

PROGRAMME SPECIFICATION

for the award of

MSc Motorsport Engineering

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 2018

RECORD OF UPDATES

Date amended*	Nature of amendment**	Reason for amendment**
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 offer an opportunity to study recent alternative 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

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:	Motorsport Engineering
Interim exit awards and award titles available:	PG Diploma Motorsport Engineering (PGDip) (Exit award only) (120 CATS credits) PG Certificate Motorsport Engineering (PGCert) (Exit award only) (60 CATS credits)
Brookes course code:	EG87
UCAS code:	P032924
JACS code:	H330
HECoS code:	100206
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 MSc in Motorsport Engineering course provides a unique preparation for work in the motorsport industry. Our location in the heart of UK motorsport valley with close proximity of the majority of Formula One teams and their supply chain gives our School unrivalled access to motorsport companies. This informs and directs development and delivery of the programmes, benefiting from contribution by a range of experts with noteworthy track record in the motorsport industry. It also offers students opportunities to undertake industry-based Dissertations, often in conjunction with our high-standing research based around state-of-the-art automotive test equipment in a purpose-designed engineering building. Our students also have an opportunity to implement their theoretical knowledge by joining Oxford Brookes Racing, our acclaimed Formula Student team to gain an understanding of racing culture and an environment where winning race cars are built.

- We are known as a premier institution for Motorsport education - our motorsport legacy is recognised worldwide and many of our graduates progress to work with leading motorsport companies, including all of F1 teams, Formula E and major suppliers to motorsport industry. Visiting speakers from business and industry provide professional perspectives, preparing our students for an exciting career, including our acclaimed Industrial lecture series, featuring prominent speakers including our alumni from Formula One and their supply chain.
- Our research incorporates latest developments within the sector with high profile visiting speakers contributing to our Invited research lectures.
- Our programme has been developed with and delivered in collaboration with the motorsport industry, taught by [staff](#) with exceptional knowledge and expertise in the field of motorsport engineering, including winning F1 race car designers and world-leading sustainable vehicle engineering researchers.
- Our close links with the motorsport industry can be seen through research Dissertations and consultancies that enable us to feed the latest developments into our teaching as well as providing opportunities for students to undertake their Dissertation with international motorsport companies.
- Laboratories include a four-post test rig, four state-of-the-art engine test cells, analytical & mechanical test equipment and the latest 3D printing technology, in addition to a range of racing cars.
- Students have the opportunity to join our international Formula Student team (OBR), mentored by alumni and visiting lecturers from motorsport industry. They put theory into practice by competing with the best universities from around the world. More information about Formula Student at Brookes can be found by visiting the [Oxford Brookes Racing website](#).
- Visits to F1 teams, Formula E teams and major suppliers to the motorsport industry provide students with opportunities to explore technical challenges and the latest technology.
- 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.

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 Motorsport 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 Motorsport Engineering problems.
- b) Ability to articulate and explain complex Motorsport 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 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
P04703	Crash Impact Modelling	20	7	C	50:50
P04705	Advanced Vehicle Aerodynamics	20	7	C	50:50
P04708	Lap time simulation and Race Engineering	20	7	C	100:0
P04712	Engineering Business Management	20	7	C	50:50
P04731	Advanced Vehicle Dynamics	20	7	C	100:0
P04791	Dissertation	60	7	C	100:0
P04719	Data Acquisition Systems and Computational Modelling	20	7	A	100:0
P04720	Electric Vehicles	20	7	A	100:0
P04721	Independent Study	20	7	A	100:0

4.2 PROGRESSION AND AWARD REQUIREMENTS

For the award of MSc Motorsport Engineering a total of 180 Credits must be passed from the above list, including all compulsory modules.

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 Motorsport Engineering a total of any 120 credits must be passed and these must include P04731 and (P04705 or P04708).

For the award of Postgraduate Certificate in Motorsport Engineering a total of 60 credits must be passed and these must include 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. The compulsory modules provide a diet that ensures all the graduate attributes are met but this is further enhanced by the provision of the optional modules. 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. Some modules feature portfolio, reports, lab reports, computer-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, CFD and laboratory investigations.

Academic Literacy

Learning outcomes relating to modern computing techniques are taught, learnt and assessed in module such as P04703 Vehicle Crash Engineering, P04705 Advanced Vehicle Aerodynamics, P04708 Lap-time Simulation and Race Engineering and P04731 Advanced Vehicle Dynamics. Analysis packages taught in these modules include multi-body codes, computation fluid dynamics, plastic FEA for crash simulation,

transient dynamic lap-time simulators and programming 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 knowledge are taught and learnt through a similar set of modules where the theory behind the computer simulations is also taught. For example, in P04731 Advanced Vehicle Design, advanced computer simulations for vehicle performance are prepared which are compared with and validated against theoretical predictions made using programming languages such as Matlab to prepare analytical solutions to equations of motion for whole vehicles. 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 P04791, the 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 P04703 Vehicle Crash Engineering or P04705 Advanced Vehicle Aerodynamics 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, P04731 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 Data Acquisition Systems and Computational Modelling, P04703 Vehicle Crash Engineering and P04791, 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 P04712 Engineering Business Management and P04791, the dissertation.

In general, the assessment regime selected is appropriate for the material covered resulting in typically half of the modules being assessed with a mixture of 50% coursework and 50% exam weighting, whilst the other half is assessed 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 36 hours of contact with the balance being preparation for assessment as directed and independent study.

SECTION 6: ADMISSION TO THE PROGRAMME

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 Motorsport or Automotive 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. Brookes alumni are working for all of Formula One teams, from Mercedes to Scuderia Ferrari and their supply chain, as well as other high-profile racing teams and associated consultancies. They are our best ambassadors - our graduates are very sought after and Formula One teams regularly recruit on campus. We have longstanding relationships with many high-end racing teams and motorsport manufacturing companies 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 engineers, race or materials engineers, as well as in production control, quality, procurement, testing, aerodynamics 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 a very strong employability support with 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.