Course Specification

Course Summary Information		
1	**Course Title**	MSc Automotive Engineering
2	**BCU Course Code**	PT1033
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**
	Our MSc Automotive Engineering course will teach you the skills you need to become a highly skilled engineer, capable of undertaking related tasks within and across different organisations. Overall, the course aims to produce skilled engineers capable of undertaking automotive engineering tasks within and across organisations utilising the latest tools and technologies. The course will encourage the application and development of modern engineering solutions to the problems of fuel efficiency and emissions abatement, as well as the improvement of vehicle performance and stability. The course explores the wider context of sustainability and climate change, as well as the specific application of advanced control techniques to solve problems through research led powertrain and vehicle system specific modules. **What's covered in the course?** The Masters in Automotive Engineering course will encourage creative thinking and the development of engineering leadership skills, as well as teaching you how to solve problems through research. You'll engage in independent study, advancing your understanding and developing new skills. The Master's project provides an opportunity for you to apply this learning to the solution of particular industry problems. These have been regularly showcased at industry events hosted by the course team over the last 12 years, and several of these have matured into doctoral projects. The course has previously achieved academic accreditation from the IMechE and IET. This accreditation has been maintained not only in recognition for demonstrating that key principles have been incorporated and integrated into the curriculum design and module development of the course, but also for actively seeking industry and sector wide input in both the design and delivery of these modules. The lecturing staff have an extensive experience in the automotive industry and academia in design, powertrain, control, computer modelling and simulation, business, supply and logistics.

Exciting opportunities include the option of participating in the Formula Student event. Every over 100 universities from all over the world design and build their own race car and compete in a July race event over a weekend at the world-famous Silverstone racetrack.

There is expected to be continuing demand for competent, versatile postgraduates who can design and implement innovative solutions for industry, and therefore this Engineering MSc course gives you an opportunity to pursue a career as a professional automotive engineer, general engineer and more.

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 using the industry standard software and hardware available to us on site.

Course Aims:

The MSc course in Automotive 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 of systems, principles and industrial techniques within the Automotive Industry.
- Versatility and creativity in the application of advanced knowledge and practice.
- Imaginative, systematic and innovative skills to take forward the knowledge base.
- A broader education in Automotive Engineering than achieved at honours degree level.
- An enhanced treatment of business and management that aids progress to a position of responsibility within the Automotive and general automotive engineering industries.
- 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 Automotive Engineering Master of Science Automotive Engineering with Professional Placement	7 7	180 240
7b	**Exit Awards and Credits Awarded**		
	Postgraduate Certificate Automotive Engineering Postgraduate Diploma Automotive Engineering	7 7	60 120

8	Variation from the University Regulations
	This course has approved variations to the University's Academic Regulations. These can be accessed via the student contract page: https://www.bcu.ac.uk/student-info/student-contract

9	Delivery Patterns		
Mode(s) of Study	**Location(s) of Study**	**Duration of Study**	**Code(s)**
Full Time	City Centre	12 months	PT1033
Part Time September	City Centre	24 months	PT1034
Part Time January	City Centre	28 months	PT1039
Full Time with Professional Placement	City Centre (and placement provider)	18 months	PT1332

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 this MSc course, you should have gained:

1. 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 Automotive Engineering.
2. 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 Automotive Engineering.

3. 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.
4. 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.
5. 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.
6. 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.
7. The qualities and transferable skills necessary for employment with the engineering profession requiring the ability to:
    - Exercise of initiative and personal responsibility.
    - Make appropriate decisions in complex and unpredictable situations.

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

Knowledge and understanding of:

1. The scientific principles of Automotive Engineering to an advanced level.
2. Mathematical and computer models relevant to the Automotive 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 Automotive Engineering
5. Critically discuss the importance of Automotive 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 Automotive 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 five key principles:

Outcomes/Aims	Pursuing Excellence	Practice Led Knowledge Applied	Interdisciplinary	Employability Driven	Internationalisation
1. Knowledge & Understanding					
The scientific principles of Automotive Engineering to an advanced level.	X	X	X	X	X
Mathematical and computer models relevant to the Automotive 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 Automotive Engineering	X	X	X	☐	☐
Critically discuss the importance of Automotive 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 Automotive 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
ENG7147	Advanced Powertrains and Control	20
ENG7153	Vehicle Control Systems	20
ENG7151	Advanced Systems Engineering	20
ENG7150	Advanced Dynamics	20
ENG7148	Control Engineering	20
ENG7142	Research Methods	20
ENG7200	Individual Master's Project	60

Level 6:
In order to qualify for the award of MSc Automotive 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 MSc Automotive Engineering

Year 1 1st Semester of Study	Advanced Systems Engineering (c) (ENG7151)	Control Engineering (c) (ENG7148)	Advanced Powertrains and Control (ENG7147)
Year 1 2nd Semester of Study	Research Methods (c) (ENG7142)	Advanced Dynamics (c) (ENG7150)	Vehicle Control Systems (ENG7153)
Year 1 3rd Semester of Study	Individual Master's Project (60 credits)		

Course Module Grid Part-Time MSc Automotive 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)	Vehicle Control Systems (ENG7153)
Year 2 1st Semester (Sept – Dec)	Advanced Powertrains and Control (ENG7147)	
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)	Vehicle Control Systems (ENG7153)	Advanced Dynamics (c) (ENG7150)
Year 1 2nd Semester (Sept – Dec)	Advanced Powertrains and Control (ENG7147)	Control Engineering (c) (ENG7148)
Year 2 1st Semester (Jan – May)	Research Methods (c) (ENG7142)	
Year 2 2nd Semester (Sept – Dec)	Advanced Systems Engineering (c) (ENG7151)	Individual Master's Project (60 Credits)
Year 3 1st Semester (Jan – May)		

Course Module Grid Part-Time MSc Automotive Engineering with Professional Placement

Professional Placement - (full time)

Year 1 1st Semester of Study	Advanced Systems Engineering (c) (ENG7151)	Control Engineering (c) (ENG7148)	Advanced Powertrains and Control (ENG7147)
Year 1 2nd Semester of Study	Research Methods (c) (ENG7142)	Advanced Dynamics (c) (ENG7150)	Vehicle Control Systems (ENG7153)
Year 1 3rd Semester of Study	Individual Master's Project (60 credits)		
Year 2 1st Semester of study	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	12
Private Study	1536
Total Hours	1800

Balance of Assessment

Assessment Mode	Percentage
Coursework	48%
Exam	42%
In-Person	10%

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 Automotive Engineering to an advanced level.	Mathematical and computer models relevant to the Automotive 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 Powertrain and Control	✓	✓		
Research Methods			✓	
Advanced Dynamics	✓			
Vehicle Control Systems	✓	✓		
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 Automotive Engineering	Critically discuss the importance of Automotive Engineering on a global scale
LEVEL 7					
Advanced Systems Engineering	✓				✓
Control Engineering	✓	✓			
Advanced Powertrain and Control	✓	✓			
Research Methods				✓	
Advanced Dynamics		✓			
Vehicle Control Systems	✓	✓			
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 Powertrain and Control	✓	✓	
Research Methods			✓
Advanced Dynamics	✓		
Vehicle Control Systems	✓	✓	
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 Automotive 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 Powertrain and Control		✓	✓	
Research Methods				✓
Advanced Dynamics		✓		
Vehicle Control Systems		✓	✓	
Masters Project	✓		✓	