projects.
- Support you in becoming a manufacturing and production engineer who possesses appropriate awareness, knowledge and understanding of the economic, social and

environmental context of industrial technology within the manufacturing and production engineering sphere.

- Enable you to accomplish your desire to successfully progress to a level 7 course of study.

Furthermore, through the Academic Plan (2015), the University has expressed its commitment to the following course aims to enhance your student experience in all courses:

- Pursuing excellence
- Practice-led, knowledge-applied education
- Interdisciplinary approaches
- Employability-driven
- Internationalisation

The following table articulates the course aims framed by the five themes of the Academic Plan:

1. Pursuing Excellence	You will develop knowledge, understanding and skills in manufacturing technology, operations systems, design and business and management disciplines relevant to manufacturing organisations.
2. Practice-led, knowledge-applied	You will focus on the application of industry-standard modelling and simulation techniques to the analysis, specification and design of manufacturing engineering systems. Engineering is recognised as embedding a range of topics linking to many disciplines
3. Interdisciplinary	In modules such as Leading Engineering Endeavour (Level 5), you will demonstrate the ability to understand the importance of developing a range of skills associated with cooperation and collaboration when working across disciplines. Engineering is recognised as embedding a range of topics linking to many disciplines
4. Employability-driven	In addition to professional and practical skills, additional value will be delivered through group work and project-based challenges that enable you to compete for a variety of employment opportunities within the manufacturing engineering and associated industries.
5. Internationalisation	You will demonstrate a consideration of the wider aspects and global impact of their discipline and an ability to contribute to the engineering sector in different international contexts.

In addition, the following course aims apply:

- Essential knowledge and understanding of management principles.
- A course of study that will extend you intellectually and practically according to your abilities and to provide the opportunity to allow you to reflect on their learning.
- An opportunity to acquire skills in response to the market need for competent project managers capable of operating across multinational organisations embracing differing cultural dimensions.
- A knowledge and full understanding of the breadth of capability in the latest software tools for facilitating multi-site project communication.

- An opportunity to demonstrate their skills as one of a new generation of project managers, with a wider, more creative, flexible skill set, including a good understanding of internal and external customer requirements.
- A course with an emphasis on active and participative education, including practical learning, problem based learning and group work which will develop their skills of analysis, synthesis, decision making and the ability to cope with new and unfamiliar problems.
- An opportunity to relate practical real life problem based learning to industry and commerce, then to apply new technologies and techniques to solve present and future problems, in an international arena.
- An ability to handle uncertainty and ambiguity and deal with complex project management.

For students that progress to the MEng Level 7, a higher appreciation is required as outlined in UK-SPEC especially regarding leadership and team work. At this level you expected to have a more comprehensive understanding of science and mathematics, a greater degree of critical awareness of current societal problems, ability to collect data and undertake engineering analysis to solve complex issues, able to generate innovate and sustainable designs and have a higher generic skills ability as outlined in AHEP3.

The very nature of the integrated Masters degree prepares you as a graduate on your way to become future leaders in the industry and deliver new designs and new products contributing to solving societal problems.

<b>7</b>	<b>Course Awards</b>		
<b>7a</b>	<b>Possible Final Awards for the Manufacturing Engineering course</b>	<b>Level</b>	<b>Credits Awarded</b>
	<b>For BEng (Hons):</b> Bachelor of Engineering with Honours Manufacturing Engineering	6	360
	Bachelor of Engineering with Honours Manufacturing Engineering with Professional Placement Year	6	480
	<b>For MEng:</b> Integrated Masters of Engineering Manufacturing Engineering	7	480
	Integrated Masters of Engineering Manufacturing Engineering with Professional Placement Year	7	600
<b>7b</b>	<b>Possible Exit Awards and Credits Awarded for the Manufacturing Engineering course</b>		
	Certificate of Higher Education Manufacturing Engineering	4	120
	Diploma of Higher Education Manufacturing Engineering	5	240
	Bachelor of Engineering Manufacturing Engineering	6	300

<b>8</b>	<b>Derogations from the University Regulations</b>
	<ol style="list-style-type: none"> <li>1. For modules with more than one item of assessment, students must achieve a minimum of 30% (undergraduate) or 40% (postgraduate) in each item of assessment in order to pass the module</li> <li>2. Compensation of marginal failure in up to 20 credits is permitted at each level</li> <li>3. Condonement of failed modules is not permitted</li> <li>4. Students on an Integrated Masters course must achieve an overall average of 50% or above at the end of Level 5 to remain on the Integrated Masters course.</li> </ol>

<b>9</b>	<b>Delivery Patterns</b>		
	<b>Mode(s) of Study</b>	<b>Location</b>	<b>Duration of Study</b>
	BEng (Hons) Full Time	City Centre	3 years
	BEng (Hons) with Professional Placement Year	City Centre	4 years
	BEng (Hons) Part Time	City Centre	5 years
	MEng Full Time	City Centre	4 years
	MEng with Professional Placement Year	City Centre	5 years
	MEng with Foundation and Professional Placement Year	City Centre	6 years
			<b>Code</b>
			US0724
			US1148
			US0725
			UM0031
			UM0080
			UM0082

<b>10</b>	<b>Entry Requirements</b>
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The admission requirements for this course are stated on the course page of the BCU website at <https://www.bcu.ac.uk/> or may be found by searching for the course entry profile located on the UCAS website.

11		Course Learning Outcomes				
The following table shows how the UK SPEC Learning Outcomes mapped against the 5 University’s Key Themes.						
UK SPEC Learning Outcomes		Pursuing Excellence	Practice Led Knowledge Applied	Interdisciplinary	Employability Driven	Internationalisation
A. Knowledge & Understanding						
A1	Maintain and extend a sound theoretical approach in enabling the introduction and exploitation of new and advancing technology in the field of Manufacturing and Production Engineering	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
A2	Engage in the creative and innovative development of manufacturing engineering technology and continuous improvement systems.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B. Design and Development of processes, systems, services and products						
B1	Identify potential projects and opportunities.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B2	Conduct appropriate research, and undertake design and development of engineering solutions within the design and development field.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
B3	Manage implementation of design solutions, and evaluate their effectiveness.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
C. Responsibility, management and leadership						
C1	Plan for effective project implementation.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
C2	Plan, budget, organise, direct and control tasks, people and resources.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
C3	Lead teams and develop staff to meet changing technical and managerial needs.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
C4	Bring about continuous improvement through quality management.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
D. Communication and interpersonal skills						
D1	Communicate in English with others at all levels.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D2	Present and discuss proposals.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
D3	Demonstrate personal and social skills.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E. Professional Commitment						
E1	Comply with relevant codes of conduct.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
E2	Manage and apply safe systems of work.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E3	Undertake engineering activities in a way that contributes to sustainable development.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
E4	Carry out and record CPD necessary to maintain and enhance competence in own area of practice	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
E5	Exercise responsibilities in an ethical manner.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>



The Course Learning Outcomes are articulated per each level in terms of:

- Knowledge and understanding;
- Intellectual skills;
- Practical/subject specific skills;
- Transferable skills.

At Level 4 you will illustrate your succession from familiarity and working understanding to a wider appreciation, application and deeper understanding at Level 5. At Level 6 you will illustrate your ability to independently apply knowledge, skills and understanding, with a focus on active and reflective practice and clear evidence of synthesis and integration of the various skills and knowledge acquired throughout the course. The Level 6 learning outcomes are designed for you to propose and carry out individual study courses in design and research that fully explore your analytical, creative and innovative problem solving potential. Your achievement of learning outcomes is an incremental and progressive by its nature as your advance through course of study, hence only Level 6 learning outcomes are listed below, demonstrating a threshold level of performance expected of all Honours graduates. At Level 7, a higher appreciation is required especially regarding leadership and team work. At this level you expected to have a more comprehensive understanding of science and mathematics, a greater degree of critical awareness of current societal problems, ability to collect data and undertake engineering analysis to solve complex issues, able to generate innovate and sustainable designs and have a higher generic skills abilities.

Appendix 1 shows the precise Level 4, 5, 6 and 7 modules alignment with the learning outcomes that is to be considered in terms of the overall progression through all levels of study.

### **Knowledge and understanding:**

#### **Level 4**

On successful completion of the course you must be able to demonstrate:

- Appropriate mathematical techniques, including algebra, trigonometry, calculus, statistics and probability
- The principle of manufacturing engineering and their application in simple engineering science
- Understand, apply and evaluate engineering science and engineering analysis procedure to solve the engineering problems.
- Safe working practices, risk assessment;

#### **Level 5**

On successful completion of the course you will be able to demonstrate:

- In depth Knowledge and understanding of essential facts, concepts, theories and principles of manufacturing and production engineering, and it's underpinning science and mathematics.
- Appreciation of the wider multidisciplinary engineering context and its underlying principles.
- In depth Knowledge of the social, environmental, ethical, economic and commercial considerations affecting the exercise of their engineering judgement.
- Understand and apply advanced DFM methods and to apply design process at a higher level.



**Level 6**

On successful completion of the course you will be able to demonstrate:

- Project management, business management, environmental issue and ethics as applied to professional engineering.
- Selection, critical evaluation, implementation and presentation of an engineering project
- Design methodology appropriate to manufacturing and production engineering
- Critical analysis and problem solving of a manufacturing and production based project

**Level 7**

On successful completion of the course you must be able to demonstrate:

- The scientific principles of Manufacturing Engineering to an advanced level.
- Further mathematical and computer models relevant to the Manufacturing engineer to a comprehensive level and an appreciation of their limitations.
- Management and business practices and their limitations as applied to strategic and tactical issues as appropriate for Chartered Engineers.

**Intellectual Abilities:****Level 4**

On successful completion of the course you must be able to:

- Apply appropriate quantitative science and engineering tools to the analysis of problems.
- Demonstrate creative and innovative ability in the synthesis of solutions and in formulating designs.
- Comprehend the broad picture and thus work with an appropriate level of detail.
- Investigate simple manufacturing problem with appropriate mathematical methods.

**Level 5**

On successful completion of the course you must be able to:

- Analyse and use appropriate advanced manufacturing engineering principles to solve wide range of problems
- Demonstrate advanced thinking and innovative ability in the synthesis of solutions and in formulating designs
- Identify and evaluate relevant practices within an appropriate professional and ethical framework
- Ability to provide in depth analysis on information and “experience” formulate independent judgments and articulate through reflection, review and evaluation.

**Level 6**

On successful completion of the course you must be able to:

- Critical analysis of working practices to ensure safety, carry out risk assessment and apply appropriate safety management techniques
- Identify relevant practices within an appropriate professional and ethical framework
- Ability to critically analyse, evaluate and recommend design and production solutions to meet client's requirements
- Identify and critically evaluate the constraint of an engineering project

**Level 7**

On successful completion of the course you must be able to:

- Use fundamental knowledge to investigate new technologies.
- Apply advanced mathematical and computer based models for solving complex problems in engineering, and the ability to assess the limitations of particular cases.
- Extract data pertinent to an unfamiliar problem, and effect solutions using computer based engineering tools when appropriate.
- Debate contemporary issues in Manufacturing Engineering
- Critically discuss the importance of Manufacturing Engineering on a global scale

**Practical / Subject Specific skills:****Level 4**

On successful completion of the course you must be able to:

- Possess practical engineering skills acquired through, for example, work carried out in laboratories and workshops; in industry through supervised work experience; in individual and group project work; in design work; and in the development and use of computer software in design, analysis and control.
- Provide evidence of group working and of participation in projects.
- Apply safe working procedures, health & safety legislation, risk assessment and risk management techniques.
- Communicate effectively by written, visual and oral means.

**Level 5**

On successful completion of the course you must be able to:

- Apply appropriate advanced techniques/methods to the manufacturing based task.
- Demonstrate technical competence in a range of skills to an appropriate professional standard including Computer Integrated Manufacturing and FMEA
- Evaluate and Analyse technical and regulatory requirements and offer solutions to changing work scenarios
- Interpret written and design information for areas of more complex work

**Level 6**

On successful completion of the course you must be able to:

- Apply project planning techniques and scheduling methods
- Identify and critically evaluate the tasks required to complete a design to manufacturing project/product in conjunction with a customer's needs
- Manage empirically-research based project under appropriate supervision and recognise of its theoretical, practical and methodology
- Able to summarise, accurately, the arguments presented in a range of complex works within and about manufacturing engineering specific subject.

**Level 7**

On successful completion of the course you must be able to:

- Use wide knowledge and comprehensive understanding of design processes and methodologies and apply and adapt them in unfamiliar situations.
- Generate ground-breaking designs for products, systems, or components
- Evaluate the impact of regulatory, commercial and environmental constraints on processes and products.

**General transferable skills:**

On successful completion of the course you must be able to:

- Have developed transferable skills that will be of value in a wide range of situations. These are exemplified by the Qualifications and Curriculum Authority Higher Level Key Skills and include problem solving, communication, and working with others, as well as the effective use of general IT [information technology] facilities and information retrieval skills.
- Demonstrate evidence of planning, self-learning and improving performance, as the foundation for lifelong learning/CPD [continuing professional development].
- Communicate effectively with other people using oral, written and graphic means.
- Apply safe working procedures, health & safety legislation, risk assessment and risk management techniques.
- Have ability and competence in a range of skills on the current CAD and IT equipment in an effective and productive manner.
- Show initiative, work independently and able to work as member of a team to develop collaborative skills.
- Display resourceful solutions including use of advanced engineering tools to the limitations of current Manufacturing and Production Engineering practice and discuss them in a major technical report.

12	Course Requirements																																																
12a	<p>Level 4:</p> <p><i>In order to complete this course a student must successfully complete all the following CORE modules (totalling 120 credits):</i></p> <table><tr><th>Module Code</th><th>Module Name</th><th>Credit Value</th></tr><tr><td>ENG4091</td><td>Engineering Principles 1</td><td>20</td></tr><tr><td>ENG4124</td><td>Mathematical Modelling 1</td><td>20</td></tr><tr><td>ENG4093</td><td>Engineering Practice</td><td>20</td></tr><tr><td>ENG4094</td><td>Engineering Principles 2</td><td>20</td></tr><tr><td>ENG4125</td><td>Mathematical Modelling 2</td><td>20</td></tr><tr><td>ENG4096</td><td>Integrated Engineering Project</td><td>20</td></tr></table> <p>Level 5:</p> <p><i>In order to complete this course a student must successfully complete all the following CORE modules (totalling 120 credits):</i></p> <table><tr><th>Module Code</th><th>Module Name</th><th>Credit Value</th></tr><tr><td>ENG5103</td><td>Operations Systems</td><td>20</td></tr><tr><td>ENG5104</td><td>Quality Systems</td><td>20</td></tr><tr><td>ENG5100</td><td>Design and Materials</td><td>20</td></tr><tr><td>ENG5097</td><td>Leading Engineering Endeavours</td><td>20</td></tr><tr><td>ENG5101</td><td>Design and Manufacture</td><td>20</td></tr><tr><td>ENG5105</td><td>Manufacturing Automation and Control</td><td>20</td></tr></table> <p>Professional Placement Year (optional)</p> <p><i>In order to qualify for the award of Bachelor of Engineering with Honours Manufacturing Engineering with Professional Placement Year or Integrated Masters of Engineering Manufacturing Engineering with Professional Placement Year, a student must successfully complete all of the modules listed as well as the following Level 5 module:</i></p> <table><tr><th>Module Code</th><th>Module Name</th><th>Credit Value</th></tr><tr><td>TBC</td><td>Professional Placement</td><td>120</td></tr></table>	Module Code	Module Name	Credit Value	ENG4091	Engineering Principles 1	20	ENG4124	Mathematical Modelling 1	20	ENG4093	Engineering Practice	20	ENG4094	Engineering Principles 2	20	ENG4125	Mathematical Modelling 2	20	ENG4096	Integrated Engineering Project	20	Module Code	Module Name	Credit Value	ENG5103	Operations Systems	20	ENG5104	Quality Systems	20	ENG5100	Design and Materials	20	ENG5097	Leading Engineering Endeavours	20	ENG5101	Design and Manufacture	20	ENG5105	Manufacturing Automation and Control	20	Module Code	Module Name	Credit Value	TBC	Professional Placement	120
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ENG5097	Leading Engineering Endeavours	20																																															
ENG5101	Design and Manufacture	20																																															
ENG5105	Manufacturing Automation and Control	20																																															
Module Code	Module Name	Credit Value																																															
TBC	Professional Placement	120																																															

**Level 6:**

***In order to complete this course a student must successfully complete all the following CORE modules (totalling 120 credits):***

Module Code	Module Name	Credit Value
ENG6073	Advanced Manufacturing	20
ENG6072	Advanced Materials	20
ENG6071	Operations Management	20
ENG6070	Product Lifecycle Management	20
ENG6200	Individual Honours Project	40

**Level 7:**

***In order to complete this course a student must successfully complete all the following CORE modules (totalling 120 credits):***

Module Code	Module Name	Credit Value
ENG7207	Group Integrated Master's Project	40
ENG7152	Advanced Materials and Manufacture	20
ENG7143	Principles of Project Management	20
ENG7159	Reverse Engineering	20
ENG7141	Resource Management	20

## 12b Structure Diagram

### Course Module Grid Full-Time Manufacturing Engineering

<b>Level 4</b>			
Engineering Practice (ENG4093)	Engineering Principles 1 (ENG4091)	Mathematical Modelling 1 (ENG4124)	Sem 1
Integrated Engineering Project (ENG4096)	Engineering Principles 2 (ENG4094)	Mathematical Modelling 2 (ENG4125)	Sem 2
<b>Level 5</b>			
Operations Systems (ENG5103)	Quality Systems (ENG5104)	Design and Materials (ENG5100)	Sem 1
Leading Engineering Endeavours (ENG5097)	Manufacturing Automation and Control (ENG5105)	Design and Manufacture (ENG5101)	Sem 2
<b>Optional</b>			
With Professional Placement Year / Industrial Placement			All Year
<b>Level 6</b>			
Individual Honours Project (ENG6200))	Operations Management (ENG6071)	Advanced Materials (ENG6072)	Sem 1
	Product Lifecycle Management (ENG6070)	Advanced Manufacturing (ENG6073)	Sem 2
<b>Level 7</b>			
Group Integrated Master's Project (ENG7207)	Advanced Material and Manufacture (ENG7152)	Principles of Project Management (ENG7143)	Sem 1
	Reverse Engineering (ENG7159)	Resource Management (ENG7141)	Sem 2

#### Course Routes:

- BEng (Hons) Manufacturing Engineering
- MEng Manufacturing Engineering Route

### **Part-Time Delivery - Manufacturing Engineering**

#### **Year 1**

Engineering Principles 1 (ENG4091)	Mathematical Modelling 1 (ENG4124)	Sem 1
Engineering Principles 2 (ENG4094)		Sem 2

#### **Year 2**

Engineering Practice (ENG4093)		Sem 1
Integrated Engineering Project (ENG4096)	Mathematical Modelling 2 (ENG4125)	Sem 2

#### **Year 3**

Quality Systems (ENG5104)	Operations Systems (ENG5103)	Sem 1
Manufacturing Automation and Control (ENG5105)	Leading Engineering Endeavour (ENG5097)	Sem 2

#### **Year 4**

Operations Management (ENG6071)	Design and Materials (ENG5100)	Sem 1
Product Lifecycle Management (ENG6070)	Design and Manufacture (ENG5101)	Sem 2

#### **Year 5**

Individual Honours Project (ENG6200)	Advanced Materials (ENG6072)	Sem 1
	Advanced Manufacturing (ENG6073)	Sem 2



**Top Up PT Delivery - Manufacturing Engineering  
 (Partner Colleges and Others)**

**Year 1 – Year 3**

**Accreditation of Prior Learning (APL)**

**Examples**  
**(HND; Foundation Degree, etc. in Manufacturing Engineering)**

**Year 4**

Operations Management (ENG6071)	Advanced Materials (ENG6072)	Sem 1
Product Lifecycle Management (ENG6060)	Advanced Manufacturing (ENG6073)	Sem 2

**Year 5**

Individual Honours Project (ENG6200)		Sem 1
		Sem 2

**Top-Up Part-Time Delivery – Manufacturing Engineering**  
**(Partner Colleges with specific foundation degree)**

**Year 1 – Year 3**

**APL - FdEng Mechanical Engineering with Manufacture**

**Year 4**

Operations Management (ENG6060)	Quality Systems (ENG5104)	Sem 1
Product Lifecycle Management (ENG6071)	Manufacturing Automation and Control (ENG5105)	Sem 2

**Year 5**

Individual Honours Project (ENG6200)	Advanced Materials (ENG6072)	Sem 1
	Advanced Manufacturing (ENG6073)	Sem 2

### 13 Overall Student Workload and Balance of Assessment

Overall student *workload* consists of class contact hours, independent learning and assessment activity, with each credit taken equating to a total study time of around 10 hours. While actual contact hours may depend on the optional modules selected, the following information gives an indication of how much time students will need to allocate to different activities at each level of the course.

- *Scheduled Learning* includes lectures, practical classes and workshops, contact time specified in timetable
- *Directed Learning* includes placements, work-based learning, external visits, on-line activity, Graduate+, peer learning
- *Private Study* includes preparation for exams

The *balance of assessment* by mode of assessment (e.g. coursework, exam and in-person) depends to some extent on the optional modules chosen by students. The approximate percentage of the course assessed by coursework, exam and in-person is shown below.

#### Level 4

##### Workload

##### % time spent in timetabled teaching and learning activity

Activity	Number of Hours
Scheduled Learning	432
Directed Learning	0
Private Study	768
<b>Total Hours</b>	<b>1200</b>

##### Balance of Assessment

Assessment Mode	Percentage
Coursework	30%
Exam	47%
In-Person	23%

#### Level 5

##### Workload

##### % time spent in timetabled teaching and learning activity

Activity	Number of Hours
Scheduled Learning	336
Directed Learning	32
Private Study	832
<b>Total Hours</b>	<b>1200</b>

##### Balance of Assessment

Assessment Mode	Percentage
Coursework	50%
Exam	28%

In-Person	22%
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## Level 6

### Workload

% time spent in timetabled teaching and learning activity

Activity	Number of Hours
Scheduled Learning	210
Directed Learning	44
Private Study	946
<b>Total Hours</b>	1200

### Balance of Assessment

Assessment Mode	Percentage
Coursework	71%
Exam	0
In-Person	29%

## Level 7

### Workload

% time spent in timetabled teaching and learning activity

Activity	Number of Hours
Scheduled Learning	162
Directed Learning	12
Private Study	1026
<b>Total Hours</b>	1200

### Balance of Assessment

Assessment Mode	Percentage
Coursework	81%
Exam	0
In-Person	19%

# **Appendix 1**

## **Curriculum Mapping**

### **Course Learning Outcomes Vs Specific Modules**

<b>LEVEL 4</b>	<b>Engineering Principles 1</b>	<b>Mathematical Modelling 1</b>	<b>Engineering Practice</b>	<b>Engineering Principles 2</b>	<b>Mathematical Modelling 2</b>	<b>Integrated Engineering project</b>
<b>General Learning Outcome</b>						
<b>Knowledge and Understanding</b>						
The principle of manufacturing engineering and their application in simple engineering science	✓		✓	✓		✓
Apply and use appropriate mathematical techniques, including algebra, trigonometry, calculus and probability.		✓			✓	
Understand, apply and evaluate engineering science and engineering analysis procedure to solve the engineering problems.	✓		✓	✓		✓
Safe working practices, risk assessment			✓			✓
<b>Intellectual Abilities</b>						
Apply appropriate quantitative science and engineering tools to the analysis of problems.	✓	✓		✓	✓	
Demonstrate creative and innovative ability in the synthesis of solutions and in formulating designs			✓			✓
Comprehend the broad picture and thus work with an appropriate level of detail.		✓			✓	✓
Investigate simple manufacturing problem with appropriate mathematical methods.		✓	✓		✓	✓
<b>Practical / Subject Specific skills</b>						
Possess practical engineering skills acquired through, for example, work carried out in laboratories and workshops; in industry through supervised work experience; in individual and group project work; in design work; and in the development and use of computer software in design, analysis and control.		✓				✓
Provide evidence of group working and of participation in a major project is expected. However, individual professional bodies may require particular approaches to this requirement.		✓				✓
Apply safe working procedures, health & safety legislation, risk assessment and risk management techniques.		✓				✓
Communicate effectively by written, visual and oral means	✓	✓	✓	✓	✓	✓
<b>General transferable skills</b>						

LEVEL 4	Engineering Principles 1	Mathematical Modelling 1	Engineering Practice	Engineering Principles 2	Mathematical Modelling 2	Integrated Engineering project
General Learning Outcome						
Have developed transferable skills that will be of value in a wide range of situations. These are exemplified by the Qualifications and Curriculum Authority Higher Level Key Skills and include problem solving, communication, and working with others, as well as the effective use of general IT [information technology] facilities and information retrieval skills.		✓	✓		✓	✓
Demonstrate evidence of planning, self-learning and improving performance, as the foundation for lifelong learning/CPD [continuing professional development].			✓			✓
Communicate effectively with other people using oral, written and graphic means			✓			✓
Apply safe working procedures, health & safety legislation, risk assessment and risk management techniques			✓			✓
Ability to use competent in a range of skills on the current CAD and IT equipment in an effective and productive manner.			✓		✓	✓
Show initiative, work independently and able to work as member of a team to develop collaborative skills		✓	✓			✓
Display resourceful solutions including use of advanced engineering tools to the limitations of current Manufacturing and Production Engineering practice and discuss them in a major technical report.	✓			✓		



LEVEL 5						
General Learning Outcome	Operations systems	Quality Systems	Design and Material	Manufacturing Automation and Control	Leading Engineering Endeavours	Design and Manufacture
<b>Knowledge and Understanding</b>						
In depth Knowledge and understanding of essential facts, concepts, theories and principles of manufacturing and production engineering, and it's underpinning science and mathematics.		✓				✓
Appreciation of the wider multidisciplinary engineering context and its underlying principles.					✓	
In depth Knowledge of the social, environmental, ethical, economic and commercial considerations affecting the exercise of their engineering judgement.			✓		✓	
Understand and apply advanced DFM methods and to apply design process at a higher level.			✓			✓
<b>Intellectual Abilities</b>						
Analyse and use appropriate advanced manufacturing engineering principles to solve wide range of problems	✓					✓
Demonstrate advanced thinking and innovative ability in the synthesis of solutions and in formulating designs			✓			✓
Identify and evaluate relevant practices within an appropriate professional and ethical framework					✓	
Ability to provide in depth analysis on information and "experience" formulate independent judgments and articulate through reflection, review and evaluation.			✓			✓
<b>Practical / Subject Specific skills</b>						

LEVEL 5						
General Learning Outcome	Operations systems	Quality Systems	Design and Material	Manufacturing Automation and Control	Leading Engineering Endeavours	Design and Manufacture
Apply appropriate advanced techniques/methods to the manufacturing based task.			✓			✓
Demonstrate technical competence in a range of skills to an appropriate professional standard including Computer Integrated Manufacturing and FMEA	✓					
Evaluate and Analyse technical and regulatory requirements and offer solutions to changing work scenarios		✓		✓		
Interpret written and design information for areas of more complex work			✓			✓
<b>General transferable skills</b>						
Have developed transferable skills that will be of value in a wide range of situations. These are exemplified by the Qualifications and Curriculum Authority Higher Level Key Skills and include problem solving, communication, and working with others, as well as the effective use of general IT [information technology] facilities and information retrieval skills.			✓		✓	✓
Demonstrate evidence of planning, self-learning and improving performance, as the foundation for lifelong learning/CPD [continuing professional development].			✓		✓	✓
Communicate effectively with other people using oral, written and graphic means			✓		✓	✓
Apply safe working procedures, health & safety legislation, risk assessment and risk management techniques				✓		✓
Ability to use competent in a range of skills on the current CAD and IT equipment in an effective and productive manner.			✓			✓
Show initiative, work independently and able to work as member of a team to develop collaborative skills			✓		✓	✓
Display resourceful solutions including use of advanced engineering tools to the limitations of current Manufacturing and Production Engineering practice and discuss them in a major technical report.						✓

LEVEL 6	Advanced Manufacturing	Advanced Materials	Operations Management	Product Lifecycle Management	Undergraduate Individual Honours Project
General Learning Outcome					
<b>Knowledge and Understanding</b>					
Project management, business management, environmental issue and ethics as applied to professional engineering.					✓
Selection, critical evaluation, implementation and presentation of an engineering project					✓
Design methodology appropriate to manufacturing and production engineering	✓			✓	
Critical analysis and problem solving of a manufacturing and production based project	✓				✓
<b>Intellectual Abilities</b>					
Critical analysis of working practices to ensure safety, carry out risk assessment and apply appropriate safety management techniques					✓
Identify relevant practices within an appropriate professional and ethical framework					✓
Ability to critically analyse, evaluate and recommend design and production solutions to meet client's requirements	✓	✓			
Identify and critically evaluate the constraint of an engineering project			✓	✓	✓
<b>Practical / Subject Specific skills</b>					
Apply project planning techniques and scheduling methods			✓		✓
Identify and critically evaluate the tasks required to complete a design to manufacturing project/product in conjunction with a customer's needs	✓				✓
Manage empirically-research based project under appropriate supervision and recognise of its theoretical, practical and methodology	✓				✓
Able to summarise, accurately, the arguments presented in a range of complex works within and about manufacturing engineering specific subject.	✓				✓

LEVEL 6	Advanced Manufacturing	Advanced Materials	Operations Management	Product Lifecycle Management	Undergraduate Individual Honours Project
General Learning Outcome					
<b>General transferable skills</b>					
Have developed transferable skills that will be of value in a wide range of situations. These are exemplified by the Qualifications and Curriculum Authority Higher Level Key Skills and include problem solving, communication, and working with others, as well as the effective use of general IT [information technology] facilities and information retrieval skills.	✓	✓	✓	✓	✓
Demonstrate evidence of planning, self-learning and improving performance, as the foundation for lifelong learning/CPD [continuing professional development].					✓
Communicate effectively with other people using oral, written and graphic means	✓				✓
Apply safe working procedures, health & safety legislation, risk assessment and risk management techniques	✓				✓
Ability to use competent in a range of skills on the current CAD and IT equipment in an effective and productive manner.	✓				
Show initiative, work independently and able to work as member of a team to develop collaborative skills	✓				✓
Display resourceful solutions including use of advanced engineering tools to the limitations of current Manufacturing and Production Engineering practice and discuss them in a major technical report.			✓	✓	✓

<b>LEVEL 7</b>	<b>Advanced Materials and Manufacture</b>	<b>Principles of Project Management</b>	<b>Reverse Engineering</b>	<b>Resource Management</b>	<b>Group Integrated Masters Project</b>
<b>General Learning Outcome</b>					
<b>Knowledge and Understanding</b>					
The scientific principles of Manufacturing Engineering to an advanced level.	✓		✓		✓
Further mathematical and computer models relevant to the Manufacturing engineer to a comprehensive level and an appreciation of their limitations.			✓		
Management and business practices and their limitations as applied to strategic and tactical issues as appropriate for Chartered Engineers.		✓			✓
<b>Intellectual Abilities</b>					
Use fundamental knowledge to investigate new technologies.	✓		✓		
Apply advanced mathematical and computer based models for solving complex problems in engineering, and the ability to assess the limitations of particular cases.			✓		
Extract data pertinent to an unfamiliar problem, and effect solutions using computer based engineering tools when appropriate.			✓		✓
Debate contemporary issues in Manufacturing Engineering	✓		✓		✓
Critically discuss the importance of Manufacturing Engineering on a global scale		✓		✓	
<b>Practical / Subject Specific skills</b>					

LEVEL 7	Advanced Materials and Manufacture	Principles of Project Management	Reverse Engineering	Resource Management	Group Integrated Masters Project
General Learning Outcome					
Use wide knowledge and comprehensive understanding of design processes and methodologies and apply and adapt them in unfamiliar situations.			✓		
Generate ground-breaking designs for products, systems, or components	✓				
Evaluate the impact of regulatory, commercial and environmental constraints on processes and products.				✓	✓
<b>General transferable skills</b>					
Have developed transferable skills that will be of value in a wide range of situations. These are exemplified by the Qualifications and Curriculum Authority Higher Level Key Skills and include problem solving, communication, and working with others, as well as the effective use of general IT [information technology] facilities and information retrieval skills.	✓		✓		
Demonstrate evidence of planning, self-learning and improving performance, as the foundation for lifelong learning/CPD [continuing professional development].					✓
Communicate effectively with other people using oral, written and graphic means	✓		✓		✓
Apply safe working procedures, health & safety legislation, risk assessment and risk management techniques					✓
Ability to use competent in a range of skills on the current CAD and IT equipment in an effective and productive manner.			✓		
Show initiative, work independently and able to work as member of a team to develop collaborative skills	✓				✓
Display resourceful solutions including use of advanced engineering tools to the limitations of current Manufacturing Engineering practice and discuss them in a major technical report.	✓				