

**PROGRAMME SPECIFICATION**

for the award of

**MSc Mechanical Engineering**

Managed by the Faculty of Technology, Design and Environment

delivered by School of Engineering, Computing and Mathematics

<b>Date approved:</b>	January 2014
<b>Applies to students commencing study in:</b>	September 2022

**RECORD OF UPDATES**

<b>Date amended*</b>	<b>Nature of amendment**</b>	<b>Reason for amendment**</b>
17/12/2020	Addition of ENGR7004 as compulsory and removal of ENGR7023.	To strengthen Engineering simulation content on the programme.
04/11/2019	Removal of acceptable modules	To maintain programme identity
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 robotics	To give additional specialism to the offering
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
01/12/18	Swap of core and optional module	Rationalisation

## SECTION 1: GENERAL INFORMATION

<b>Awarding body:</b>	Oxford Brookes University
<b>Teaching institution and location:</b>	Oxford Brookes University Wheatley Campus, Wheatley, Oxon, OX33 1HX
<b>Language of study:</b>	English
<b>Final award/s:</b>	MSc (180 CATS credits)
<b>Programme title:</b>	Mechanical Engineering
<b>Interim exit awards and award titles available:</b>	PG Diploma Mechanical Engineering (PGDip) (Exit award only) (120 CATS credits)  PG Certificate Mechanical Engineering (PGCert) (Exit award only) (60 CATS credits)
<b>Brookes course code:</b>	TE57/MSC-MH
<b>UCAS code:</b>	P032923
<b>JACS code:</b>	H330
<b>HECoS code:</b>	100190
<b>Mode of delivery:</b> (Mode of Study given in brackets)	Face to face/on-campus (full-time) Face to face/on-campus (part-time)
<b>Duration of study:</b>	Give normal expected, and maximum possible, duration for each mode of study*. Full-time: one, five Part-time: two, five
<b>Subject benchmark statement/s which apply to the programme:</b>	UKSPEC
<b>Professional accreditation attached to the programme:</b>	IMechE <a href="https://www.imeche.org/">https://www.imeche.org/</a> IET <a href="http://www.theiet.org/">http://www.theiet.org/</a> Full academic requirements for CEng status
<b>Apprenticeship Standard:</b>	NA
<b>University Regulations:</b>	The programme conforms to the University Regulations for the year of entry as published/archived at: <a href="http://www.brookes.ac.uk/regulations/">http://www.brookes.ac.uk/regulations/</a>

## **SECTION 2: WHY STUDY THIS PROGRAMME?**

Superb industrial links and world-class research come together to make Oxford Brookes one of the best places in the UK to study Mechanical Engineering at postgraduate level. Being in the heart of one of Europe's highest concentration of high-tech businesses provides opportunities for industry-focused studies. Students take charge of their career by building on their undergraduate Mechanical degree and developing their professional skills. It introduces them to research, development and practice in advanced mechanical engineering design and equips them for professional practice at senior positions of responsibility. They gain the skills to take complex products all the way from idea to fully validated designs. Using industry level advanced CAD packages, they learn the techniques required to analyse and test their mechanical designs, followed by full design implementation. Our teaching is centred around our state-of-the-art mechanical engineering laboratories in a purpose-designed mechanical engineering building.

- Our students are taught by [staff](#) with exceptional knowledge and expertise in their fields, including world-leaders in research on sustainable engineering, materials and joining technology and design engineers leading development of novel products such as the carbon and bamboo bikes that make use of novel manufacturing methods.
- Our research Dissertations and consultancies are undertaken with partners such as Siemens, YASA Motors, Stannah Stairlifts and 3M, using our facilities including analytical and mechanical test equipment, scanning electron microscope and the latest 3D printing technology. Well-funded research programmes within the School address areas of current concern such as modern composite materials, vehicle end-of-life issues and electric vehicles.
- Visits to a range of industries provide students with opportunities to explore real world technical challenges and the latest technology developments.
- Students have the opportunity to join our acclaimed Formula Student team (OBR), where they are able to 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](#).
- Our research incorporates the latest developments within the sector with high profile visiting speakers contributing to our invited research lectures. 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 Mechanical 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 Mechanical Engineering problems.
- b) Ability to articulate and explain complex Mechanical 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	Status	Coursework: Exam ratio
ENGR7009	Engineering Business Management	20	C	100:0
ENGR7010	Engineering Reliability and Risk Management	20	C	70:30
ENGR7012	Advanced Strength of Components	20	C	50:50
ENGR7013	Advanced Mechanical Design	20	C	100:0
ENGR7019	MSc Dissertation	60	C	100:0
ENGR7003	Noise, Vibration and Harshness	20	C	50:50
ENGR7004	Impact Modelling	20	C	50 :50
ENGR7026	Independent Study	20	A	100:0

### 4.2 PROGRESSION AND AWARD REQUIREMENTS

For the award of MSc Mechanical Engineering 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 Mechanical Engineering a total of 120 credits must be passed and these must include P04716/ENGR7013.

For the award of Postgraduate Certificate in Mechanical Engineering a total of any 60 credits must be passed and these must include P04716/ENGR7013.

### 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. 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 Finite Element Analysis (FEA), Matlab and Computational Fluid Dynamics (CFD), laboratory investigations and more.

In general, the assessment regime selected is appropriate for the material covered resulting in an assessment mixture of 50% coursework and 50% exam and 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 P04702/ENGR7003 Noise Vibration and Harshness, P04715/ENGR7012 Advanced

Materials and Strength of Components, ENGR7004 Impact Modelling and P04716/ENGR7013 Advanced Mechanical Design

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 P04703/ 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 P04791/ENGR7019, the Dissertation where students are developing research and study methods and are taught how 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 P04716/ENGR7013 Advanced Mechanical Design I involve 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, P04712/ENGR7009 Engineering Business Management for example, involve students working in groups, gaining 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 with requirement for the students to reflect on learning and future personal development at points within the academic year.

### **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 engineering 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 and preparation of design reports. Modules such as P04702/ENGR7003 Noise, Vibration and Harshness and P04791/ENGR7019 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 modules such as management, 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 and IET are 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/ENGR7009 Engineering Business Management and P04791/ENGR7019 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 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 Mechanical 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 EDF energy, Caterpillar, WIPAC, YASA motors, Barrus and Cummins.

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 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 engineers as well as materials, production control, quality, procurement and testing engineers as well as in 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 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.