



UNIVERSITY OF
BIRMINGHAM

SCHOOL OF
METALLURGY
AND MATERIALS

MATERIALS SCIENCE AND ENGINEERING

Course outline



Materials Science and Engineering

Understanding the properties of new materials is essential to developing new and improved products. Materials engineers work at the forefront of new technology, with designers and engineers of every discipline, to push forward the boundaries of science and engineering.

Materials Science and Engineering at Birmingham combines teaching from lecturers who are global experts in their field, with leading edge teaching facilities and laboratories to enhance the learning experience for our students. The department has strong partnerships with key employers who provide projects and work placements for our students and regularly recruit our graduates.

At Birmingham, our staff and students work on a diverse range of research areas in the aerospace, automotive, biomedical, sport and sustainable development fields. As a student of Materials Science and Engineering at Birmingham, you will get a front-row seat to the latest developments in the field.

Our Programmes

Single Honours	
BEng Materials Science and Engineering	J5F2
BEng Metallurgy	JJ25
MEng Materials Science and Engineering	F2H1
MEng Materials Science and Engineering with Industrial Experience	J200
Mechanical and Materials Engineering	
BEng Mechanical and Materials Engineering	HJ35
MEng Mechanical and Materials Engineering	HJ53
Foundation Year pathway	
BEng Engineering Foundation Year	HFJ0



Key features of our programmes

- Small class sizes
- Personal tutorial system
- Internationally outstanding members of academic staff
- All programmes are accredited by The Institute of Materials, Minerals and Mining (IoM3)
- Mechanical and Materials Engineering courses are accredited by both IoM3 and the Institution of Mechanical Engineers (IMechE)
- New approaches to learning
- Group and individual research projects
- Additional language options
- International industrial placements
- Transferable skills for a wide range of career opportunities

Scholarships

We offer a number of scholarships to our students. Students are awarded scholarships based on entry grades: £3,500 for A*A*A and £2,500 for A*AA, where A* grades are in mathematics and/or experimental science. We also offer £1,500 for the top 5 AAA students, based on overall UCAS tariff and performance at applicant visit days. Additional scholarships are available for overseas students, music and sports. Additionally, there are a number of awards and prizes for continued performance throughout the degree.

Background and course structure

Materials surround us – from bricks to body scanners – and our programmes in Materials Science and Engineering provide an understanding of how materials behave, and how they can be used and improved, which is essential to the development of new products and the practical realisation of new scientific phenomena.

'Innovative surface engineering techniques developed in the school of Metallurgy and Materials have paved the way for the regular use of titanium components in Formula One and CART engines. This has helped to make our engines more powerful and maintain a competitive edge.'

MRS A BRYD, SENIOR MATERIALS TECHNOLOGIST, MERCEDES-ILMOR LTD, SUPPLIER OF ENGINES TO MCLAREN AND WILLIAMS F1 TEAMS

Our programmes include lectures, practicals and case studies developing your understanding in all areas of materials – properties, selection, processing, failure and protection of metals, polymers, ceramics and composites. These are related to applications such as aerospace, automotive, IT, medicine, power generation and many others. Case studies build your team working and communication skills.

Many opportunities for industrial internships and placements within the School arise during the summer, allowing you to put all your skills into practice. Eligible students can choose the 4-year MEng programme, which involves an individual research project and six Masters level modules in the fourth year.

The third and fourth years advance your understanding of design, processing, failure and applications along with management, whilst options allow you to gain specialist materials knowledge in areas that interest you most, such as aerospace, biomaterials and computer simulations. You will also take part in a group research project during your third year.

A detailed course structure can be found on our website including module outlines for each level of the course.

Entry requirements

Typical offers range between AAB-AAA. Subject requirements apply. Please contact the admissions tutor or visit www.birmingham.ac.uk/materials for more details and International Baccalaureate (IB) requirements.

The School of Metallurgy and Materials is one of the best centres for materials research in the UK. We have over 25 full-time academic staff in addition to 30 honorary and visiting staff, 70-80 research fellows and close to 150 postgraduate students.

Our diverse research portfolio ranges from fundamental aspects of Materials Science to practical high performance engineering applications. Research is funded from a wide range of sources including the UK Research Councils, the EU and a cross-section of national and international companies.

Our research income averages £7 million per year, and we have attracted large investments from companies and the government, including £60 million for the High Temperature Research Centre. Success in joint research with industry has been recognised by the award of the Secretary of State for Industry's University/ Industry Partnership Prize. At the last Research Excellence Framework, the School was ranked in the top five Materials Science and Engineering departments in the UK.

EXAMPLES OF INDIVIDUAL RESEARCH PROJECTS

- Development of carbon fibre composite components for Formula 1 racing cars
- Corrosion resistance of high performance aluminium alloys (Jaguar Cars Ltd)
- Selection of new materials for the Formula SAE racing car space frame
- Design and production of high performance carbon fibre sports prosthetic limbs
- Assessment of golf club performance (R&A Ltd – previously the Royal and Ancient Golf Club of St Andrews)
- High performance materials for cycle tubes (Reynolds Tubing Ltd)
- Alloy Development of Al-Based Bulk Metallic Glasses
- Thin film transparent conducting oxides for flat panel displays (DuPont)
- Improved Corrosion Resistance for Aerospace Alloys Through Laser Surface Alloying (BAE Systems)
- Optical Fibre Sensors for Smart Structures in Biomedical and Sports Applications
- Micromechanisms of fracture and fatigue crack growth in a burn-resistant advanced titanium alloy (Rolls-Royce Ltd)
- Plasma Surface Modification of Ultra High Molecular Weight Polythene



'I found the Birmingham materials course diverse, we were able to choose modules which enabled me to tailor my degree to my strengths and interests. A materials degree leaves your career options open and gives you lots of transferable skills that you can use in almost any area of work in the future.'

DR STEPHANIE ANKRAH, MATERIALS SCIENCE AND ENGINEERING GRADUATE, TECHNICAL REPRESENTATIVE, NIKE UK LTD.

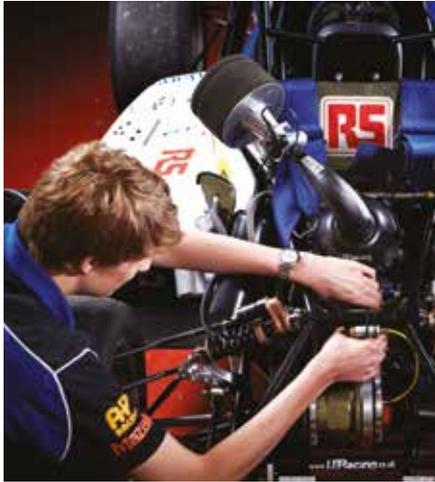
'Rolls-Royce has recruited a significant number of students from Birmingham at both graduate and postgraduate level. Undergraduates are able to experience real life industrial situations via vacation attachments in the company. We are very pleased with the quality of Birmingham graduates. They are stimulating change and making an impact on the output of the Materials Group. They possess a good balance of technical, interpersonal and IT skills.'

MIKE HICKS, CHIEF TECHNOLOGIST-MATERIALS, ROLLS-ROYCE

'In collaborative projects over the past few years we have worked with undergraduates, postgraduates and staff from the School of Metallurgy and Materials, incorporating all aspects of material interactions occurring within golf. We have been impressed by their professionalism and the standard of their work. Many of the undergraduates have gone on to work on PhD projects with us and are making significant advances in our understanding, providing us with a source of information at the leading edge of materials technology.'

DR STEVE OTTO, R&A RULES LTD, ST ANDREWS

BEng/MEng Mechanical and Materials Engineering



Background and course structure

The design of any machine – from a skateboard to a jet engine – for optimal performance cannot be separated from the materials used to make it. This challenging programme thus combines the design skills of mechanical engineering with the in-depth knowledge of materials engineering, so that, on graduation, you are able to create innovative and cutting-edge designs, which make the best use of materials.

First and second years

A combination of lectures, practicals and case studies develops your understanding in both mechanical engineering – engineering design, mechanics, modelling, mathematics, professional skills (teamwork, communication and management) – and materials – the properties, selection, processing, failure and protection of metals, polymers, ceramics and composites. These are related to industries such as aerospace, automotive, IT, medicine, power generation and many others. Many opportunities for industrial internships and placements within the School arise during the summer, allowing you to put all your skills into practice. Eligible students can choose the 4-year MEng programme, which involves an individual research project in the fourth year.

'The Mechanical and Materials Engineering course at Birmingham offers many practical exercises that are both stimulating and challenging. The lectures are also well supported with relevant practicals. In the final year of the MEng degree, students have the opportunity to complete a team design project for outside local companies (such as Arvin Meritor, Jaguar etc), be part of the University racing car team and have an individual placement in industry for six months which provides excellent links for future employment. The combination of mechanical engineering experience with a firm basic grounding in materials can lead to a wealth of exciting opportunities within

the engineering community and beyond. Personally, completing my degree has led to an Engineering Doctorate (EngD) researching on new innovative technologies at Rolls-Royce. Having worked in the team at R-R for 6 months it has been highlighted that graduates with dual discipline skills are in demand as valuable resources and this should continue to be so into the future.'

**CLAIRE TAYLOR, EngD RESEARCH ENGINEER,
BLISK TECHNOLOGY ACQUISITION TEAM,
MANUFACTURING TECHNOLOGY,
ROLLS-ROYCE**

Third and fourth years

The third year advances your understanding of mechanical engineering whilst you gain specialist knowledge in the areas of materials that interest you most, such as aerospace or biomaterials. You will also take part in a group research project (BEng and MEng) in your third year, and an individual project in your final year (MEng).

A detailed course structure can be found on our website including module outlines for each level of the course.

Career opportunities

Our close links with a large number of engineering companies means that your employment prospects are excellent. During the programme you develop the specialist knowledge, understanding and transferable skills needed to fulfil a challenging and rewarding career in the industry of the future.

Entry requirements

Typical offers range from between AAB–AAA. Subject requirements apply. Please contact the Admissions Tutor or visit www.birmingham.ac.uk/materials for more details and International Baccalaureate (IB) equivalents.



LEARN MORE

Admissions Tutor
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www.birmingham.ac.uk/materials

This leaflet was written several months in advance of the start of the academic year. It is intended to provide prospective students with a general picture of the programmes and courses offered by the School. Please note that not all programmes or all courses are offered every year. Also, because our research is constantly exploring new areas and directions of study some courses may be dropped and new ones offered in their place.



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Edgbaston, Birmingham,
B15 2TT, United Kingdom
www.birmingham.ac.uk

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