

Course Specification

| Course Summary Information | | |
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| 1 | Course Titles | Manufacturing Engineer (Degree) (ST0025) Apprenticeship |
| 2 | BCU Course Codes | US1017/ US1019 US1021/US1023 |
| 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 |
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| | <p>The skills shortages in the engineering sector has been recognised by the government, and a report published by the Royal Academy of Engineering in 2016 has reported that the UK will have a shortage of more than one million engineers/technicians by the year 2020 unless action is take. Ongoing updates from the government publications continue to show the need for professionally accredited engineers which the proposed degree apprenticeships will address.</p> <p>This degree apprenticeship is fully informed and supported by industry practice and recognised research in design and delivery of modules by experienced staff who have extensive industry experience.</p> <p>The curriculum is practice led and cultivates problem solving skills, improving communication through effective real-life project work, work experience, and cases. Team working on real life scenarios develop professional competence and prepares you for further employment opportunities and career development.</p> <p>Manufacturing engineering is an essential feature in the vast arena of 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>This degree apprenticeship has been developed to provide you with a good knowledge of a range of manufacturing principles. It will prepare you for the rapidly developing field of manufacturing engineering and its supporting operational systems. Upon your completion 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 apprenticeship in manufacturing engineer 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. You will be equipped with relevant skills to allow you to progress into positions of responsibility in relevant industry, or further postgraduate apprenticeships 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> |

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| 7 | Course Awards | | |
| 7a | Final Awards for the Degree Apprenticeship Manufacturing Engineer | Level | Credits Awarded |
| | Bachelor of Engineering with Honours Manufacturing Engineering | 6 | 360 |
| 7b | Exit Awards and Credits Awarded | | |
| | Certificate of Higher Education Manufacturing Engineering | 4 | 120 |
| | Diploma of Higher Education Manufacturing Engineering | 5 | 240 |
| | Bachelor of Engineering Manufacturing Engineering | 6 | 300 |

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| 8 | Derogations from the University Regulations |
| | <ol style="list-style-type: none"> 1. For modules with more than one item of assessment, apprentices must achieve a minimum of 30% in each item of assessment in order to pass the module 2. Compensation of marginal failure in up to 20 credits is permitted at each level 3. Condonement of failed modules is not permitted |

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| 9 | Delivery Patterns | | |
| | Mode(s) of Study | Location | Duration of Study |
| | BEng (Hons) Part Time | City Centre | 5 years |
| | | | USxxxx |

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| 10 | Entry Requirements |
| | <p>The admission requirements for this degree apprenticeship 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.</p> |

| 11 | Course Learning Outcomes |
|-------------------------------------|--|
| Science and Mathematics (SM) | |
| SM1i | Knowledge and understanding of the scientific principles underpinning relevant technologies, and their evolution |
| SM2i | Knowledge and understanding of mathematics and an awareness of statistical methods necessary to support application of key engineering principles |
| SM1b | Knowledge and understanding of scientific principles and methodology necessary to underpin their education in Manufacturing engineering, to enable appreciation of its scientific and engineering context, and to support their understanding of relevant historical, current and future developments and technologies |
| SM2b | Knowledge and understanding of mathematical and statistical methods necessary to underpin their education in Manufacturing engineering and to enable them to apply mathematical and statistical methods, tools and notations proficiently in the analysis and solution of engineering problems |
| SM3b | Ability to apply and integrate knowledge and understanding of other engineering disciplines to support study of their Manufacturing engineering discipline |
| Engineering Analysis (EA) | |
| EA1i | Ability to monitor, interpret and apply the results of analysis and modelling in order to bring about continuous improvement |
| EA2i | Ability to apply quantitative methods in order to understand the performance of systems and components |
| EA3i | Ability to use the results of engineering analysis to solve engineering problems and to recommend appropriate action |
| EA4i | Ability to apply an integrated or systems approach to engineering problems through know-how of the relevant technologies and their application |
| EA1b | Understanding of engineering principles and the ability to apply them to analyse key engineering processes |
| EA2 | Ability to identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques |
| EA3b | Ability to apply quantitative and computational methods in order to solve engineering problems and to implement appropriate action |
| EA4b | Understanding of, and the ability to apply, an integrated or systems approach to solving engineering problems |
| Design (D) | |
| D1i | Be aware of business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics |
| D2i | Define the problem identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards |
| D3 | Work with information that may be incomplete or uncertain and be aware that this may affect the design |
| D4i | Apply problem-solving skills, technical knowledge and understanding to create or adapt designs solutions that are fit for purpose including operation, maintenance, reliability etc. |
| D5i | Manage the design process, including cost drivers, and evaluate outcomes |
| D6 | Communicate their work to technical and non-technical audiences |
| D1 | Understand and evaluate business, customer and user needs, including considerations such as the wider engineering context, public perception and aesthetics |

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| D2 | Investigate and define the problem, identifying any constraints including environmental and sustainability limitations; ethical, health, safety, security and risk issues; intellectual property; codes of practice and standards. |
| D3b | Work with information that may be incomplete or uncertain and quantify the effect of this on the design |
| D4 | Apply advanced problem-solving skills, technical knowledge and understanding, to establish rigorous and creative solutions that are fit for purpose for all aspects of the problem including production, operation, maintenance and disposal |
| D5 | Plan and manage the design process, including cost drivers, and evaluate outcomes |
| <i>Economic, Legal, Social, Ethical and Environmental Context (EL)</i> | |
| EL1 | Understanding of the need for a high level of professional and ethical conduct in engineering and a knowledge of professional codes of conduct |
| EL2 | Knowledge and understanding of the commercial, economic and social context of engineering processes |
| EL3i | Knowledge of management techniques that may be used to achieve engineering objectives |
| EL4i | Understanding of the requirement for engineering activities to promote sustainable development |
| EL5 | Awareness of the relevant legal requirements governing engineering activities, including personnel, health & safety, contracts, intellectual property rights, product safety and liability issues |
| EL6i | Awareness of risk issues, including health & safety, environmental and commercial risk |
| EL3 | Knowledge and understanding of management techniques, including project management, that may be used to achieve engineering objectives |
| EL4 | Understanding of the requirement for engineering activities to promote sustainable development and ability to apply quantitative techniques where appropriate |
| EL6 | Knowledge and understanding of risk issues, including health and safety, environmental and commercial risk, and of risk assessment and risk management techniques |
| <i>Engineering Practice (P)</i> | |
| P1i | Knowledge of contexts in which engineering knowledge can be applied (e.g. operations and management, application and development of technology, etc.) |
| P2i | Understanding of and ability to use relevant materials, equipment, tools, processes, or products |
| P3i | Knowledge and understanding of workshop and laboratory practice |
| P4i | Ability to use and apply information from technical literature |
| P6i | Ability to use appropriate codes of practice and industry standards |
| P7 | Awareness of quality issues and their application to continuous improvement |
| P11i | Awareness of team roles and the ability to work as a member of an engineering team |
| P1 | Understanding of contexts in which engineering knowledge can be applied (e.g. operations and management, application and development of technology, etc.) |
| P2 | Knowledge of characteristics of particular materials, equipment, processes or products |
| P3 | Ability to apply relevant practical and laboratory skills |
| P4 | Understanding of the use of technical literature and other information sources |
| P5 | Knowledge of relevant legal and contractual issues |
| P6 | Understanding of appropriate codes of practice and industry standards |
| P8 | Ability to work with technical uncertainty |
| P11 | Understanding of, and the ability to work in, different roles within an engineering team |
| <i>Additional General Skills (G)</i> | |
| G1 | Apply their skills in problem solving, communication, information retrieval, working with others and the effective use of general IT facilities |

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| G2 | Plan self-learning and improve performance, as the foundation for lifelong learning/CPD |
| G3i | Plan and carry out a personal programme of work |
| G4i | Exercise personal responsibility, which may be as a team member |

| 12 | Course Requirements | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-------------|---|--------------|-------------|--------------|---------|--------------------------|----|---------|--------------------------|----|---------|----------------------|----|---------|--------------------------|----|---------|--------------------------|----|---------|--------------------------------|----|-------------|-------------|--------------|---------|--------------------|----|---------|-----------------|----|---------|----------------------|----|---------|-------------------------------|----|---------|------------------------|----|---------|--------------------------------------|----|-------------|-------------|--------------|---------|------------------------|----|---------|--------------------|----|---------|-----------------------|----|---------|------------------------------|----|---------|----------------------------|----|
| 12a | <p>Level 4:</p> <p><i>In order to complete this course an apprentice 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 an apprentice 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 Endeavour</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>Level 6:</p> <p><i>In order to complete this course an apprentice 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>ENG6073</td><td>Advanced Manufacturing</td><td>20</td></tr><tr><td>ENG6072</td><td>Advanced Materials</td><td>20</td></tr><tr><td>ENG6071</td><td>Operations Management</td><td>20</td></tr><tr><td>ENG6070</td><td>Product Lifecycle Management</td><td>20</td></tr><tr><td>ENG6200</td><td>Individual Honours Project</td><td>40</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 Endeavour | 20 | ENG5101 | Design and Manufacture | 20 | ENG5105 | Manufacturing Automation and Control | 20 | 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 |
| 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 Endeavour | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ENG5101 | Design and Manufacture | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| ENG5105 | Manufacturing Automation and Control | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

12b Structure Diagram

Level 6 Degree Apprenticeship - Manufacturing Engineer

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| 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 (ENG6060) | Design and Materials (ENG5100) | Sem 1 |
| Product Lifecycle Management (ENG6071) | Design and Manufacture (ENG5101) | Sem 2 |
| Year 5 | | |
| Individual Honours Project (ENG6200) | Advanced Materials (ENG6072) | Sem 1 |
| | Advanced Manufacturing (ENG6073) | Sem 2 |

Apprentices with appropriate Level 4 equivalent qualification such as HNC will be able to join this degree apprenticeship at Year 3 of its delivery

Apprentices with appropriate Level 5 equivalent qualification such as HND or Foundation Degree or Level 5 Apprenticeship will be able to join this degree apprenticeship at Year 4 of its delivery as shown overleaf:

Top Up Apprenticeship Delivery - Manufacturing Engineering

Year 1 – Year 3

APL – Examples (HND; Foundation Degree, etc.)

Year 4

Operations Management (ENG6060)

Advanced Materials (ENG6072)

Sem 1

Product Lifecycle Management
(ENG6071)

Advanced Manufacturing (ENG6073)

Sem 2

Year 5

Individual Honours Project (ENG6200)

Sem 1

Sem 2

13 Overall Apprentices Workload and Balance of Assessment

Overall an apprentice *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 apprentices will need to allocate to different activities at each level of the apprenticeship.

- *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 the apprentices. 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 |
| Total Hours | 1200 |

Balance of Assessment

| Assessment Mode | Percentage |
|-----------------|------------|
| Coursework | 27% |
| Exam | 47% |
| In-Person | 26% |

Level 5

Workload

% time spent in timetabled teaching and learning activity

| Activity | Number of Hours |
|--------------------|-----------------|
| Scheduled Learning | 336 |
| Directed Learning | 32 |
| Private Study | 832 |
| Total Hours | 1200 |

Balance of Assessment

| Assessment Mode | Percentage |
|-----------------|------------|
| Coursework | 52% |
| Exam | 28% |
| In-Person | 20% |

Level 6**Workload**

% time spent in timetabled teaching and learning activity

| Activity | Number of Hours |
|--------------------|------------------------|
| Scheduled Learning | 210 |
| Directed Learning | 44 |
| Private Study | 946 |
| Total Hours | 1200 |

Balance of Assessment

| Assessment Mode | Percentage |
|------------------------|-------------------|
| Coursework | 70% |
| Exam | 0 |
| In-Person | 30% |