Course Specification

Course Summary Information		
1	**Course Title**	MSc Mechanical Engineering
2	**BCU Course Code**	PT0939
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) The Institution of Mechanical Engineers (IMechE) *Please see important course accreditation information at the end of section 6, for more information about the IET and the IMechE accreditations.

6	**Course Description**
	This highly-respected course will enhance your strategic management and leadership capabilities. The course builds on sustainable futures and the Government's STEM agenda, helping you to gain the knowledge and attributes needed to thrive in this ever-changing industry, and you'll work on industry-standard complex analytical tools such as Matlab/Simulink, CATIA, Ansys and ADAMS Mechanisms. You will work collaboratively with tutors, practitioners, theorists and designers, equipping you with everything you need launch your career. In the UK, companies such as Jaguar Land Rover, BMW and Honda all require a constant supply of highly skilled engineers, and our course will ensure you have a fully-rounded experience in mechanical engineering. **What's covered in the course?** Advance your knowledge and understanding, develop your critical thinking and prepare to work across a range of organisations with our MSc Mechanical Engineering course. Overall, the course aims to produce skilled engineers capable of undertaking mechanical engineering tasks within and across organisations utilising the latest tools and technologies. The course will encourage creative thinking and the development of engineering leadership skills. Building on a foundation of the generic skills required by tomorrow's engineers, the courses explore the wider context of engineering, as well as the application of advanced engineering principles to solve problems through research. You will engage in independent study and systematic enquiry at an advanced level and take responsibility for the conclusions drawn from it. There will be opportunity to integrate and differentiate a variety of traditions and bodies of knowledge and to continue to advance their knowledge and understanding, and to develop new skills at an advanced level through research led modules. In addition to further academic research opportunities, career prospects are expected to keep pace with the rapid advances in computer aided methods and intelligent technologies, hence, there is expected to be continuing demand for competent, versatile postgraduates who can design and implement innovative solutions for industry. The course has previously achieved academic accreditation from the IMechE and IET. This accreditation has been maintained in recognition for demonstrating that key principles have been incorporated and integrated into the curriculum design and module development of the courses.

The teaching and learning on the courses focuses and emphasises the importance of the body of knowledge and ensures that we incorporate it within the guiding principles underpinning these courses.

In addition to further academic research opportunities, career prospects are expected to keep pace with the rapid advances in computer aided methods and intelligent technologies, hence, there is expected to be continuing demand for competent, versatile postgraduates who can design and implement innovative solutions for industry.

Course Aims:

The MSc course in Mechanical Engineering aims to:

- Provide flexible learning opportunities of a high standard in the field of advanced engineering, accessible to part-time and full-time students, whether local, EU or international.
- Ensure that opportunity is equally available to all who have the potential to benefit from it, regardless of race, nationality, or disability.

The MSc should provide opportunities for individuals to develop:

- Advanced in-depth knowledge and understanding.
- Versatility and creativity in the application of advanced knowledge and practice.
- Imagination, systemic and innovative skills to take forward the knowledge base.
- A broader education in engineering than achieved at honours degree level.
- An enhanced treatment of business and management that aids progress to a position of responsibility.
- Greater confidence to manage projects and to take on leadership in major engineering projects (CEng).

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 have demonstrated the attitudes and abilities of confident problem solvers in your chosen discipline.
2. Practice-led, knowledge-applied	You will have demonstrated the development of a broad range of subject specific and transferable skills.
3. Interdisciplinary	You will have demonstrated the ability to understand the importance of developing a range of skills associated with cooperation and collaboration when working across disciplines.
4. Employability-driven	You will have demonstrated the ability to self-evaluate your role and in attributed needed when becoming work ready.
5. Internationalisation	You will have demonstrated a consideration of the wider aspects and global impact of your discipline.

***Important Course Accreditation Information**

Students completing an IMechE or 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.

The accredited MSc will meet, in part, the exemplifying academic benchmark requirements for registration as a Chartered Engineer. Accredited MSc 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 MSc 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	**Name of Final Award**	**Level**	**Credits Awarded**
	Master of Science Mechanical Engineering Master of Science Mechanical Engineering with Professional Placement	7 7	180 240
7b	**Exit Awards and Credits Awarded**		
	Postgraduate Certificate Mechanical Engineering Postgraduate Diploma Mechanical Engineering	7 7	60 120

8	Derogations from the University Regulations
	1. A maximum volume of 20 credits per course in a Master's degree (other than an integrated Master's degree) can be compensated. 2. No condonement of modules at Levels 4-7 is permitted.

9	Delivery Patterns			
Mode(s) of Study	**Location(s) of Study**	**Duration of Study**	**Code(s)**
Full Time September	City Centre	12 months	PT0939
Full Time January	City Centre	12 months	PT0939
Part Time September	City Centre	20 months	PT0938
Part Time January	City Centre	35 months	PT0942
Full Time January 'with Professional Placement'	City Centre (and placement provider)	18 months	PT1330
Full Time September 'with Professional Placement'	City Centre (and placement provider)	18 months	PT1330

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/.

11	Course Learning Outcomes

Generic Learning Outcomes

Upon Completion of the MSc you should have gained:

- Systematic understanding of the knowledge base , and a critical awareness of current problems and developments at the forefront of the engineering discipline and in particular within the areas of professional practice of Mechanical and Manufacturing Engineering.
- A comprehensive understanding of research techniques and enquiry methods and be able to apply advanced knowledge and practice in an original manner to the solution of complex situations within the engineering discipline in particular within the areas of professional practice of Mechanical and Manufacturing Engineering .
- Conceptual understanding that enables you to:
    - Evaluate critically current research and advanced scholarship in the discipline; and
    - Evaluate methodologies and develop critiques of them and, where appropriate, to propose new hypotheses.
- Deal with complex technical issues systematically, systemically and creatively, make sound judgements in the absence of complete data, and communicate their conclusions clearly to specialist and non-specialist audiences.
- Demonstrate self-direction and originality in tackling and solving engineering problems, and be able to act autonomously in planning and implementing tasks at a professional level.
- To have the commitment and enthusiasm to continue to advance their knowledge and understanding of the engineering discipline, and to develop new skills to a high level for continuing professional development.
- The qualities and transferable skills necessary for employment with the engineering profession requiring:
    - Exercising initiative and personal responsibility.
    - Decision-making in complex and unpredictable situations.

The Specific Learning Outcomes for the MSc Mechanical Engineering course are listed below:

Knowledge and Understanding of:

1. The scientific principles of Mechanical Engineering to an advanced level.
2. Mathematical and computer models relevant to the Mechanical engineer to a comprehensive level and an appreciation of their limitations.
3. Management and business practices and their limitations as applied to strategic and tactical issues as appropriate for Chartered Engineers.
4. Rapid Prototyping and Manufacturing for future research and development

Intellectual Skills – the ability to:

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

Practical/Subject Specific Skills – the ability to:

1. Use wide knowledge and comprehensive understanding of design processes and methodologies and apply and adapt them in unfamiliar situations and discuss the results in your final major project report.
2. Generate ground-breaking designs for products, systems, or components
3. Evaluate the impact of regulatory, commercial and environmental constraints on processes and products.

General Transferable Skills – the ability to:

1. Display resourceful solutions to the limitations of current Mechanical Engineering practice at Chartered Engineer Level.
2. Apply extensive knowledge and understanding of a wide range of engineering materials and components..
3. Critically identify an engineering problem at the design stage
4. Critically apply advanced engineering tools to a variety of situations and discuss the results in your final major project report.

Appendix 1 shows the precise modules alignment/mapping with the learning outcomes that is to be considered in terms of the overall progression through all levels of study.

The following table shows the course learning outcomes mapped against the University's 5 kep principles:

Outcomes/Aims	Pursuing Excellence	Practice Led Knowledge Applied	Interdisciplinary	Employability Driven	Internationalisation
1. Knowledge & Understanding					
The scientific principles of Mechanical Engineering to an advanced level.	X	X	X	X	X
Mathematical and computer models relevant to the Mechanical engineer to a comprehensive level and an appreciation of their limitations.	X	X	X	X	X
Management and business practices and their limitations as applied to strategic and tactical issues as appropriate for Chartered Engineers.	X	X	X	☐	☐
Rapid Prototyping and Manufacturing for future research and development	X	X	X	☐	☐
2. Cognitive & Intellectual Skills					
Use fundamental knowledge to investigate new technologies.	X	X	X	X	X
Apply advanced mathematical and computer based models for solving complex problems in engineering, and the ability to assess the limitations of particular cases.	X	X	X	☐	☐
Extract data pertinent to an unfamiliar problem, and effect solutions using computer based engineering tools when appropriate.	X	X	X	X	X
Debate contemporary issues in Mechanical Engineering	X	X	X	☐	☐
Critically discuss the importance of Mechanical Engineering on a global scale	X	X	X	X	X
3. Practical & Professional Skills					
Use wide knowledge and comprehensive understanding of design processes and methodologies and apply and adapt them in unfamiliar situations and discuss the results in your final major project report.	X	X	☐	☐	☐
Generate ground-breaking designs for products, systems, or components	X	X	X	☐	☐
Evaluate the impact of regulatory, commercial and environmental constraints on processes and products.	X	X	X	X	X
4. Key Transferable Skills					
Display resourceful solutions to the limitations of current Mechanical Engineering practice at Chartered Engineer Level.	X	X	X	☐	☐
Apply extensive knowledge and understanding of a wide range of engineering materials and components..	X	X	X	☐	☐
Critically identify an engineering problem at the design stage	X	X	X	☐	☐
Critically apply advanced engineering tools to a variety of situations and discuss the results in your final major project report.	X	X	X	X	X

12	**Course Requirements**
12a	**Level 7:** ***In order to complete this course a student must successfully complete all the following CORE modules (totalling 180 credits):***

Module Code	Module Name	Credit Value
ENG7149	Thermofluids	20
ENG7148	Control Engineering	20
ENG7151	Advanced Systems Engineering	20
ENG7150	Advanced Dynamics	20
ENG7152	Advanced Materials and Manufacture	20
ENG7142	Research Methods	20
ENG7200	Individual Master's Project	60

Level 6:
In order to qualify for the award of MSc Mechanical Engineering with Professional Placement, a student must successfully complete all of the Level 7 modules listed above as well as the following Level 6 module:

Module Code	Module Name	Credit Value
PLA6004	Professional Placement	60

12b Structure Diagrams

Course Module Grid Full-Time Mechanical Engineering

September Entry

Year 1 1st Semester (Sept – Dec)	Advanced Systems Engineering (c) (ENG7151)	Control Engineering (c) (ENG7148)	Advanced Materials and Manufacture (ENG7152)
Year 1 2nd Semester (Jan – May)	Research Methods (c) (ENG7142)	Advanced Dynamics (c) (ENG7150)	Thermofluids (ENG7149)
Year 1 3rd Semester (May- Sept)	Individual Master's Project (60 credits)		

January Entry

Year 1 1st Semester (Jan – May)	Advanced Systems Engineering (c) (ENG7151)	Control Engineering (c) (ENG7148)	Advanced Materials and Manufacture (ENG7152)
Year 1 2nd Semester (June - Sept)	Research Methods (c) (ENG7142)	Advanced Dynamics (c) (ENG7150)	Thermofluids (ENG7149)
Year 2 1st Semester (Sept - Jan)	Individual Master's Project (60 credits)		

Course Module Grid Part-Time Mechanical Engineering

September Entry

Year 1 1st Semester (Sept – Dec)	Control Engineering (c) (ENG7148)	Advanced Systems Engineering (c) (ENG7151)
Year 1 2nd Semester (Jan – May)	Research Methods (c) (ENG7142)	Thermofluids (ENG7149)
Year 2 1st Semester (Sept – Dec)	Advanced Materials and Manufacture (ENG7152)	
Year 2 2nd Semester (Jan – May)	Advanced Dynamics (c) (ENG7150)	Individual Master's Project (60 Credits)
Year 2 3rd Semester (May – Sept)		

January Entry

Year 1 1st Semester (Jan – May)	Thermofluids (ENG7149)	Research Methods (c) (ENG7142)
Year 1 2nd Semester (Sept – Dec)	Advanced Systems Engineering (c) (ENG7151)	Control Engineering (c) (ENG7148)
Year 2 1st Semester (Jan – May)	Advanced Dynamics (c) (ENG7150)	
Year 2 2nd Semester (Sept – Dec)	Advanced Materials and Manufacture (ENG7152)	Individual Master's Project (60 Credits)
Year 3 1st Semester (Jan – May)		

Professional Placement - January Entry (Full Time)

September Entry

Year 1 1st Semester (Sept – Dec)	Advanced Systems Engineering (c) (ENG7151)	Control Engineering (c) (ENG7148)	Advanced Materials and Manufacture (ENG7152)
Year 1 2nd Semester (Jan – May)	Research Methods (c) (ENG7142)	Advanced Dynamics (c) (ENG7150)	Thermofluids (ENG7149)
Year 1 3rd Semester (May- Sept)	Individual Master's Project (60 credits)		

January Entry

Year 1 1st Semester (Jan – May)	Advanced Systems Engineering (c) (ENG7151)	Control Engineering (c) (ENG7148)	Advanced Materials and Manufacture (ENG7152)
Year 1 2nd Semester (June - Sept)	Research Methods (c) (ENG7142)	Advanced Dynamics (c) (ENG7150)	Thermofluids (ENG7149)
Year 2 1st Semester (Sept - Jan)	Individual Master's Project (60 credits)		

Year 1 1st Semester (Jan – May)	Research Methods (c) (ENG7142)	Advanced Dynamics (c) (ENG7150)	Thermofluids (ENG7149)
Year 1 2nd Semester (Sept – Dec)	Advanced Systems Engineering (c) (ENG7151)	Control Engineering (c) (ENG7148)	Advanced Materials and Manufacture (ENG7152)
Year 2 1st Semester (Jan – May)	Individual Master's Project (60 credits)		
Year 2 2nd Semester (May – Nov)	Professional Placement (60 credits)		

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 7

Workload

14% time spent in timetabled teaching and learning activity

Activity	Number of Hours
Scheduled Learning	252
Directed Learning	80
Private Study	1468
Total Hours	1800

Balance of Assessment

Assessment Mode	Percentage
Coursework	31%
Exam	64%
In-Person	5%

Appendix 1

Curriculum Mapping

Course Learning Outcomes Vs Specific Modules

Knowledge and Understanding On successful completion of the course you will be able to: **Module Title**	The scientific principles of Mechanical Engineering to an advanced level.	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	Rapid Prototyping and Manufacturing for future research and development
LEVEL 7				
Advanced Systems Engineering	✓	✓		
Control Engineering	✓	✓		
Advanced Materials and Manufacture				✓
Research Methods			✓	
Advanced Dynamics	✓			
Thermofluids	✓	✓		
Masters Project		✓		✓

Intellectual skills On successful completion of the course you will be able to: **Module Title**	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					
Advanced Systems Engineering	✓				✓
Control Engineering	✓	✓			
Advanced Materials and Manufacture			✓		✓
Research Methods				✓	
Advanced Dynamics		✓			
Thermofluids		✓			
Masters Project		✓	✓	✓	

Practical/subject specific skills On successful completion of the course you will be able to: **Module Title**	Use wide knowledge and comprehensive understanding of design processes and methodologies and apply and adapt them in unfamiliar situations and discuss the results in your final major project report.	Generate ground-breaking designs for products, systems, or components	Evaluate the impact of regulatory, commercial and environmental constraints on processes and products
LEVEL 7			
Advanced Systems Engineering	✓		
Control Engineering	✓	✓	
Advanced Materials and Manufacture			✓
Research Methods			✓
Advanced Dynamics	✓		
Thermofluids		✓	
Masters Project	✓		

General Transferable skills On successful completion of the course you will be able to: **Module Title**	Display resourceful solutions to the limitations of current Mechanical Engineering practice at Chartered Engineer Level.	Apply extensive knowledge and understanding of a wide range of engineering materials and components.	Critically identify an engineering problem at the design stage	*Critically apply advanced engineering tools to a variety of situations* and discuss the results in your final major project report.
LEVEL 7				
Advanced Systems Engineering		✓		
Control Engineering		✓		
Advanced Materials and Manufacture		✓	✓	
Research Methods				✓
Advanced Dynamics		✓		
Thermofluids		✓		
Masters Project	✓		✓	