Course Specification

Course Summary Information				
1	**Course Titles**		BEng (Hons) Mechanical Engineering BEng (Hons) Mechanical Engineering with Sandwich Year MEng Mechanical Engineering MEng Mechanical Engineering with Sandwich Year	
2	**BCU Course Codes**	**UCAS Codes**	BEng (Hons) US0665 MEng UM0030	H300 H301
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)		The Institution of Engineering and Technology (IET) *Please see important course accreditation information at the end of section 6, for more information about the IET accreditations.	

6	**Course Description**
	BEng (Hons) / MEng Mechanical Engineering will develop you as a skilled engineer capable of undertaking mechanical engineering tasks within and across organisations. The course focuses on the importance of sustainable futures and the Government's STEM agenda, in order to give you the knowledge and attributes you will need to thrive in this ever-changing industry. You'll work on industry-standard analytical tools, develop your design skills, as well as exploring a wide range of facilities, such as our test cell and exhaust analysis equipment. **What's covered in the course?** Our engineering courses focus on project-based activities, giving you lots of opportunity to work in teams on projects from design to implementation. This will give you practical experience of applying engineering science to real world problems, working in multidisciplinary teams to develop your interpersonal skills, and prepare you for a key aspect of modern engineering practice. Problem solving and project management are key skills for an engineer, and our focus on practical experience will help to improve your skills in these highly sought after areas. During your studies, you will use the latest tools and technologies, developing new skills at an advanced level. The course will encourage your creative thinking and develop your engineering leadership skills. Building on a foundation of the generic skills required by tomorrow's engineers, you will also explore the wider context of engineering, as well as the application of advanced engineering principles to solve problems through research and development. You'll engage in independent study and systematic enquiry at an advanced level and take responsibility for the conclusions drawn from it. You will have lots of opportunity to apply industry-standard modelling and simulation techniques to the analysis, specification and design of mechanical engineering systems so that you are able to apply your knowledge and theory to a practical situation. In this way, we make sure you are ready to step straight into employment.

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:

- Use of general and specialist engineering knowledge and understanding.
- Application of appropriate theoretical and practical methods to appropriate application.
- Technical and commercial leadership and management at all levels.
- 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:

- Mechanical technology including Mechanical methodologies, methods, techniques and current / developing theories and conceptual ideas.
- Mechanical Engineering Science and Applied Mathematics.
- Management, including current management techniques and theories, Risk management, supplier relations and financial controls.
- IT which will include developing the student's skills in the areas of CAD, CAM, spread sheets, 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 mechanical organisations, such as Rolls-Royce and Bombardier, who must have personnel that are skilled in these areas in order to successfully compete in today's global market place.

Course Aims:

The content and structure of the Mechanical Engineering Course are designed to provide you with an academically challenging and vocationally relevant degree, which encompasses all of the issues involved in successfully entering and progressing your career within the Mechanical Engineering. Furthermore, the course has 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 Mechanical Engineering Course Aims are to:

- Provide you with the appropriate intellectual tools in order to be able to operate effectively as an applications engineer, within the multidisciplinary engineering environment of a mechanical engineering based company.
- Develop your 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 appropriate practical engineering opportunities, combining theory and experience, to enable you to become applications engineers with awareness, knowledge, skills, and an understanding of a range of experience of engineering practice

- Extend your confidence and professionalism in high-level communication tools at and to develop interpersonal and team working skills in order to be able to contribute effectively to business activities.
- Develop your ability to reflect on and evaluate their learning and technical achievements and performance in order to clearly identify their proposed professional intent.
- Provide an accessible and flexible course suitable for you from a wide range of backgrounds to succeed and progress.
- Enables you to develop critical evaluation and apply appropriate engineering solutions
- Enables you to fulfil the role of a competent applications engineer by being able to tackle engineering needs and problems associated with products systems, processes and components. To do this you have to be able to perform the analysis necessary and to apply results to improve systems and projects.
- Supports you in becoming an application engineer who possesses appropriate awareness, knowledge and understanding of the economic, social and environmental context of industrial technology within the mechanical engineering area.

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 stress analysis, thermodynamics, design and management, etc. relevant to industry needs and recognised for delivering value driven solutions.
2. Practice-led, knowledge-applied	You will focus on the application of industry-standard design, modelling and simulation techniques to support the analysis, specification and implementation of mechanical engineering systems.
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 mechanical engineering and associated industries.
5. Internationalisation	You will have demonstrated a consideration of the wider aspects and global impact of your 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.

	***Important Course Accreditation Information** Students completing an IET accredited degree are deemed to have met part or all of the academic requirements for registration as a Chartered or Incorporated Engineer and are in a strong position to move on to achieve professional engineering status after a period of initial professional development in industry. **BEng Accreditation Information** In order for you to achieve professional accreditation, you must have, on top of your academic qualifications, a minimum of 4 years relevant industrial engineering experience at the appropriate level. Our current BEng courses are accredited at Partial CEng level, meaning that provided you have the relevant industrial experience, you may be eligible to apply for Incorporated Engineer Level. Should you wish to apply for CEng Engineer level, there will be requirement for further learning at PG level, for example, an accredited MSc in the relevant subject. Our MSc courses are accredited at full CEng level. **MEng Accreditation Information** The accredited MEng will meet, in part, the exemplifying academic benchmark requirements for registration as a Chartered Engineer. Accredited MEng graduates who also have a BEng (Hons) accredited for CEng will be able to show that they have satisfied the educational base for CEng registration. It should be noted that graduates from an accredited MEng programme that do not also have an appropriately accredited Honours degree, will not be regarded as having the exemplifying qualifications for professional registration as a Chartered Engineer with the Engineering Council; and will need to have their qualifications individually assessed through the Individual Case Procedure if they wish to progress to CEng.

7	Course Awards		
7a	**Possible Final Awards for the Mechanical Engineering Course**	**Level**	**Credits Awarded**
	For BEng (Hons): Bachelor of Engineering with Honours Mechanical Engineering Bachelor of Engineering with Honours Mechanical Engineering with Sandwich year **For MEng:** Integrated Masters of Engineering Mechanical Engineering Integrated Masters of Engineering Mechanical Engineering with Sandwich Year	 6 6 7 7	 360 360 480 480
7b	**Exit Awards and Credits Awarded**		
	Certificate of Higher Education Mechanical Engineering Diploma of Higher Education Mechanical Engineering Bachelor of Engineering Mechanical Engineering	4 5 6	120 240 300

8	Derogation from the University Regulations
	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. 2. Compensation of marginal failure in up to 20 credits is permitted at each level. 3. Condonement of failed modules is not permitted. 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.

9	Delivery Patterns		
Mode(s) of Study	**Location**	**Duration of Study**	**Code**
BEng (Hons) Full Time	City Centre	3 years	US0665
BEng (Hons) Full Time Sandwich	City Centre	4 years	US0665S
BEng (Hons) Part Time	City Centre	5 years	US0666
MEng Full Time	City Centre	4 years	UM0030
MEng Full Time Sandwich	City Centre	5 years	UM0030S

10	Entry Requirements
	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 Mechanical Engineering	☒	☒	☐	☒	☒
A2	Engage in the creative and innovative development of mechanical engineering technology and continuous improvement systems.	☒	☒	☒	☒	☐
	B. Design and Development of processes, systems, services and products					
B1	Identify potential projects and opportunities.	☒	☒	☒	☒	☐
B2	Conduct appropriate research, and undertake design and development of engineering solutions within the design and development field.	☒	☒	☒	☒	☐
B3	Manage implementation of design solutions, and evaluate their effectiveness.	☒	☒	☒	☒	☐
	C. Responsibility, management and leadership					
C1	Plan for effective project implementation.	☒	☒	☒	☒	☒
C2	Plan, budget, organise, direct and control tasks, people and resources.	☒	☒	☒	☒	☒
C3	Lead teams and develop staff to meet changing technical and managerial needs.	☒	☒	☒	☒	☒
C4	Bring about continuous improvement through quality management.	☒	☒	☒	☒	☒
	D. Communication and interpersonal skills					
D1	Communicate in English with others at all levels.	☒	☒	☐	☒	☐
D2	Present and discuss proposals.	☒	☒	☐	☒	☐
D3	Demonstrate personal and social skills.	☒	☒	☐	☒	☐
	E. Professional Commitment					
E1	Comply with relevant codes of conduct.	☒	☒	☒	☒	☒
E2	Manage and apply safe systems of work.	☒	☒	☒	☒	☐
E3	Undertake engineering activities in a way that contributes to sustainable development.	☒	☒	☒	☒	☒
E4	Carry out and record CPD necessary to maintain and enhance competence in own area of practice	☒	☒	☐	☒	☐
E5	Exercise responsibilities in an ethical manner.	☒	☒	☒	☒	☒

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 mechanical 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 must be able to demonstrate:

- In depth Knowledge and understanding of essential facts, concepts, theories and principles of mechanical engineering, and its 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.
- Computer-Based Design and modelling include its applications.

Level 6
On successful completion of the course you must 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 mechanical engineering
- Critical analysis and problem solving of a mechanical based project

Level 7
On successful completion of the course you must be able to demonstrate:

- The scientific principles of Mechanical Engineering to an advanced level.
- Further mathematical and computer models relevant to the Mechanical 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 mechanical problem with appropriate mathematical methods.

Level 5
On successful completion of the course you must be able to:

- Analyse and use appropriate advanced mechanical engineering principles to solve wide range of problems
- Use of Computer Aided Design and engineering analysis tools
- Identify and evaluate relevant practices within an appropriate professional and ethical framework
- Evaluate and apply mechanical problem solving that can assist in the engineering process

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 and critically evaluate relevant practices within an appropriate professional and ethical framework
- Ability to analyse, evaluate and recommend design solutions to meet client's requirements
- Identify 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 Mechanical Engineering
- Critically discuss the importance of Mechanical 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 safe working practices to the mechanical engineering based laboratory work.
- Use a Computer Aided Design package in a design process
- 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 mechanical 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 mechanical 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 Mechanical Engineering practice and discuss them in a major technical report.

12	Course Requirements

12a Level 4:

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
ENG4091	Engineering Principles 1	20
ENG4093	Engineering Practice	20
ENG4124	Mathematical Modelling 1	20
ENG4094	Engineering Principles 2	20
ENG4125	Mathematical Modelling 2	20
ENG4096	Integrated Engineering Project	20

Level 5:

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
ENG5098	Thermodynamics and Fluid Mechanics	20
ENG5100	Design and Materials	20
ENG5099	Numerical Analysis	20
ENG5097	Leading Engineering Endeavour	20
ENG5102	Mechanical Science	20
ENG5101	Design and Manufacture	20

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
ENG6075	Computer Aided Engineering	20
ENG6074	Dynamics and Control	20
ENG6084	Advanced Mechanics	20
ENG6079	Thermodynamics and Energy Systems	20
ENG6200	Individual Honours Project	40

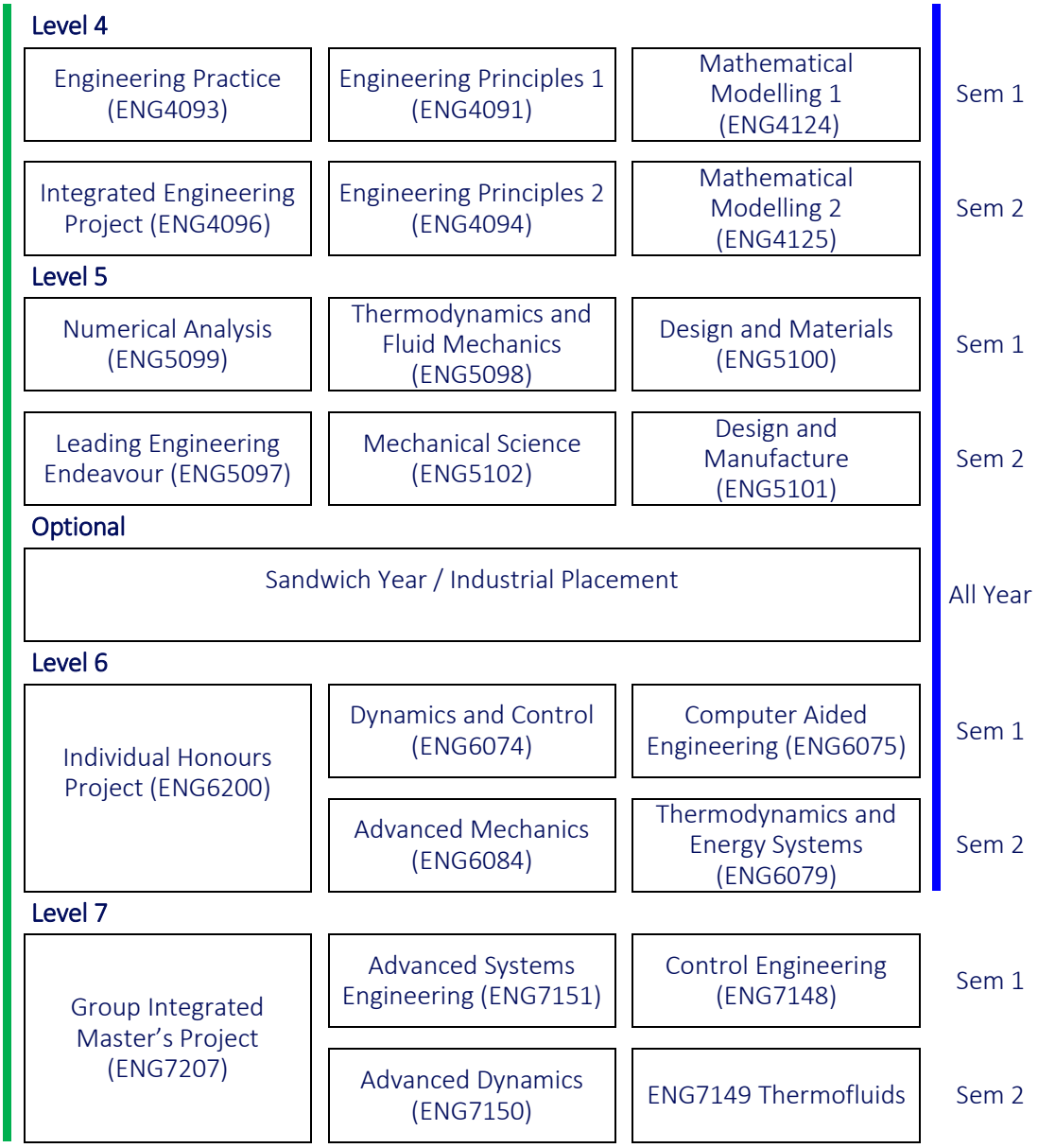
Level 7:

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
ENG7151	Advanced Systems Engineering	20
ENG7148	Control Engineering	20
ENG7150	Advanced Dynamics	20
ENG7149	Thermofluids	20

12b Structure Diagram

Course Module Grid Full-Time Mechanical Engineering



Course Routes:

---------- BEng (Hons) Mechanical Engineering

---------- MEng Mechanical Engineering Route

Part-Time Delivery – Mechanical 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		
Numerical Analysis (ENG5099)	Thermodynamics and Fluid Mechanics (ENG5098)	Sem 1
Mechanical Science (ENG5102)	Leading Engineering Endeavour (ENG5097)	Sem 2
Year 4		
Computer Aided Engineering (ENG6075)	Design and Materials (ENG5100)	Sem 1
Advanced Mechanics (ENG6084)	Design and Manufacture (ENG5101)	Sem 2
Year 5		
Individual Honours Project (ENG6200)	Dynamics and Control (ENG6074)	Sem 1
	Thermodynamics and Energy Systems (ENG6079)	Sem 2

Top-Up Part-Time Delivery – Mechanical Engineering

Partner Colleges and Others

Year 1 – Year 3

Accreditation of Prior Learning (APL)

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

Year 4

Computer Aided Engineering (ENG6075)	Dynamics and Control (ENG6074)	Sem 1
Advanced Mechanics (ENG6084)	Thermodynamics and Energy Systems (ENG6079)	Sem 2

Year 5

Individual Honours Project (ENG6200)		Sem 1 Sem 2

Top-Up Part-Time Delivery – Mechanical Engineering

(Partner Colleges with specific foundation degree)

Year 1 – Year 3

APL - FdEng Mechanical Engineering with Manufacture

Year 4

Computer Aided Engineering (ENG6075)	Numerical Analysis (ENG5099)	Sem 1
Advanced Mechanics (ENG6084)	Mechanical Science (ENG5102)	Sem 2

Year 5

Individual Honours Project (ENG6200)	Dynamics and Control (ENG6074)	Sem 1
	Thermodynamics and Energy Systems (ENG6079)	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
Total Hours	1200

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	0
Private Study	864
Total Hours	1200

Balance of Assessment

Assessment Mode	Percentage
Coursework	55%
Exam	33%
In-Person	12%

Level 6

Workload

% time spent in timetabled teaching and learning activity

Activity	Number of Hours
Scheduled Learning	210
Directed Learning	11
Private Study	979
Total Hours	1200

Balance of Assessment

Assessment Mode	Percentage
Coursework	26%
Exam	74%
In-Person	0%

Level 7

Workload

% time spent in timetabled teaching and learning activity

Activity	Number of Hours
Scheduled Learning	156
Directed Learning	18
Private Study	1026
Total Hours	1200

Balance of Assessment

Assessment Mode	Percentage
Coursework	16%
Exam	80%
In-Person	4%

Appendix 1

Curriculum Mapping

Course Learning Outcomes Vs Specific Modules

LEVEL 4 General Learning Outcome	Engineering Principles 1	Mathematical Modelling 1	Engineering Practice	Engineering Principles 2	Mathematical Modelling 2	Integrated Engineering project
Knowledge and Understanding						
The principle of mechanical 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			✓			✓
Intellectual Abilities						
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 mechanical problem with appropriate mathematical methods.		✓	✓		✓	✓
Practical / Subject Specific skills						
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	✓	✓	✓	✓	✓	✓

LEVEL 4 General Learning Outcome	Engineering Principles 1	Mathematical Modelling 1	Engineering Practice	Engineering Principles 2	Mathematical Modelling 2	Integrated Engineering project
General transferable skills						
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 Mechanical Engineering practice and discuss them in a major technical report.	✓			✓		

LEVEL 5 General Learning Outcome	Thermodynamics and Fluid Mechanics	Numerical Analysis	Design and Material	Mechanical Science	Leading Engineering Endeavours	Design and Manufacture
Knowledge and Understanding						
In depth Knowledge and understanding of essential facts, concepts, theories and principles of your engineering discipline, and its 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			✓		✓	
Computer-Based Design and modelling include its applications.		✓	✓			✓
Intellectual Abilities						
Analyse and use appropriate advanced mechanical engineering principles to solve wide range of problems	✓			✓		
Use of Computer Aided Design and engineering analysis tools		✓	✓			✓
Identify, evaluate and apply relevant practices within an appropriate professional and ethical framework			✓		✓	
Evaluate and apply mechanical problem solving that can assist in the engineering process	✓		✓	✓		✓

LEVEL 5 General Learning Outcome	Thermodynamics and Fluid Mechanics	Numerical Analysis	Design and Material	Mechanical Science	Leading Engineering Endeavours	Design and Manufacture
Practical / Subject Specific skills						
Apply safe test to the mechanical based laboratory task.			✓			✓
Use a Computer Aided Design package in a design process			✓			✓
Interpret written and design information for areas of more complex work			✓	✓		✓
General transferable skills						
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 Mechanical Engineering practice and discuss them in a major technical report.	✓					✓

LEVEL 6 General Learning Outcome	Dynamics and Control	Computer Aided Engineering	Advanced Mechanics	Thermodynamics and Energy Systems	Undergraduate Individual Honours Project
Knowledge and Understanding					
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 mechanical engineering	✓		✓		
Critical analysis and problem solving of a mechanical based project					✓
Intellectual Abilities					
Critical analysis of working practices to ensure safety, carry out risk assessment and apply appropriate safety management techniques					✓
Identify and critically evaluate relevant practices within an appropriate professional and ethical framework				✓	✓
Ability to critically analyse, evaluate and recommend design solutions to meet client's requirements	✓		✓		
Identify and critically evaluate the constraint of an engineering project					✓

LEVEL 6 General Learning Outcome	Dynamics and Control	Computer Aided Engineering	Advanced Mechanics	Thermodynamics and Energy Systems	Undergraduate Individual Honours Project
Practical / Subject Specific skills					
Apply project planning techniques and scheduling methods					✓
Identify and critically evaluate the tasks required to complete a mechanical project/product in conjunction with a customers' needs					✓
Manage empirically-research based project under appropriate supervision and recognise of its theoretical, practical and methodology		✓			✓
Evaluate and critically summarise accurately the arguments presented in a range of complex works within and about mechanical engineering specific subject.	✓			✓	
General transferable skills					
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 Mechanical Engineering practice and discuss them in a major technical report.					✓

LEVEL 7 General Learning Outcome	Control Engineering	Advanced Systems Engineering	Advanced Dynamics	Thermofluids	Group Integrated Masters Project
Knowledge and Understanding					
The scientific principles of Mechanical Engineering to an advanced level.	✓	✓	✓	✓	✓
Further mathematical and computer models relevant to the Mechanical 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.					✓
Design methodology appropriate to mechanical engineering	✓		✓		
Intellectual Abilities					
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 Mechanical Engineering					✓
Critically discuss the importance of Mechanical Engineering on a global scale		✓			

LEVEL 7 General Learning Outcome	Control Engineering	Advanced Systems Engineering	Advanced Dynamics	Thermofluids	Group Integrated Masters Project
Practical / Subject Specific skills					
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					
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 Mechanical Engineering practice and discuss them in a major technical report.	✓	✓	✓	✓	