DEPARTMENT OF MECHANICAL ENGINEERING & MATHEMATICAL SCIENCES
Contents

3 Welcome from the Head of Department
4 Why choose Oxford Brookes?
5 Industry standard teaching and research facilities

6 Mathematics MMath
8 Mathematics BSc (Hons)
10 Mathematical Sciences BSc (Hons)
12 Engineering Foundation
14 Automotive Engineering BEng/MEng
16 Mechanical Engineering BEng/MEng
18 Mechanical Engineering BSc (Hons)
20 Motorsport Engineering BEng/MEng
22 Motorsport Technology BSc (Hons)
24 Graduate profile and student live projects

26 Work placements
27 The placement year in industry
28 Oxford Brookes Racing and Formula Student
30 Research and industry collaboration
Welcome from the Head of Department

Mechanical Engineering and Mathematical Sciences at Brookes

We are situated on the Wheatley campus in a purpose-built £9m facility, equipped to the highest standards. This creates an environment in which technical expertise is enhanced by creativity and imagination. We have a friendly, close-knit community, with around 700 students supported by experienced and well qualified academic and technical staff. Our staff also spend a significant proportion of their time working with outside organisations, many of which are global, as practitioners in their discipline. We also have excellent student support staff.

On our programmes you will develop practical skills, giving you an advantage in securing your desired career path. For example, in addition to essential theory and techniques in mathematics and statistics, we teach modern and interesting applications in specific subject areas. This enables our students to see the relevance and importance of the material in their degree programmes. You will be equipped to identify and implement solutions to real-world problems in a professional manner. We support student activity such as the Formula Student Team: students design, build and then race their car at Silverstone.

All of our courses equip you with specialist knowledge and skills in the latest technology and specialist software packages. This is recognised by many employers, especially in Formula 1, who recruit a significant number of our graduates. Many of our students also receive sponsorship. We are also working in close partnership with a range of colleges in the region to support foundation degrees.

In our teaching, research and knowledge transfer we strive to help students, staff and our partners reach their full potential.

Professor Gareth Neighbour
Head of the Department of Mechanical Engineering and Mathematical Sciences
Oxford Brookes University has a long history of providing high quality, accredited courses and is noted for running mathematics courses for over forty years and motorsport courses for over twenty years. Whether your passion is road cars, race cars, great engineering design, probabilistic concepts or algorithms, one of our courses in engineering and mathematics will help you realise your ambitions. Our graduates enjoy excellent employment opportunities. Many go on to pursue successful careers in leading areas of business and commerce, with engineering and technology organisations and major automotive and motorsport companies including Formula 1 teams and suppliers. If you want to work at the forefront of your industry you need to invest in the skills and knowledge that only the best undergraduate study can provide.

In the area of motorsport we have lecturers who have designed and worked on winning Formula 1 race cars. We were chosen by Fernando Alonso and the Cajastur bank to host their motorsport MSc scholarships, which have been running since 2007 for Spanish students.

We have a purpose-built teaching and research facility with the very best equipment, including a four-post test rig and state-of-the-art engine test cells. Our dedicated computer suites provide access to the latest industry standard design software.

Our links with industry go back over twenty years and remain central to our activities. Courses are developed in conjunction with industry and are designed to ensure that students graduate with the skills and knowledge they need to excel in their chosen careers.

Our reputation for providing excellent student experience is reflected in our recent National Student Survey (NSS) scores in areas such as teaching and assessment. We are always striving to improve facilities: a recent addition is the new Mathematics lab, which was an instant hit with students.

Research in mathematical sciences also supports our ethos of providing real world solutions such as applications in medical tomography or flow networks for optimising production systems, transportation, communications and energy supply.

Oxfordshire is home to many high technology companies with Harwell Oxford nearby, a home for world leading science, technology and business. Oxford is right in the heart of the UK’s motorsport industry, often called ‘Motorsport Valley’. In total, the area has over 4,000 high-performance engineering businesses which make us one of the best locations to pursue your passion for engineering, technology and mathematical sciences.
INDUSTRY STANDARD TEACHING AND RESEARCH FACILITIES

We have excellent experimental and computational facilities to conduct advanced research supporting our teaching. Our students have access to laboratories for their coursework and projects, which include the following areas:

**Mathematics lab**

The lab is the focal point of mathematical activity in the department, containing specialist equipment for mathematics. Students use the space for group study, teaching and careers sessions. The maths arcade run weekly drop-in sessions and the lab is the home of the Mathematical Modelling team. Mathematics students enjoy discussing problems together in a space where they can learn from mistakes that they make together.

**Engines**

Advanced research and teaching is carried out on emissions, alternative fuels and engine component development for efficiency and durability. Academics and students are designing and developing engines to be the backbone of our Formula Student activities for years to come. We have four engine test cells with state-of-the-art instrumentation used in the development of engines. The facilities are comparable to those available at major vehicle manufacturers.

**Automotive**

These are dedicated areas for Formula Student and the four-post rig for analysing the vehicle dynamics. We have a number of vehicles (for example BAR Formula 1 race car, Formula Renault, BMW MINI and 1 Series) used both for research and teaching. In addition, we are working on a multi-disciplinary project looking at developing an autonomous vehicle. This project draws on expertise from across the faculty but in particular in the area of computer vision. There are very few universities in the world which have this line up.

**Dynamics**

A dedicated area for dynamic characterisation of vibrating structures and noise reduction. The facilities are used for teaching engineering dynamics and postgraduate research. There are several pieces of high-performance equipment which include uniaxial and triaxial accelerometers, source control, spectral acquisition analysis, a series of small shakers, two large shakers, structural excitation and a damper dynamometer.

**Fluids**

The equipment located in this area enables students to gain deeper understanding of internal and external flows through the use of equipment such as the small-scale wind tunnel, centrifugal pump performance test rig, 2 x flow benches, laminar and turbulent flow rig and forced convection equipment.

**Mechanical testing & stress**

This area houses multi-functional equipment used in teaching, research, contract testing and consultancy. We have experimental facilities to conduct fatigue and impact tests and an in-house heat treatment facility.

**Joining technology**

For over forty years, Oxford Brookes has been involved in the research and development of various joining technologies. More recently, with the increasing demand for lighter and more efficient structures, we have been engaged with the science and engineering of adhesives, sealants and bonding technology. Specialist equipment includes Fourier Transform Infrared Spectroscopy (FTIR), Scanning Electron Microscopy (SEM), Differential Mechanical Thermal Analysis (DMTA), Video Contact Analysis (VCA), mechanical test machines, video imaging non-contacting extensometry and environmental cabinets.

The department employs a range of advanced engineering software for undergraduates to use, including:

- A collection of industry level CAD packages.
- Stress and dynamics analysis packages
- Computational Fluid Dynamics and Engine simulation software.
- Specialised vehicle performance simulation software.
- Students have the chance to develop the skills needed to apply these packages creatively to produce designs customers want.
This programme will develop teamwork and leadership skills, and will extend the BSc Mathematics course for students wanting to undertake further study, or to pursue a career involving a higher level of mathematics.

During year 1 you will develop essential knowledge and skills in mathematics and statistics, and will immediately learn to apply those ideas in a modelling context.

In year 2, you will extend these techniques further, and will select from a range of mathematics and statistics modules to suit your interests. You will explore a variety of problems from industry in the second year modelling module, and will encounter further applications in supplementary modules.

An optional placement year is available for those who wish to consolidate their mathematics in an industrial or commercial setting, and students also have the opportunity to undertake study abroad.

Year 3 focuses on the transferrable skills of teamwork and communication, developing and refining key techniques of modelling and pure and applied mathematics in preparation for the fourth year project.

Year 4 allows a choice of modules so that students can focus on the areas which are of most interest to them.

Study modules

As courses are reviewed regularly, the module list you choose from may vary from that shown here. Some modules will be compulsory.

**Year 1**
- Algebra and Calculus (double)
- Mathematical Skills and Modelling (double)
- Probability Theory
- Statistical Inference
- Introductory Mathematics
- Discrete Mathematics
- Basic Survey Methods

Students can also choose from a wide variety of modules from around the University.

**Year 2**
- Linear Algebra and Analysis (double)
- Mathematical Models (double)
- Quantitative Research Methods
- Further Discrete Mathematics
- Numerical Analysis I
- Applied Abstract Algebra
- Graph Theory
- Time Series Analysis
- Complex Analysis
- Mathematical Statistics
- Simulation and Modelling

**Year 3**
- Ordinary and Partial Differential Equations
- Honours Topics in Mathematics
- Numerical Analysis II
- Topology
- Group Project in Mathematics
- Geometry
- Regression Models

**Year 4 (MMath)**
- MMath Project
- Functional Analysis
- Inverse Problems
- Computation and Modelling
- Numerical Solution of Differential Equations
- Stochastic Processes
- Reliability and Risk Management
- Categorical Data Analysis
- Advanced Statistical Modelling with SAS
Work placements

It is possible to study the MMath in Mathematics as a five year sandwich course, the third year being spent in supervised work experience.

Our work placement programme has been commended by professional bodies as a model of excellence.

A placement year enables you to work in industry or commerce for one year between the second and third years of your course. Students taking this option recognise the benefits of obtaining professional experience, consolidating their understanding of mathematics, and having the opportunity to apply their knowledge in a professional setting.

After graduation

Recent research has shown that graduates in mathematical disciplines enjoy one of the highest earning potentials of all graduates. Employers recognise that mathematical knowledge and skills are essential to the solution of many current problems, not only in science and technology but also in business and commerce.

Typical offers

**A-level:** grades ABB or equivalent

**IB Diploma:** 32 points, to include at least a 5 in Higher Level Mathematics

**BTEC National Diploma:** two distinctions and one merit PLUS grade A minimum in A-level Mathematics.

Specific entry requirements

**A-level:** grade A minimum in Mathematics

**GCSE:** grade C minimum in English Language

English requirements

**IELTS 6.0** (with 6.0 in reading and writing, 5.5 in listening and speaking)

English requirements for visas

If you need a student visa to enter the UK you will need to meet the UK Border Agency’s minimum language requirements as well as the university’s requirements.

This course places particular emphasis on mathematical modelling and the use of mathematics in modern application areas, ensuring that our graduates will have the knowledge and skills that are most valued by employers.

As well as using their knowledge directly in scientific research and teaching, graduates in Mathematics go on to develop careers in accountancy, computing, actuarial, market research or management work where they can use their numeracy and skills such as problem-solving and statistical modelling.

Graduates in Mathematics are particularly well equipped for a career in information technology and related areas. For example, demand is strong for graduates capable of developing error-free software that is mathematically based and also for those who can exploit sophisticated software and technology effectively.
Studying Mathematics at Brookes, you will focus on the subject’s modern applications. Mathematics is an elegant and exciting subject encompassing theory and techniques which underpin science and technology.

During Year 1 you will develop essential knowledge and skills in pure mathematics, mathematical methods and mathematical modelling (and statistics in the single honours course). In Year 2 and the final year on the single honours course, you will spend most of your time on mathematics but you will also have the opportunity to study some statistics. On the combined honours course, modules in mathematics are complemented by those in your other field of study. Throughout the course we will encourage you to acquire and develop your computing abilities through the extensive use of up-to-date mathematical (and, for single honours, statistical) software.

**Study modules**

As courses are reviewed regularly the module list you choose from may vary from that shown here. Some modules will be compulsory.

**Year 1**
- Algebra and Calculus (double)
- Mathematical Skills and Modelling (double)
- Probability Theory
- Statistical Inference
- Introductory Mathematics
- Discrete Mathematics
- Basic Data Analysis
- Basic Survey Methods

If you are studying single honours you will also be able to choose from:
- Statistical Inference
- Basic Survey Methods

**Year 2**
- Linear Algebra and Analysis (double)
- Mathematical Models (double)
- Quantitative Research Methods (single honours only)
- Further Discrete Mathematics
- Numerical Analysis I
- Applied Abstract Algebra
- Graph Theory
- Time Series Analysis (single honours only)
- Complex Analysis
- Mathematical Statistics (single honours only)
- Simulation and Modelling
- Mathematics for Decision Making

**Year 3**
- Ordinary and Partial Differential Equations
- Honours Topics in Mathematics
- Numerical Analysis II
- Topology
- Geometry
- Regression Models (single honours only)
- Medical Statistics (single honours only)
- Final Year Project

If you are studying combined honours you will also be able to choose from:
- Honours Topics in Mathematics
- Mathematics Interdisciplinary Project

If you are studying single honours you will also be able to choose from:
- Quantitative Research Methods
- Honours Topics in Mathematics (double)
- Time Series Analysis
- Sampling and Surveys
- Communicating Statistics
- Linear Regression Models
- Honours Topics In Statistics
- Medical Statistics
Work placements

It is possible to study Mathematics as a four-year sandwich course, the third year being spent in supervised work experience.

Our work placement programme has been commended by professional bodies as a model of excellence.

A placement year enables you to work in industry or commerce for one year between the second and final years of your course. Students taking this option recognise the benefits of obtaining professional experience, consolidating their understanding of mathematics, and having the opportunity to apply their knowledge in a professional setting.

After graduation

Recent research has shown that graduates in mathematical disciplines enjoy one of the highest earning potentials of all graduates. Employers recognise that mathematical knowledge and skills are essential to the solution of many current problems, not only in science and technology but also in business and commerce.

As well as using their knowledge directly in scientific research and teaching, graduates in Mathematics go on to develop careers in accountancy, computing, actuarial, market research or management work where they can use their skills in problem-solving and mathematical modelling. Many of our graduates also progress to postgraduate study, both MSc and PhD.

Graduates in Mathematics are particularly well equipped for a career in information technology and related areas. For example, there is a strong demand for graduates capable of developing error-free software that is mathematically based and also for those who can exploit sophisticated mathematical software and technology effectively.

As mathematics is a National Curriculum subject, a combined or single honours mathematics degree will equip you to proceed directly to a teaching qualification. There is high demand for mathematics graduates in the teaching profession.

Typical offers

A-level: grades ABC or equivalent

IB Diploma: 30 points, to include at least a 5 in Higher Level Mathematics

BTEC National Diploma: one distinction and two merits PLUS grade A minimum in A-level Mathematics. For combined honours, normally the offer will lie between the offer quoted for each subject.

Specific entry requirements

A-level: grade A minimum in Mathematics

GCSE: grade C minimum in English Language

English language requirements

IELTS 6.0 (with 6.0 in reading and writing, 5.5 in listening and speaking)

English requirements for visas

If you need a student visa to enter the UK you will need to meet the UK Border Agency’s minimum language requirements as well as the university’s requirements.
MATHEMATICAL SCIENCES BSc (Hons)

Accredited by the Institute of Mathematics and its Applications (IMA)

This course will develop your logical, analytical and problem-solving abilities. It focuses on increasing your awareness of the use of the mathematical sciences as problem-solving tools in a wide range of applied areas.

During Year 1 you will build essential knowledge and skills in pure mathematics, mathematical methods, mathematical modelling and statistics. Your computing abilities will develop through a specialist module in mathematical software and the integrated use of up-to-date computer packages throughout the course.

In Year 2 and the final year, you will have the opportunity to shape your course of study as your knowledge and interests develop. You may choose to specialise in mathematics or statistics, or follow a broader programme in mathematical sciences. Your choice will be guided by tutors and by literature showing recommended pathways.

In the final year, you can choose from specialised modules, covering topics such as coding and cryptography, medical statistics and geometry. You will also have the opportunity to work on an individual project, or to take a specialist module from a range of topics. These are particularly valuable as they further develop your analytical and problem-solving skills, and provide experience in the use of a range of communication skills.

Study modules

As courses are reviewed regularly the module list you choose from may vary from that shown here. Some modules will be compulsory.

**Year 1**
- Algebra and Calculus (double)
- Mathematical Skills and Modelling (double)
- Probability Theory
- Statistical Inference
- Introductory Mathematics
- Discrete Mathematics
- Basic Data Analysis
- Basic Survey Methods

**Year 2**
- Linear Algebra and Analysis (double)
- Mathematical Models (double)
- Quantitative Research Methods (single honours only)
- Further Discrete Mathematics
- Numerical Analysis I
- Applied Abstract Algebra
- Graph Theory
- Time Series Analysis (single honours only)
- Complex Analysis
- Mathematical Statistics (single honours only)
- Simulation and Modelling
- Mathematics for Decision Making

**Year 3**
- Ordinary and Partial Differential Equations
- Honours Topics in Mathematics
- Numerical Analysis II
- Topology
- Geometry
- Regression Models (single honours only)
- Medical Statistics (single honours only)
- Final Year Project
Typical offers

**A-level:** grades BBC or equivalent
**IB Diploma:** 31 points, to include at least 6 in Standard Mathematics
**BTEC National Diploma:** one distinction and two merits, PLUS grade B minimum in A-level Mathematics

Specific entry requirements

**A-level:** grade B minimum in Mathematics
**GCSE:** grade C minimum in English Language

English language requirements

IELTS 6.0 (with 6.0 in reading and writing, 5.5 in listening and speaking)

English requirements for visas

If you need a student visa to enter the UK you will need to meet the UK Border Agency’s minimum language requirements as well as the university’s requirements.

After graduation

Recent research has shown that graduates in mathematical disciplines enjoy one of the highest earning potentials of all graduates. Employers recognise that mathematical knowledge and skills are essential to the solution of many problems in science, technology, business and commerce.

Graduates in Mathematical Sciences may use their subject knowledge directly in scientific research and teaching, or develop careers in accountancy, computing, actuarial, market research or management work where they can use their skills in problem-solving and mathematical modelling. Many of our graduates also progress to postgraduate study, both MSc and PhD.
This is a one-year course for students who want to take a degree or higher diploma in engineering, science or technology but do not hold A-levels (or the equivalent) in mathematics and a science, or have not achieved the necessary standards.

You will have access to state-of-the-art workshops, laboratories and computers, and you will study in an environment which combines technical expertise with creativity and imagination. This one-year course is designed to improve your skills in physical science and engineering and, if you complete it successfully, you can progress onto a BSc, BEng or MEng degree course at Oxford Brookes.

The foundation course covers core subjects in electronic and mechanical engineering principles, and also helps to develop your mathematical skills. In addition, modules are available in media technology and computing. The material is of A-level standard and provides opportunities to improve your technological knowledge before entering industry. The material also provides solid preparation for higher degrees in technological subjects such as mechanical and automotive engineering.

We will introduce you to the mathematical and scientific principles underpinning first-year undergraduate studies in engineering and technology.

Semester 1 covers basic principles in post-GCSE mathematics and engineering. In Semester 2 you will develop understanding of more advanced mathematics, mechanical and electrical engineering principles. You will also take two modules in engineering applications. In addition, you will develop an appreciation of the role of new technology in society and you will gain hands-on experience of technological equipment.

Study modules

This is normally a one-year course and you will need to take 8 modules over two semesters. The modules on offer may vary from year to year and some will be compulsory.

Module list

- Fundamentals and Applications of Technology (double)
- Basic Mechanical Engineering Principles
- Basic Electronic Engineering Principles
- Basic Mathematical Methods I
- Basic Mathematical Methods II
- Introductory Mathematics
- Foundations of Computer Programming
- Engineering Applications
- Basic Data Analysis
**Typical offers**

A-level: grades CD or equivalent
IB Diploma: 24 points
BTEC National Diploma: 3 passes

Mature students with relevant experience, including a substantial period of suitable employment, are welcome to apply.

**Specific entry requirements**

**A-level:** grades CD or equivalent
**GCSE:** Maths at grade B and English Language at grade C minimum

This course is intended for students who are at least 18 years old and hold either:
- recognised non-science qualifications to A-level standard.
- recognised science qualifications to A-level standards, but with grades insufficient to qualify for an engineering degree or diploma course.

**English language requirements**

IELTS 6.0 (with 6.0 in reading and writing, 5.5 in listening and speaking)

**English requirements for visas**

If you need a student visa to enter the UK you will need to meet the UK Border Agency’s minimum language requirements as well as the university’s requirements.

---

**Student profile**

**Tamba Konteh**

Service leaver Tamba Konteh was accepted on to a Foundation course at Oxford Brookes University and has since successfully progressed to studying for a BEng degree in Mechanical Engineering.

“I enlisted in the army in 2004 and I joined 17 Port and Maritime Regiment and went into the Railway Squadron. In 2007, during military duties overseas, I was injured and because of these injuries I was unable to continue active service and was discharged. I still had my passion for engineering and I started to look at where I could pursue this ambition.

After attending two open days I was impressed by the facilities and the information about the course was just what I needed to know. My foundation year was a success and this was down to the fantastic support of the lecturers such as Dr Claudia Carrillo, Mr Douglas Higgison and Dr Simon Farley, they are very friendly and are always there if I had any queries or issues. After the success of my foundation year I have decided to continue to complete a BEng Mechanical Engineering. So far I am enjoying my degree, doing the foundation year has given me a good grounding to build on.

Once I graduate I would like to be a freelance engineer in the future with the ultimate goal of having my own engineering firm. My goal is to go on and complete the MEng at Brookes. I want to take advantage of all of the opportunities that are available for Brookes students. What motivates me to go on and complete the degree is the success of graduates who are now doing well in industry.”
To succeed on this course, you should want to become a designer of cars. You should have an aptitude for practical engineering, perhaps with some experience of building, driving, maintaining or designing automotive-related products.

As well as studying mathematics, engineering principles, design and management during year 1, you will work in small groups to strip a car and rebuild it, to gain familiarity with automotive systems. In year 2 you will develop your analytical skills through a study of dynamics, thermodynamics and stress analysis and then apply them in design.

In year 3 you will study specialised automotive engineering subjects. For example, you will learn to use software to analyse the dynamic behaviour of a car when it undertakes manoeuvres. As well as studying automotive aerodynamics and automotive engines, you will be able to choose from a range of optional modules. You will also select a project of personal interest from our research and industrial activities.

Many students undertake a work placement between years 2 and 3.

If you wish to extend your degree you may seek selection for the four-year MEng course. The first three years of the MEng run parallel with the BEng course, while the final year of the MEng allows you to broaden and deepen your studies. You may enrol on either course when joining the university but progression onto the MEng is only possible for the most able students. You can also apply from elsewhere to join our MEng in the third year.

Study modules

As courses are reviewed regularly the module list you choose from may vary from that shown here. Some modules will be compulsory.

**Year 1**
- Introduction to Mathematics for Engineers (double)
- Introduction to Engineering Thermo Fluid Dynamics
- Introduction to Engineering Mechanics
- Graphics and Design
- Automotive Materials and Manufacturing Techniques
- Basic Electrical Engineering
- Introduction to Engineering Management
- Programming the Virtual World
- Automotive Engineering Design and Computer Aided Engineering (double)
- Automotive Electronics

**Year 3**
- New Product Development
- Stress Analysis II
- Chassis Engineering
- Automotive Engines
- Vehicle Aerodynamics
- Advanced CAD/CAM
- Automotive Group Design Study
- Project (double)

**Year 4 (MEng)**
- Automobile Design, Test and Modelling Project
- Noise, Vibration and Harshness
- CAD/CAM
- Sustainable Engineering Technology
- Engineering Reliability and Risk Management
- Advanced Engineering Management
- Vehicle Crash Engineering
- Advanced Vehicle Aerodynamics
- Advanced Chassis Engineering
- Computation and Modelling
- Advanced Materials Engineering and Joining Technology
- Advanced Strength of Components
- Advanced Powertrain Engineering
Typical offers

A-level: grades BBB (for BEng) or ABB (for MEng)
IB Diploma: 30 points (BEng) / 33 points (MEng) to include minimum grade 6 (7 for MEng) in HL Maths and Physics
BTEC National Diploma: an engineering subject, with a DDM profile plus A-level Maths at grade B (BEng) / DDD profile plus A-level Maths at grade A (MEng)
A-level: for BEng, grades BBB should include Maths and Physics; for MEng, grades ABB should include Maths grade A and Physics.

Specific entry requirements

A-level: Mathematics (grade B for BEng, grade A for MEng), Physics and a third subject, preferably Chemistry or Design Technology
GCSE: English Language grade C minimum

BTEC National Diploma: to include a distinction grade in Further Maths for Technicians unit, for BEng and MEng, plus A-level Maths grade B (BEng) or grade A (MEng)
IB: to include Higher Level Maths and Physics minimum grade 6 (grade 7 for MEng)

English language requirements

IELTS 6.0 (with 6.0 in reading and writing, 5.5 in listening and speaking)

English requirements for visas

If you need a student visa to enter the UK you will need to meet the UK Border Agency’s minimum language requirements as well as the university’s requirements.

After graduation

Graduates from Automotive Engineering typically obtain engineering roles within the sector and our degree in Automotive Engineering provides the right balance of education and practical experience to equip you for this exciting profession. There are also postgraduate learning opportunities open through the department at an MSc or PhD level.

Graduates from Automotive Engineering have gone on to secure roles with companies including:

- Aston Martin
- Bentley
- BMW
- Cummins
- Ford
- Jaguar Land Rover
- Nissan
MECHANICAL ENGINEERING BEng/MEng

Accredited by the Institution of Mechanical Engineers (IMechE)

This course will prepare you for a career in any area of mechanical engineering, either as a specialist in a particular field or as an engineer with a broad range of responsibilities. The course is enhanced by the involvement of several local companies offering training and industrial placement opportunities to students.

The course is taught in modern, purpose-built premises with impressive facilities. The modules you take in year 1 cover fundamental work in engineering science, applied mathematics, manufacturing techniques and ancillary subjects such as electronics, graphics and design.

In year 2 you will build on these subjects to gain an understanding of how basic principles can be applied to more complex problems, and to develop analytical techniques.

In year 3 you will select a project of personal interest from the varied research and industrial activities available. Year 3 also allows you to select modules to extend your specialist knowledge in core fields of interest and to broaden your engineering experience.

If you wish to extend your degree you may seek selection for the four-year MEng course. The first three years of the MEng run parallel with the BEng course, while the final year of the MEng allows you to broaden and deepen your studies. You may enrol on either course when joining the university but progression onto the MEng is only possible for the most able students. You can also apply from elsewhere to join our MEng in the third year.

Successful students on this course are imaginative and keen to use technology for creating products and solutions that don’t merely ‘do the job’ but which become market leaders in their field. You should be creative and have a desire to see your ideas become a reality.

Study modules

As courses are reviewed regularly, the module list you choose from may vary from that shown here. Some modules will be compulsory.

**Year 1**
- Introduction to Mathematics for Engineers (double)
- Introduction to Engineering Thermo Fluid Dynamics
- Introduction to Engineering Mechanics
- Graphics and Design
- Materials and Manufacturing Techniques
- Basic Electrical Engineering
- Introduction to Engineering Management
- Programming the Virtual World

**Year 2**
- Materials Engineering
- Stress Analysis I
- Engineering Dynamics I
- Engineering Mathematics
- Engineering Thermo-Fluids
- Mechanical Engineering Design and Computer Aided Engineering (double)
- Control Technology

**Year 3**
- New Product Development
- Stress Analysis II
- Advanced Dynamics
- Strength of Components
- Engineering Dynamics II
- Automotive Engines
- Advanced CAD/CAM
- Group Design Study
- Project (double)

**Year 4 (MEng)**
- Mechanical Engineering Project
- Advanced Mechanical Engineering Design
- CAD/CAM
- Advanced Strength of Components
- Noise, Vibration and Harshness
- Computation and Modelling
- Advanced Engineering Management
- Advanced Vehicle Aerodynamics
- Sustainable Vehicle Engineering
- Engineering Reliability and Risk Management
- Advanced Materials Engineering and Joining Technology
After graduation

Our students are well prepared for the world of work, as the Mechanical Engineering degree is tailored to the current needs of industry. Our graduates work in all areas of mechanical engineering, such as design, aerospace, manufacturing, pharmaceuticals, and automotive and motorsport engineering, as well as in more general managerial and commercial roles. Our graduates have secured roles at companies such as Mercedes High Performance Engines, Rolls-Royce, Pfizer, SS Analysis, Siemens Magnet Technology and VCT Design.

Typical offers

A-level: grades BBB (for BEng) / ABB (for MEng)
IB Diploma: 30 points (BEng) / 33 points (MEng) to include minimum grade 6 (7 for MEng) in HL Maths and Physics
BTEC National Diploma: an engineering subject, with a DDM profile plus A-level Maths at grade B (BEng) / DDD profile plus A-level Maths at grade A (MEng)

A-level: for BEng, grades BBB should include Maths and Physics; for MEng, grades ABB should include Maths grade A and Physics

BTEC National Diploma: to include a distinction grade in Further Maths for Technicians unit, for BEng and MEng, plus A-level Maths grade B (BEng) or grade A (MEng)
IB: to include Higher Level Maths and Physics minimum grade 6 (grade 7 for MEng)

English language requirements

IELTS 6.0 (with 6.0 in reading and writing, 5.5 in listening and speaking)

English requirements for visas

If you need a student visa to enter the UK you will need to meet the UK Border Agency’s minimum language requirements as well as the university’s requirements.

Specific entry requirements

A-level: Mathematics and Physics plus a third subject, preferably Chemistry or Design Technology
GCSE: English Language grade C minimum

BTEC National Diploma: to include an engineering subject, with a DD profile plus A-level Maths at grade B (BEng) / DDD profile plus A-level Maths at grade A (MEng)

A-level: for BEng, grades BBB should include Maths and Physics; for MEng, grades ABB should include Maths grade A and Physics

BTEC National Diploma: to include a distinction grade in Further Maths for Technicians unit, for BEng and MEng, plus A-level Maths grade B (BEng) or grade A (MEng)
IB: to include Higher Level Maths and Physics minimum grade 6 (grade 7 for MEng)

English language requirements

IELTS 6.0 (with 6.0 in reading and writing, 5.5 in listening and speaking)

English requirements for visas

If you need a student visa to enter the UK you will need to meet the UK Border Agency’s minimum language requirements as well as the university’s requirements.

Student profiles

Ross Jackson and Richard Smith

Richard is completing a final year dissertation about understanding how various geometry changes on a model will actually affect the aerodynamics of a car. He is using the wind tunnel to validate his computer generated model that he has already tested.

‘Oxford Brookes has a number of great facilities, including a wind tunnel, which gives you a number of extra transferable skills. Having access to this sort of equipment has enabled us to do a final year dissertation project in aerodynamics. We have a rapid prototype machine that can print out a model profile of a car that we have drawn in CAD, we then mount this model in the wind tunnel, using the load cells; we can then measure the aerodynamic drag, load and down force.’

During Ross’s placement year at Cummins, looking at diesel engines, their manufacture and client problem solving, within his role of supporting clients he used knowledge on failure analysis and materials which he had gained through his degree.

‘When I graduate I am looking at going into either engineering consultancy; working on new building projects or as I have a passion for cars I am also looking at going into the automotive industry’ – Ross Jackson

‘After completing my placement year as a Design Engineer with McLaren they have expressed an interest in offering me a position within their team.’ – Richard Smith
This course will enable you to take project-design ideas and express them as computer models. This may range from simple to complex three-dimensional parametric models, or models which simulate the motion of parts, allowing the user to study in detail an engineering system before it is manufactured.

You will study the basic principles that engineers use to turn design possibilities into real solutions. You will learn how to use computer-based packages to produce design solutions of your own, enabling you to build up a portfolio of designs.

By the time you reach year 3 you will have the skills to tackle a typical industry-based problem and produce a complete design solution, including computer models of how the solution will look, and how it will function and be manufactured.

**Study modules**

As courses are reviewed regularly the module list you choose from may vary from that shown here. Some modules will be compulsory.

**Year 1**
- IEng Engineering Mathematics and Modelling
- Design and Practice I
- Introduction to Materials
- Basic Dynamics
- Basic Stress Analysis
- Basic Thermodynamics

**Year 2**
- Stress and Dynamic Systems
- Design and Practice II
- Control Technology
- Automotive Electronics
- Simulation of Thermal Systems
- Materials Engineering

**Year 3**
- Management Ethics, Energy and Sustainability
- Vehicle Dynamics I
- Design of Machines I
- Motorsport Engineering Technology
- Project (double)
Typical offers
A-level: grades BBC, preferably in Science and/or Design/Technology, or Mathematics
IB Diploma: 30 points, preferably including Science or Technology related subjects
BTEC Extended National Diploma: a relevant subject with a DDM profile and GCSE mathematics.

Other equivalent qualifications will be assessed on an individual basis.

Specific entry requirements
A-level: BBC, preferably in Science and/or Design/Technology, or Mathematics
GCSE: Maths grade B minimum and English Language grade C minimum

English requirements for visas
If you need a student visa to enter the UK you will need to meet the UK Border Agency’s minimum language requirements as well as the university’s requirements

After graduation
Our graduates have an excellent preparation for the world of work. The Mechanical Engineering BSc is tailored to the current needs of industry, and our graduates work in all areas of engineering: design, manufacturing, service industries, consulting, and in the automotive and aerospace industries.

English language requirements
IELTS 6.0 (with 6.0 in reading and writing, 5.5 in listening and speaking)

Graduate profile
Nabeela Rehman
We get lots of experience working with specialist programs like MATLAB and CATIA, which are used in industry. For my dissertation, I’m designing some improved joints for a bamboo bike which has been developed by Brookes engineers. I’m using the software program Abaqus to test the stresses and ensure that the joints will stay strong and not fail. Last year, I was involved in a project called Formula Student, where we design and build a racing car. Everything that you learn in class you apply to Formula Student. Unlike other universities, most of the parts are actually made by our students, which is great experience.
MOTORSPORT ENGINEERING BEng/MEng

Accredited by the Institution of Mechanical Engineers (IMechE)

To succeed on this course, you should be keen on motorsport and have a taste for practical engineering. You will benefit from the strong links we have forged with the local motorsports industry, which supports the course in many ways and is actively involved in shaping its content and style.

We have active research interests in racing vehicle design, aerodynamics, chassis, powertrain, suspension, tyre dynamics, lap time simulation and racing engine design. Our specialist facilities include a four-post rig, damper dyno and high-revolution engine test cells. We use a range of industry-standard software in teaching and give our students the skills to contribute to innovation and growth in the industry.

During year 1, as well as studying mathematics, engineering principles, design and management, you will also undertake relevant practical work to gain familiarity with motorsports systems and engineering manufacture.

In year 2 you will develop your analytical skills studying dynamics, thermo-fluids, and stress analysis and design.

In year 3 you will study specialised automotive engineering and motorsport subjects, including aerodynamics, automotive engines and technology, motorsport vehicle performance and chassis engineering. You will also choose optional modules and select a project of personal interest.

If you wish to extend your degree, you may select the four-year MEng course. The first three years of the MEng run parallel with the BEng course, while the final year of the MEng allows you to broaden and deepen your studies. You may enrol on either course when joining the university but progression onto the MEng is only possible for the most able students. You can also apply from elsewhere to join our MEng in the third year.

Study modules

As courses are reviewed regularly the module list you choose from may vary from that shown here. Some modules will be compulsory.

Year 1
- Introduction to Mathematics for Engineers (double)
- Introduction to Engineering Thermo Fluid Dynamics
- Introduction to Engineering Mechanics
- Graphics and Design
- Automotive Materials and Manufacturing Techniques
- Basic Electrical Engineering
- Introduction to Engineering Management
- Programming the Virtual World

Year 2
- Materials Engineering
- Stress Analysis I
- Engineering Dynamics I

Year 3
- Engineering Mathematics
- Engineering Thermo-Fluids
- Automotive Engineering Design and Computer Aided Engineering (double)
- Automotive Electronics
- New Product Development
- Stress Analysis II
- Chassis Engineering
- Motorsport Vehicle Performance
- Automotive Engines
- Vehicle Aerodynamics
- Advanced CAD/CAM
- Motorsport Group Design Study
- Motorsport Engine Technology
- Project (double)

Year 4 (MEng)
- Formula Student Design and Build Project
- Laptime Simulation and Race Engineering
- CAD/CAM
- Engineering Reliability and Risk Management
- Advanced Engineering Management
- Vehicle Crash Engineering
- Advanced Vehicle Aerodynamics
- Advanced Materials Engineering and Joining Technology
- Advanced Chassis Engineering
- Computation and Modelling
- Advanced Strength of Components
- Data Acquisition Systems
- Racing Engine Design
Typical offers

A-level: grades BBB (for BEng) or ABB (for MEng)
IB Diploma: 30 points (BEng) / 33 points (MEng) to include minimum grade 6 (7 for MEng) in HL Maths and Physics
BTEC National Diploma: an engineering subject, with a DDM profile plus A-level Maths at grade B (BEng) / DDD profile plus A-level Maths at grade A (MEng)

A-level: for BEng, grades BBB should include A-level Maths and Physics; for MEng, grades ABB should include Maths grade A and Physics.

Specific entry requirements

A-level: Mathematics (grade B for BEng, grade A for MEng), Physics and a third subject, preferably Chemistry or Design Technology
GCSE: English Language grade C minimum

BTEC National Diploma: to include a distinction grade in Further Maths for Technicians unit, for BEng and MEng, plus A-level Maths grade B (BEng) or grade A (MEng)
IB: to include Higher Level Maths and Physics minimum grade 6 (grade 7 for MEng)

English language requirements

IELTS 6.0 (with 6.0 in reading and writing, 5.5 in listening and speaking)

English requirements for visas

If you need a student visa to enter the UK you will need to meet the UK Border Agency’s minimum language requirements as well as the university’s requirements.

Student profile

Gavin Ward

I chose Brookes because I knew about it as a good course back when Arrows was an F1 team. I saw an advert on the website saying ‘If you want to work in F1 go to Brookes’, so I knew it was the place to be. As the course content is relevant to industry it enabled me to not only get my industrial placement job but also my current job with Red Bull.

Formula Student was a big highlight of Oxford Brookes for me and all the work I did for them. The lecturing at Oxford Brookes is exceptional, as you are being taught by lecturers who actually have experience of the industry.

The industrial placement year was an important part of my degree. My placement with Red Bull Racing gave me the foot in the door to Formula 1, as well as the sponsorship for my final year and when I graduated I was offered a position with the team.

The project I started during my placement year was quite detailed and vast and became my final dissertation. The project was in Formula 1 clutches in Red Bull Racing cars, and in return for this Red Bull paid the tuition for my final year at Brookes.

The main experience I took away from the year in industry was the knowledge of the technology and software used in Formula 1, which was essential for me getting my current job.

Brookes is a great place to study and the course is excellent; you get out what you put in and it’s all very practical which is important when looking for jobs in industry.

After graduating I have gone on to work for Red Bull Racing as a performance engineer. I would like to stay in motorsport but I am also toying with the idea of going into design or aerodynamics.

After graduation

The United Kingdom is the home of the motorsport industry and it employs many graduates each year. Several generations of our students are in F1 companies as race engineers, designers, aerodynamicists, and chassis and powertrain engineers.
MOTORSPORT TECHNOLOGY BSc (Hons)

Accredited by the Institution of Mechanical Engineers (IMechE)

At Brookes you can get involved in racing vehicle design, powertrain design, lap time simulation and racing engine design. We have specialist facilities such as four-post rig, damper dyno and high-revolution engine test cells. Industry-standard software will enable you to contribute to innovation and growth in the industry.

This course gives you practical technical involvement in motorsports and computer-aided design for racing cars. Many leading motorsports companies are based within 20 miles of Oxford and we work closely with them, actively involving them in shaping the course’s content and style.

The Motorsport Technology degree course covers the fundamentals of motorsport technologies and lasts three years (or four if you include the optional placement year). The disciplines covered range from CAD/CAM, stress and dynamic analysis, thermo-fluids to business and management. You will be exposed to all aspects of racing and road car design, gaining an understanding of the entire design process and learning how to turn your ideas into well-prepared design proposals.

Study modules

As courses are reviewed regularly the module list you choose may vary from that shown here. Some modules will be compulsory.

**Year 1**
- Engineering Mathematics and Modelling
- Design and Practice I
- Introduction to Materials
- Basic Dynamics
- Basic Stress Analysis
- Basic Thermodynamics

**Year 2**
- Statics and Dynamics Loading
- Design and Practice II
- Control Technology
- Automotive Electronics
- Simulation of Thermal Systems
- Materials Engineering

**Year 3**
- Incorporated Engineering Project
- Management Ethics, Energy and Sustainability
- Vehicle Dynamics
- CAD/CAM
- Sensors and Data Logging
- Advanced Automotive Electronics
- Motorsport Vehicle Performance
- Motorsport Engineering Technology
After graduation

The UK motor industry employs thousands of graduates each year and has a highly successful autosports sector. Whether it’s a rallying, F1, Indycar or touring car race, the chances are that a British car will be the winner. On the other hand, your aspirations may lead you to design the next new Mini or the latest executive saloon with an international pedigree.

These are the career paths to which our undergraduates aspire, and Motorsport Technology provides the right balance of education and practical experience to equip you for this exciting profession.

Typical offers

A-level: grades BBC, preferably in Science and/or Design/Technology, or Mathematics.

IB Diploma: 30 points, preferably including Science or Technology related subjects

BTEC Extended National Diploma: a relevant subject with a DDM profile and GCSE mathematics.

Other equivalent qualifications will be assessed on an individual basis.

Specific entry requirements

A-level: BBC, preferably in Science and/or Design/Technology, or Mathematics

GCSE: Maths grade B minimum and English Language grade C minimum

English language requirements

IELTS 6.0 (with 6.0 in reading and writing, 5.5 in listening and speaking)

English requirements for visas

If you need a student visa to enter the UK you will need to meet the UK Border Agency’s minimum language requirements as well as the university’s requirements.

English language requirements for visas

IELTS 6.0 (with 6.0 in reading and writing, 5.5 in listening and speaking)

English requirements for visas

If you need a student visa to enter the UK you will need to meet the UK Border Agency’s minimum language requirements as well as the university’s requirements.
GRADUATE PROFILE

CHRISTOPHER ROBERTS

Christopher Roberts studied BSc in Motorsport Technology and is now working for M-Sport as a Rally Engineer

Before coming to Brookes I completed a three-year diagnostic course with Citroen. We would be released in two-week blocks to study in various manufacturer training colleges across the UK. The rest of the time I was serving an apprenticeship as a dealership mechanic.

During this time I started to help a Euro Nascar team, unpaid, on my weekends. After completing the apprenticeship I joined Ramsport and did a year as a rally mechanic. Following this I contracted to as many teams as possible; gaining experience in Formula Renault, historic F1 and Group C Le Mans.

In 2008 I read an article about the new Engineering school in ‘Motorsport News’ and was taken on a tour of Wheatley Campus during an Open Day. The facilities where impressive and the level of post-graduates was high, with strong links to surrounding industry.

Brookes offered a well-balanced education. The best bits of studying at Brookes are the high level of ability and knowledge of the teaching staff, and I enjoyed living in Oxford.

If you want to work in motorsport in particular, try to gain experience with a team at a good level, whilst studying. This should help your CV to stand out later on.

I did not complete an industrial placement, as I continued to work as a sub-contracting mechanic in Formula Palmer Audi and FIA Formula Two, whilst studying at Brookes.

A major factor in landing my first engineering role was having a combination of industry experience and academic knowledge.

I joined AF Corse as a Junior Race Engineer during my final year at Brookes. This meant that I had to take time out of studying to go away on race events. I don’t advise this for everyone as it leads to less time to complete your studies, when the time pressures are already high!

I left AF Corse after one year to join M-Sport, initially in the Customer Engineering Department, with the aim of having a more in-depth role than just the race weekends.

The best moments so far have been:

■ competing for the FIA Formula Two championship in 2012 (we finished a close 2nd!).
■ working with Jake Dennis when he won the BRDC McLaren Autosport Young Driver Award in 2013.
■ winning the WRC2 and Middle East rally titles in 2015 with Nasser Al-Attiyah.
■ rallying is much more of an adventure than circuit-racing!

The most challenging moments so far have been stepping up to the works WRC (World Rally Championship) programme for 2016, running Eric Camilli, who is stepping up to World Championship level with very little experience. There are many more performance variables to consider compared to circuit racing!

There are too many customer-rally related stories to fit in here, particularly adventures in the Middle East, such being escorted around Lebanon by the military and working with various extremely wealthy business men and royal family members.

If you want to work in motorsport in particular, try to gain experience with a team at a good level, whilst studying. This should help your CV to stand out later on.

I did not complete an industrial placement, as I continued to work as a sub-contracting mechanic in Formula Palmer Audi and FIA Formula Two, whilst studying at Brookes.

A major factor in landing my first engineering role was having a combination of industry experience and academic knowledge.

I joined AF Corse as a Junior Race Engineer during my final year at Brookes. This meant that I had to take time out of studying to go away on race events. I don’t advise this for everyone as it leads to less time to complete your studies, when the time pressures are already high!

I left AF Corse after one year to join M-Sport, initially in the Customer Engineering Department, with the aim of having a more in-depth role than just the race weekends.

The best moments so far have been:

■ competing for the FIA Formula Two championship in 2012 (we finished a close 2nd!).
■ working with Jake Dennis when he won the BRDC McLaren Autosport Young Driver Award in 2013.
■ winning the WRC2 and Middle East rally titles in 2015 with Nasser Al-Attiyah.
■ rallying is much more of an adventure than circuit-racing!

The most challenging moments so far have been stepping up to the works WRC (World Rally Championship) programme for 2016, running Eric Camilli, who is stepping up to World Championship level with very little experience. There are many more performance variables to consider compared to circuit racing!

There are too many customer-rally related stories to fit in here, particularly adventures in the Middle East, such being escorted around Lebanon by the military and working with various extremely wealthy business men and royal family members.
LIVE PROJECTS

SPEEDWAY AND DALLARA

Speedway

Oxford Brookes moves to two-wheels: Research projects using the department’s expertise is changing the landscape of the Speedway GP series.

In January 2015 the department announced its exciting new collaboration with Speedway GP (SGP) and IMG. The Speedway championship is a series of stand-alone worldwide events over the course of a season which determines the Speedway World Champion. The project is looking at the research opportunities surrounding the technical development of the sport, which is being led by students and staff. Four research projects have been completed during the first year including a project supported by a postgraduate WISE Research Scholarship.

The projects look at a range of different aspects of the sport; The focus of these projects is on the frame design currently used by riders and how it can be improved to increase the performance characteristics of the bike, and proposing a possible alternative design. The other projects focus on the feasibility and design requirements needed to construct an electric bike, which could be used as an alternative to the current methanol fuelled bikes, provided a similar performance could be ascertained.

The research projects have been completed by final year MSc, MEng and BEng Mechanical Engineering students. Students’ experience of working with Speedway has inspired other students to get involved in the research around this exciting sport. The collaboration is continuing with more research projects for the coming year. The aim is for students to complete further research and development so that a proposal can be submitted for consideration that will alter the Speedway series and allow it to regain its popularity within the UK.

Dallara

Oxford Brookes University is collaborating with Dallara, a world-leading race car manufacturer.

The collaboration involves the design and development of an electric formula race car. Dallara Automobili has started to get involved in electric formula race cars by developing the chassis of the FIA Formula E vehicles.

Dallara is a world-heavy-weight in the race car manufacturing industry. For over 40 years the company has built some of the world’s most competitive racing cars. Currently building cars for a number of different areas such as GP3, F3, Indycar, the new Indylights and GP2, Dallara builds the fastest and safest cars within each sport. The company’s current state-of-the-art headquarters are in Parma, Italy but they have recently opened a new Research and Development facility in Indiana, USA, a state with a rich auto racing industry.

In the first year of the project, a group of MSc students engaged in research trying to find the most suitable parts for the vehicle finishing with an initial prototype. This year the students have researched the following areas of development, with the intention to have a model of the vehicle:

- Battery design and development
- Powertrain design and development
- Feasibility study
- Aerodynamics and cooling
- Suspension kinematics and dynamics
- Full vehicle modelling and simulation

Students have also produced a business plan which includes market analysis, sales strategies, as well as 4-year financial projections.
MECHANICAL ENGINEERING AND MATHEMATICAL SCIENCES

Our work placement programme has been commended by professional bodies as a model of excellence. We have placement opportunities with local automotive and product manufacturing companies.

You will be encouraged to undertake a work placement for one year between the second and third years of your course. More and more students are taking up this option, as they recognise the benefits of obtaining industrial experience, consolidating their understanding of their subject area in general and having the opportunity to apply their knowledge in an industrial environment. On returning to the university for their final year, the experience they have gained invariably improves their academic performance.

We have an excellent record of students gaining full-time employment on graduation with their industrial-placement-year company. Sponsored students spend the year with their sponsoring company. Students who are not sponsored will be assisted in finding a suitable placement.

WORK PLACEMENTS

Work placement profile

Haseena Mangera - MEng
Mechanical Engineering

The course at Brookes has some of the best prospects to work in the automotive and Formula 1 industry after graduating. Brookes also provided me with the opportunity to have an accredited degree course, and for an international student, this is very beneficial. I have found lecturers to be very helpful and involved – something I did not expect and was told would not happen at university! The course is always improving and students are involved in this process by giving feedback to staff.

I have just completed my placement year. I have met many different industry people with vast experience, which has helped to extend my network and build connections. Importantly, I have been able to apply what I have learnt at university to a specific industry and decide what I want to pursue. I strongly recommend a placement year, something Brookes has a supportive network of staff specifically aimed to help you apply for positions and assist you as needed once you’re in industry.

During my placement year I have been responsible for a variety of projects which include:

- Working on a research portfolio on issues with the highest customer dissatisfaction submitted to BMW engineers for the design and improvement of the next generation cars. I will follow this theme with my final year dissertation project.
- Responsible for operating the daily running of the 3D printer at BMW Plant Oxford
- Providing design solutions through problem solving and root cause analysis of parts and vehicles, including CAD design of jigs and prototype parts. Analysis into parts and issues, whilst also being knowledgeable of industry legislation when designing and/or revising current production parts. This often, if not always, involves liaising with various departments throughout the BMW Group and suppliers.

I thought the placement year was invaluable to my university experience. The first few months were very difficult, as you are starting afresh. You are in a position where anything you do can have an effect on the real world, in my case it was mass production, where a car came off the track every 68 seconds.

At first you are not given much responsibility as they need to understand your capabilities and how to challenge you in your role. This is difficult, but you need to keep asking for work to do and with time you will be working on more difficult tasks that will increase your knowledge and make you a well rounded accredited engineer.

I have gained a large quantity of experience and training in a number of different areas; however I have gained knowledge of 3D Printing and CAD training, working within a team, as well as working with various departments throughout BMW (including engineers in Munich) and suppliers and an understanding of the systems used throughout the BMW Group.

Having completed a year in industry I have met many individuals with vast experience and diverse backgrounds. I hope that the experience I have gained will stand me in good stead to pursue my ideal job.
The placement year is an option for students studying engineering and mathematics degrees and constitutes the third year of a four-year degree programme. A placement will normally last 12 months, or a minimum of 40 weeks, you will be employed within one company and you will have a suitable level of responsibility to make the job challenging (or ‘real’). The experience will add value to you, your degree and your future career.

A great range of companies offers placements to our students, from large multi-nationals to local employers who may recruit just one student. Some of the companies where students have undertaken placements are BMW, Bosch, Caterpillar, GlaxoSmithKline, Cummins, JCB, McLaren, Mercedes F1, Merck Sharp & Dohme Ltd, Nissan, Stanley Black & Decker, Triumph Motorcycles Ltd, Red Bull Technology, Rolls-Royce and Williams F1.

Placements take place between the second and final years of a degree programme. Second year students are given training in preparation for placements through guided lectures, seminars and 1:1 tutorials. The University Careers Office provides help with CVs, applications and interview techniques to help you gain your preferred placement. Once you are out on placement, you will be supported by a member of the academic staff who will arrange to visit you whilst you are there.

Towards the end of the first calendar year of your placement, or in the following January, we arrange a Recall Conference within the department, for a mutual catch-up. You will find it very useful to re-connect with both the department and your fellow students at this point.

Placements can be anywhere in the world and there may be funding available through the Erasmus scheme to support a work placement in Europe. Provided your programme of study overseas is agreed by the department, it will count towards your degree. We may not be able to arrange an academic visit if you choose to complete your placement overseas, but you will still be supported by us while you are there.

Remember, a placement year is not a compulsory part of degree programmes in the department of Mechanical Engineering and Mathematical Sciences, but students who include this year invariably find that it enhances their final year of study and their final year project.

For more information about placements, contact the Partnerships and Placements Office: tdeplacements-enquiry@brookes.ac.uk

For information about the Erasmus scheme, see www.brookes.ac.uk/european-work-placements
OXFORD BROOKES RACING AND FORMULA STUDENT

Oxford Brookes Racing (OBR) is the award-winning Formula Student team from Oxford Brookes University. OBR have competed in Formula Student since its inception in 1999. Working to a budget the team design, build and race a single-seat car. The team is made up of approximately 110 students from across the department’s engineering courses.

Oxford Brookes Racing (OBR) was one of the first teams to compete in the Formula Student UK in 1999. The first entry was a wooden prototype chassis and it raced in the class 2 category. The early years of competition saw the team develop a variety of ideas and concepts including an aluminium monocoque chassis and the team’s first and only ‘wing’ car. The 2002 competition marked the beginning of the team’s rise to the front, with OBR finishing 13th overall at FSUK. After the successes of the previous year, the 2003 season saw OBR win their first competition, finishing 5th overall and winning the coveted title of ‘Best UK Team’ for the first time, a feat that the team, to date, have won a total of 5 times in sixteen years.

OBR regularly compete at FSUK (which races at Silverstone) and FSG (Germany). In 2004 the team have had the opportunity to race in FSAE in USA. This included utilising race team facilities to develop their car. In 2005 the team returned triumphant after winning the skid-pad event for the first time in Michigan.

The mid-2000s were successful and innovative years; the team came 3rd overall and won the cost event and endurance and they regained the title of ‘Best UK Team’ for the third time. 2007 saw the team field two cars (combustion and electric cars) at FSUK and they were the only team to have both cars finish the endurance. At FSG the team finished in 8th position.

OBR won the skid-pad event for the second time at FSG and finished on the podium at FSUK in autocross, design and the business presentation. 2010 was the last time the team ran a space frame chassis. The car started as a combustion entry and by the 2011 season was fully converted to electric. 2011 saw a return to the aluminium monocoque chassis and the team were back at the front with a 4th place in design at FSUK and 3rd in Autocross at FSG. In the 2012 season the team regained the Best UK Team title with their monocoque designed car. 2013 saw a new competition on the FS calendar; Czech Republic, where the team collected prizes in the business presentation and podiums in autocross, design and skid-pad events. In 2014 the car had its first aerodynamic package, which is being continually developed with mentoring by experts from F1.

There is an opportunity for a student to complete their work placement year as team leader. In 2014, George Simmons completed his placement year as OBR team leader.

“I used to watch Formula Student (FS) while I was still at school – now I have completed my work placement year with OBR as team leader. Formula Student is not just about building a race car, it’s also about developing a business plan, pitching the idea to show that it is profitable, liaising with sponsors and manufacturers and so on. Where else would I get that kind of experience?

Being team leader I am running the team, looking after the 110 students, building the car and taking it to competition in Silverstone, Germany and Europe. Everything hinges on me; all the deadlines and objectives are directed by me. It doesn’t matter what type of experience you have, everyone is able to join and get involved.

This placement year has strengthened my studies, as it is not technically based. I am interested in having a well-rounded package and experience by the time I graduate. Apart from experience of the theoretical side of the maths and physics, I also have experience of managing a team and working with people, motivating the team and making sure that deadlines are met which are all really important.

One big plus is the networks I’m building with the motorsport industry. Lots of people have good degrees; Formula Student gives me something on top – I’m demonstrating that I can apply my learning to a complex, real-life project.”
The V-twin is the world’s first entirely bespoke engine and transmission package for Formula Student. It was started in 2006 when members of OBR team began to lay out a concept for a purpose-built engine and transmission package for the Formula Student car class 1 entry. In 2007 the engine layout was completed for manufacture. In 2009 the manufacturing process started and in 2011 engine and gearbox were unveiled by Racecar Engineering Magazine at Autosport International Show at the NEC Birmingham.

### Specification

The engine is a 75º V-twin unit of 600cc capable of running up to 12,500rpm, with dry sump lubrication on both engine and gearbox. Five-axis machined ports and combustion chambers enable the engine to develop an unrestricted power output of 200hp / litre. The gearbox is a 4-speed sequential unit with automated pneumatic shifting which transmits the torque to an innovative torque-steer active differential.

### The future of the project

The manufacturing of the engine is approaching completion with the remaining parts to be machined in-house and through external companies. There are also some minor design adjustments to be done. The V-twin is certainly the pride of the OBR team as it is unique and has huge potential not only in performance, but also in the knowledge and experience this project has given to team members.

---

‘Formula Student challenges students to design, build and actually race a car. It is a very interesting competition, lots of teams around the world have enormous budgets. At Brookes we have a modest budget and despite this, our students perform extremely well. Of course this is the key thing. In an automotive or motorsport company, how many times will your boss say to you that you have a large budget? Probably it is never going to happen, designing to a budget and still achieving high performance is the key. It is in this area that we excel above almost all universities.’

**James Balkwill**  
Principal Lecturer in  
Mechanical Engineering

‘Formula Student gives you hands on experiences that are not possible from coursework and lectures alone. The technical experience as well as working in a dynamic team environment is extremely valuable to future employers.’

**Blake Hinsey**  
Performance Engineer at Force India Formula 1 team,  
studied an MSc in Motorsport Engineering
There is an excellent research environment in the Department of Mechanical Engineering and Mathematical Sciences, underpinned by very well-established links with industry. The research is focused on issues of global concern and is organised into three cross-cutting, inter-disciplinary themes: Sustainable Engineering and Innovation (SEI); Advanced Engines, Propulsion and Vehicles (AEPV); and Simulation, Modelling and Systems Integration (SMSI). Research in the department is supported by the UK Research Councils, the European Commission, industry and charitable foundations.

**Sustainable Engineering and Innovation**

The Sustainable Engineering and Innovation (SEI) theme of research at Oxford Brookes University draws together a collective of many different technological disciplines, highly successful research groups and individuals. A strong multi-disciplinary team is able to deliver innovative and sustainable engineering solutions to both national and international issues concerning current and future environmental, social and economic needs.

The key focus areas of SEI include:
- Intelligent and integrated solutions for sustainable mobility.
- Closed-loop manufacturing through the development of smart materials, efficient processes and innovative design.
- Advanced sustainable materials and joining processes.
- Whole life energy analysis and low carbon solutions.
- Expertise in the use, manufacture and performance of carbon materials.

**Low Carbon Vehicles**

The Advanced Engines, Propulsions and Vehicles research group (AEPV) brings together scientific and industrial expertise for providing solutions for fuel efficient and low emission engines and vehicles. The group has six main research areas: combustion and fuels, particulate matter emissions, emissions assessment, powertrain simulation and performance evaluation, computational fluid dynamic simulation of engine processes and the design and development of high performance engines.

**Simulation, Modelling and Systems Integration**

The research carried out in the Simulation, Modelling and Systems Integration research theme enables complex systems to be analysed, designed and predicted. The work is outwardly focused and looks to develop solutions, which provide economic and social benefits, to real problems. The work is underpinned by high-quality fundamental research in mathematics and engineering.

**Collaboration**

The department has excellent connections with industry and it is these connections that enable staff and students to be involved in ground-breaking research. The department collaborates with industry leaders such as BMW, YASA Motors, McLaren, BSI Speedway and Dallara.

One of our international collaborations within the Automotive industry is with the R&D department of MAN in Germany. An MSc student has completed his capstone project, in the field of traffic modelling: traffic parameters such as density, flow and speed are used to develop a local traffic estimator, which informs decisions of MAN's adaptive cruise control system. Local traffic estimator uses on-board radar and video fusion to calculate traffic parameters which can be used to observe different traffic states of each lane. This is a very exciting project aimed at not only reducing but also improving fuel consumption and road safety.
In September 2014 the Oxford Bus Company launched a redesigned and new look BROOKESbus, which uses Gyrodrive technology to help the buses reduce fuel consumption by around 20%. These new buses were designed with input from one of our alumni, Glen Pascoe – Glen studied motorsport engineering and graduated in 2006. He remembers regularly travelling with his now wife on the BROOKESbus and said: “As a Brookes alumnus I feel honoured that Gyrodrive will be making a positive impact on the current students and the university in general by helping to achieve its sustainable travel plans. I hope that my story will inspire all students to realise their potential and make a difference.”

Glen Pascoe
Motorsport Engineering alumnus