

PROGRAMME SPECIFICATION

for the award of

MSc Automotive Engineering with Electric Vehicles

Managed by the Faculty of Technology, Design and Environment

delivered by School of Engineering, Computing and Mathematics

Date approved:	January 2014
Applies to students commencing study in:	September 2021

RECORD OF UPDATES

Date amended*	Nature of amendment**	Reason for amendment**
04/11/2019	Removal of acceptable module	To streamline programme and to enhance programme identity
05/02/2018	Modification of programme title	To reflect the newly introduced content related to electric vehicles
05/02/2018	Reduction of number of optional modules	To enhance the identity of the programme
05/02/2018	Introduction of an optional module related to electric vehicles	To introduce recent developments in the field
05/02/2018	Introduction of independent study module	To provide flexibility required in case an optional module is failed
05/02/2018	Revision of award achievement for PGDip and PGCert	Simplification
17/12/2020	Change of Module Name for ENGR7004 to 'Impact Modelling'.	To better reflect the module content.

SECTION 1: GENERAL INFORMATION

Awarding body:	Oxford Brookes University
Teaching institution and location:	Oxford Brookes University Wheatley Campus, Wheatley, Oxon, OX33 1HX
Language of study:	English
Final award/s:	MSc (180 CATS credits)
Programme title:	Automotive Engineering with Electric Vehicles
Interim exit awards and award titles available:	PG Diploma Automotive Engineering (PGDip) (Exit award only) (120 CATS credits) PG Certificate Automotive Engineering (PGCert) (Exit award only) (60 CATS credits)
Brookes course code:	MSC-EV / TE64
UCAS code:	P045439
JACS code:	H330
HECoS code:	100201
Mode of delivery: (Mode of Study given in brackets)	Face to face/on-campus (full-time) Face to face/on-campus (part-time)
Duration of study:	Give normal expected, and maximum possible, duration for each mode of study*. Full-time: one, five Part-time: two, five
Subject benchmark statement/s which apply to the programme:	UKSPEC
Professional accreditation attached to the programme:	IMechE https://www.imeche.org/ IET http://www.theiet.org/ Full academic requirements for CEng status
Apprenticeship Standard:	NA
University Regulations:	The programme conforms to the University Regulations for the year of entry as published/archived at: http://www.brookes.ac.uk/regulations/

SECTION 2: WHY STUDY THIS PROGRAMME?

The Automotive design industry is undergoing a very swift and radical change and this course educates engineers capable of dealing with this complex and fast development. Our applied approach to design, manufacture and testing of automotive products ensures that our graduates are industry-ready, with excellent employability prospects. In addition, our location is in the heart of one of Europe's biggest concentrations of high-tech businesses and the UK motorsport valley. This offers unrivalled opportunities for students to collaborate with industry and keep abreast with the current developments in automotive technologies, production methods, processes and management techniques. Our teaching is centred around our state-of-the-art laboratories in a purpose-designed engineering building.

- Students are taught by [staff](#) with exceptional knowledge and expertise in their fields, in a purpose-designed engineering building. Lecturers include world-leaders in research on sustainable vehicle engineering and those with experience of designing and working with major automotive manufacturers such as TATA, MAN and BMW. Our visiting speakers from business and industry provide professional perspective, preparing our students for an exciting career; including our acclaimed Industrial lecture series schedule, featuring prominent speakers including alumni from automotive industry and their supply chain.
- We have close links with industry including the BMW MINI plant in Oxford, Porsche, Ford, MAN, MIRA and other national and international partners. Our research incorporates the latest developments within the sector with high profile visiting speakers contributing to our Invited research lectures.
- Well-funded research programmes deliver research Dissertations and consultancies with the areas of current concern such as vehicle end-of-life issues, modern composite materials, in-cylinder combustion modelling and electric vehicles using our state-of-the-art facilities including a four-post test rig and engine test cells, available for both teaching and research based on our strong ethos of shared resources. In the most recent REF, 57% of the School's research was judged to be of world leading quality or internationally excellent with 96% being internationally recognised.
- Regular visits to automotive industry and their supply chain provide students with opportunities to explore technical challenges and the latest technology.
- Students have the opportunity to join our international Formula Student team (OBR), mentored by our alumni and visiting lecturers from automotive and motorsport industry. They put theory into practice by competing with the best universities from around the world. Find out more about Formula Student at Brookes by visiting the [Oxford Brookes Racing website](#)

SECTION 3: PROGRAMME LEARNING OUTCOMES

On successful completion of the programme, graduates will demonstrate the following Brookes Attributes:

3.1 ACADEMIC LITERACY

- a) Ability to apply modern computing techniques, using innovative and creative approaches, to a wide range of complex Automotive Engineering problems.
- b) Ability to integrate and apply advanced levels of knowledge, in a logical and practical manner, as appropriate, in the solution of interdisciplinary engineering problems.

3.2 RESEARCH LITERACY

- a) Ability to critically evaluate the research of others and generate new contributions to professional knowledge consistent with being an expert in the field.
- b) Ability to keep abreast with new and emerging technologies within their subject area by studying as independent learners.

3.3 CRITICAL SELF-AWARENESS AND PERSONAL LITERACY

- a) Ability to critically assess the work of oneself and others in the autonomous synthesis of solutions to complex Automotive Engineering problems.
- b) Ability to articulate and explain complex Automotive Engineering problems in written and oral presentational forms with clarity, brevity and logic.
- c) Ability to function collaboratively, with good interpersonal skills, in diverse teams successfully solving engineering problems.
- d) Ability to deal with complex issues both systematically and creatively, make sound judgements in the absence of complete data, and communicate their conclusions clearly to specialist and non-specialist audiences.
- e) Ability to self-manage and self-organise both at a personal level and as a Dissertation manager.

3.4 DIGITAL AND INFORMATION LITERACY

- a) Ability to utilise a broad range of appropriate information technology skills and their application within a technical or commercial environment.
- b) Ability to organise and analyse information, and to present it in a clear, logical and concise manner.

3.5 ACTIVE CITIZENSHIP

- a) Ability to work effectively and responsibly in business and management context.
- b) Ability to act professionally, in accordance with IMechE/IET graduate membership guidance, and so be recognised internationally as able to operate at a high level of responsibility consistent with Chartered Engineer status.

SECTION 4: CURRICULUM CONTENT & STRUCTURE

4.1 PROGRAMME STRUCTURE AND REQUIREMENTS:

Code	Module Title	Credits	Level	Status	Coursework: Exam ratio
ENGR7003	Noise, Vibration and Harshness (NVH)	20	7	C	50:50
ENGR7005	Advanced Powertrain Engineering	20	7	C	50:50
ENGR7009	Engineering Business Management	20	7	C	100:0
ENGR7015	Advanced Vehicle Dynamics	20	7	C	100:0
ENGR7025	Electric Vehicles	20	7	C	100:0
ENGR7019	Dissertation	60	7	C	100:0
ENGR7004	Impact Modelling	20	7	C	50:50
ENGR7026	Independent Study	20	7	A	100:0

4.2 PROGRESSION AND AWARD REQUIREMENTS

For the award of MSc Automotive Engineering with Electric Vehicles, a total of 180 Credits must be passed from the above list.

Provided that the required number of credits has been passed in an admissible collection of modules, then the MSc award classification shall be a 'Pass' if the average is over 50%. This shall be superseded by a 'Merit', if the average is over 60% and the Dissertation mark is over 58% and this shall be superseded by a 'Distinction', if the average marks gained are over 70% and the Dissertation mark is over 68%.

For the award of Postgraduate Diploma in Automotive Engineering with Electric Vehicles a total of 120 credits must be passed and these must include ENGR7015 / P04731 and (ENGR7025 / P04720 or ENGR7005/ P04704).

For the award of Postgraduate Certificate in Automotive Engineering with Electric Vehicles a total of 60 credits must be passed and these must include ENGR7015 / P04731.

4.3 PROFESSIONAL REQUIREMENTS

N/A

SECTION 5: TEACHING AND ASSESSMENT

The teaching, learning and assessment of the five graduate attributes are addressed in a distributed way throughout the modules on the programme providing a diet that ensures all the graduate attributes are met. A very important element in the teaching, learning and assessment of the graduate attributes is the Dissertation, which covers all five attributes in a single module. Students experience a variety of teaching and assessment methods on the programme. Some modules feature portfolio, reports, lab reports, compute- based assessments, presentations and case studies. Learning methods include formal lectures but also guided independent learning, use of the computer-based virtual learning environment 'Moodle', independent research, the preparation of computer simulations and analysis, including FEA, Matlab, numerical simulations and laboratory investigations.

In general, the assessment regime selected is appropriate for the material covered resulting in the modules being assessed with a mixture of 50% coursework and 50% exam weighting or by coursework only. Each specific graduate attribute is considered below and the way in which the programme enables students to meet the learning outcomes associated with each graduate attribute is examined. The final Dissertation is assessed nominally as coursework and includes written reports and a progress viva. Students are expected to spend an average of 200 hours for a 20 credit module, typically split as 48 hours of contact with the balance being preparation for assessment as directed and independent study.

Academic Literacy

Learning outcomes relating to modern computing techniques are taught, practised and assessed in modules such as ENGR7004 Impact Modelling, ENGR7003 Noise, Vibration and Harshness (NVH), ENGR7005 Advanced Powertrain and ENGR7015 Advanced Vehicle Dynamics.

Analysis techniques taught in these modules include FEA and languages such as Matlab amongst others. Learning methods include demonstrations, tutorials and guided learning whilst assessments feature reports based on simulations of case studies and the validation of test cases against experimental data and results. The academic literacy learning outcomes relating the application of advanced levels of knowledge to the solution of interdisciplinary problems are taught and learnt through a similar set of modules where the theory behind the computer simulations is also taught. For example, in ENGR7003 Noise, Vibration and Harshness, advanced computer simulations are compared with and validated against theoretical predictions made using software and experimental data. This theme is common to a number of modules and forms an excellent learning platform for the acquisition of academic literacy.

Research Literacy

Although many modules on the programme require students to research and critically evaluate the work of others in the completion of their assessed work, one module in particular addresses this graduate attribute. This is ENGR7019 Dissertation where students are taught to critically evaluate the research of others and to make new contributions to the field. Experiential learning and formative assessment are employed with students undertaking literature reviews, writing critical evaluations and preparing reasoned arguments to complex problems as a preparation for the Dissertation. The Dissertation itself features more research and the synthesis of solutions to complex multidisciplinary engineering problems.

Critical self-awareness and personal literacy

This graduate attribute is addressed in a number of modules. The Dissertation module features critical assessment of one's own work and the work of others. Modules with coursework reports such as ENGR7004 Impact Modelling or ENGR7005 Advanced Powertrain involve the synthesis of solutions to complex problems. The Dissertation requires students to develop the ability to articulate and explain complex problems and students are required to present their work to others as well. Several modules, ENGR7015 Vehicle Dynamics for example, involve students working in groups and students that join the Formula Student team gain a very full learning experience in this area. Formal tuition in the management modules also provides teaching, learning and assessment for the ability to manage oneself in a commercial context.

Digital information literacy

Graduates of the programme necessarily have very well -developed computer based analytical skills because of the large amount of computer software used in the design and analysis of Motorsport artefacts. However, the graduate attribute, 'Digital information literacy' extends beyond this to include the use of computers for more general skills such as presentations, literature reviews, preparation of design reports etc. Several modules, such as ENGR7004 Impact Modelling and ENGR7019, the Dissertation, amongst other, all provide opportunities for students to learn and be assessed on these abilities. The Dissertation in particular requires the presentation of complex engineering issues in a clear and logical manner so that other people new to the subject can quickly understand the analysis presented and its worth.

Active Citizenship

This graduate attribute relates to how well the graduates of the programme are prepared for work in the international and business context. The international makeup of the programmes promote working within groups that are made up of a wide range of nationalities and hence through the management module students will need to consider the views of a more diverse global community to complete assessment tasks. In some considerable measure, the learning outcomes for this graduate attribute are met through the professional accreditation of the programme. The Institution of Mechanical Engineers is recognised worldwide as providing a high quality, regulated framework that ensures new graduates are well rounded and conversant with the influences shaping the current climate for practice. Modules that address these learning outcomes particularly well include ENGR7009 / P04712 Engineering Business Management and ENGR7019 / P04791, the Dissertation.

SECTION 6: ADMISSION TO THE PROGRAMME

Updated December 2017

6.1 ENTRY REQUIREMENTS

Students entering the course will normally be at least 21 years of age and hold one of the following qualifications:

- An Engineering Council-accredited Mechanical, Automotive or Motorsport Engineering Degree with a minimum level of lower second-class Honours.
- An alternative Engineering subject or suitable science degree with a minimum level of upper second-class Honours.
- A qualification equivalent in standard to these qualifications.

In the Mission Statement the University has highlighted the need to widen access to higher education from those traditionally under-represented among students. With respect to this requirement the School provision to enable this strategy is to enable the MSc to be taken in full or part time study mode and to give individual consideration to applicants from industry without the specifically named entry qualifications in above.

Applicants with a proven track record in the Automotive or Motorsport Engineering sector are welcome to apply and start the course or can raise their entry status to an acceptable level by taking appropriate undergraduate modules as associate students.

Where appropriate, suitable English as a Foreign Language qualifications will be required.

6.2 DBS AND OTHER PRE-COURSE CHECKS REQUIRED

N/A

6.3 JOB ROLE/EMPLOYER PROFILE (DEGREE AND HIGHER APPRENTICESHIPS)

N/A

SECTION 7: PREPARATION FOR EMPLOYMENT

Graduate employability of the programme is excellent, with more than 90% of graduates going on to work in relevant industry or taking a higher degree. Students have recently graduated and started work with high-profile companies such as Aston Martin, Lotus, Caterham, Jaguar-Land Rover, McLaren Automotive, BMW and Bentley. In addition, other graduates have joined tier-one suppliers such as Bosch, TRW, and Delphi; others have joined volume manufacturers such as Honda or Nissan. Brookes alumni working for these companies are our best ambassadors - our graduates are very sought after and we now have even international visitors coming to our recruitment fairs. We have long-standing relationships with many automotive manufacturers and vacancies are often filled directly from Brookes without public advertisements ever being made. For many years our students have been recruited as design, data, race or materials engineers, as well as in production control, quality, procurement, testing, aerodynamics, NVH and management roles. The kind of programme that raises students to this level of preparation is demanding and students work long and hard to realise this potential. However, our students are of very high calibre, very motivated and competitive thus our completion rates are very high year on year.

We have very strong employability support with a dedicated Careers adviser not only providing CV workshops and interview training but also supports on campus employment fairs. Brookes is regularly contacted by engineering companies seeking our graduates and our Placements Officer provides a very strong and active link between the employers and students. There is also specialist help for students preparing their CV from their dedicated Academic Adviser.