Materials Science and Energy Engineering BEng

Undergraduate degree programme Materials Science and Energy Engineering BEng JH58:

Materials scientists are at the forefront of new technology, pushing forward the boundaries of science and engineering with designers and engineers of every discipline. Research and development produce new materials to meet the demands of modern technology. For instance, metals grown from single crystals for advanced engines are making air travel safer. More durable plastic and glass components for mobile 'phones, make them thinner and lighter. Team GB won 7 out of 10 golds in cycling at the 2012 Olympics using bicycles made from advanced carbon fibre materials.

Our School (http://www.birmingham.ac.uk/schools/metallurgy-materials/index.aspx) and the **Interdisciplinary Research Centre in Materials Processing (http://www.birmingham.ac.uk/research/activity/irc-materials-processing/index.aspx)** together make up the largest centre for materials research in the UK. We work on a diverse range of projects in the aerospace, automotive, biomedical, sport and sustainable development fields. Join us, and become part of an academic elite designing a safer, more sustainable and brighter future!

Course fact file

UCAS code: JH58

Duration: 3 years

Places Available: 35 (for all Metallurgy and Materials programmes)

Applications in 2014: 193

Typical Offer: AAB (**More detailed entry requirements and the international qualifications accepted can be found in the course details (?OpenSection=EntryRequirements)**)

Start date: September 2013

Related courses

Metallurgy and Materials undergraduate degree courses (/schools/metallurgy-materials/undergraduate-courses/index.aspx)

Contact

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School of Metallurgy and Materials (/schools/metallurgy-materials/index.aspx)

Follow us on Twitter (http://twitter.com/eps_unibham)

Details

This three-year programme covers all areas in depth.

Materials Scientists and Metallurgists are helping to solve key issues facing the world in energy, transport and healthcare. Our programmes in Metallurgy and Materials provide an understanding of how materials behave and how we can develop and use them to make the products we experience – from bricks to bridges to body scanners.

We use our understanding of materials at the atomic and microscopic levels to design, for example, new types of medical implants, new alloys and production methods for more energy-efficient engines, and better sports equipment to allow athletes to safely perform at their maximum levels.

Course structure

The course offers a modular programme of study which normally leads to the award of Bachelor of Engineering (BEng) in three years.

First and second years

Our programmes share a common first two years, with lectures, practicals and case studies developing your understanding in all areas of materials, including:

- Properties
- Selection
- Processing
- Failure and protection of metals
- Polymers
- Ceramics
- Composites

These are related to applications such as aerospace, automotive, sports, IT and biomedicine. You'll also study how to apply maths to solve engineering problems – a key requirement for many employers.

In the first year you take the module '**Introduction to Energy Engineering** ' to get a basic overview of the subject, allowing you to choose your specialisations for later years. At the end of the first year you also have the opportunity, should you wish, to switch back to Single Honours Metallurgy or Materials Science courses.

Third year

The third year advances 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, sports and biomaterials. You also take part in an individual research project.

Industrial experience
We help and encourage you to gain work experience in external companies and/or University research groups in the summer vacations. Industrial experience increases your employability, helps you to choose your career path and increases your motivation to succeed in your chosen profession. Recently students have worked at Rolls-Royce plc and other UK companies but have also travelled as far afield as CSIRO in Australia to pursue particular research interests.

Generic skills-training, focusing on transferable skills and employability, is embedded throughout the course from the outset, and will ensure that you are equipped with the ICT, presentation, team-working and problem–solving skills which will enhance your employability on graduation.

BEng or MEng?
The first two years of the BEng course are identical to our **Master of Engineering (MEng) programme FH28 (/undergraduate/courses/metallurgy-materials/materials-science-energy-meng.aspx)** , which means that you can delay your final choice of degree until the end of your second year. Entry onto the MEng programme is dependent upon successful completion of your second year and you must provide excellent results (i.e. be on target for a minimum of a high 2ii).

Related links

- **Metallurgy and Materials undergraduate degree courses (/schools/metallurgy-materials/undergraduate-courses/index.aspx)**
- Energy Engineering undergraduate degrees page

Why study this course

Why Birmingham?

- The School of Metallurgy and Materials at Birmingham is a major research centre with world class facilities, and is consistently rated in the top three of research centres of its kind in the UK. Success in joint research with industry has been recognised by the award of the Secretary of State for Industry's University/Industry Partnership Prize.
- Successful Metallurgy and Materials graduates are creative, numerate, good communicators and skilled at solving problems and delivering results. With these qualities our graduates not only develop careers as high-quality practising scientists and engineers, but are sought after by top companies for their potential in management, finance, consulting and other senior professional positions.
- Our students experience the whole range of materials science technology and engineering and have a strong science base. As professional engineers, they have every prospect of working with new ideas which encourage the application of science.
- Our students enjoy exceptionally high employment prospects

What our students say

'The balance between practical and theory work was excellent. I had so much choice of research areas for my final year project and then for my PhD. My future career prospects are numerous; a materials degree offers loads of opportunities. When I started the course I was amazed at how broad and relevant the subject is. The practical aspects of the course are great fun, particularly as we get to break things!'

- Dr. Jane Berry, Texaco

'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, Nike UK Ltd.

'From my perspective, the highlight of the MEng course was the 6 months spent in industry. I was working in a 'high technology' company called Hycalog which made high performance diamond tipped drill bits for the drilling industry. The placement allowed me to use the transferable skills components of the course, this enabled me to become part of the team. The placement also gave me the experience of working in other departments of the company such as quality testing.'
- Andy Fones, PhD Student in Metallurgy and Materials

Fees and funding

Standard fees (http://www.birmingham.ac.uk/students/ug/courses/fees/standard) apply
Learn more about **fees and funding (http://www.birmingham.ac.uk/students/ug/feesandfinance/loans.aspx)**

Scholarships

- For information about scholarships specific to the School of Metallurgy and materials, please visit the School's own **scholarships page (/schools/metallurgy-materials/undergraduate-courses/ug-scholarships.aspx)** .
- Scholarships and paid research placements are available for eligible students. Please visit the s**cholarships, grants and bursaries page (/undergraduate/fees/funding/index.aspx)** for details;

Further queries may be directed to the School of Metallurgy and Materials Undergraduate Admissions Tutor **Mark Ward (mailto:)** .

Entry requirements

Number of A levels required: 3

Typical offer: AAB

Required subjects and grades: A level Mathematics and one A level from Physics, Chemistry or Design and Technology

General Studies: Not accepted, but a good performance may be taken into account if you fail to meet the conditions of the offer

Additional information:

Other qualifications are considered – learn more about **entry requirements (http://www.birmingham.ac.uk/students/ug/requirements)**

International students:

International Baccalaureate Diploma: 6,6,5 at Higher Level, including Mathematics and either Physics, Design Technology or Chemistry, with a minimum of 32 points overall.

Standard English language requirements apply
Learn more about **international entry requirements (http://www.birmingham.ac.uk/students/ug/requirements/international)**

Depending on your chosen course of study, you may also be interested in the Birmingham Foundation Academy, a specially structured programme for international students whose qualifications are not accepted for direct entry to UK universities. Further details can be found on the **foundation academy web pages (http://www.birmingham.ac.uk/students/foundation-academy/Pathways/index.aspx)** .

How to apply

Apply through UCAS at **www.ucas.com (http://www.ucas.com/)**
Learn more about **applying (http://www.birmingham.ac.uk/students/ug/courses/apply)**

Key Information Set (KIS)

Key Information Sets (KIS) are comparable sets of information about full- or part-time undergraduate courses and are designed to meet the information needs of prospective students.

All KIS information has been published on the Unistats website and can also be accessed via the small advert, or 'widget', below. On the **Unistats website (http://unistats.direct.gov.uk)** you are able to compare all the KIS data for each course with data for other courses.

The development of Key Information Sets (KIS) formed part of HEFCE's work to enhance the information that is available about higher education. They give you access to reliable and comparable information in order to help you make informed decisions about what and where to study.

The KIS contains information which prospective students have identified as useful, such as student satisfaction, graduate outcomes, learning and teaching activities, assessment methods, tuition fees and student finance, accommodation and professional accreditation.

Related links

Metallurgy and Materials prospectus (pdf 4 MB) (/Documents/college-eps/metallurgy/ug/metallurgy-materials-prospectus.pdf)

Undergraduate Scholarships - School of Metallurgy and Materials (/schools/metallurgy-materials/undergraduate-courses/ug-scholarships.aspx)

Degrees in Metallurgy and Materials (pdf 237 KB) (/Documents/college-eps/metallurgy/ug/MatMetEng.pdf)

Related news and events

Metallurgy and Materials receives top marks for student satisfaction (/schools/metallurgy-materials/news/nss-scores-2015.aspx)

Metallurgy and Materials at Birmingham ranks high in Guardian league tables (/schools/metallurgy-materials/news/birmingham-high-guardian-league-tables.aspx)

Learning and teaching

As a Birmingham student you are part of an academic elite and will learn from world-leading experts. At Birmingham we advocate an enquiry based learning approach, from the outset you will be encouraged to become an independent and self-motivated learner, qualities that are highly sought after by employers. We want you to be challenged and will encourage you to think for yourself.

Your learning will take place in a range of different settings, from scheduled teaching in lectures and small group tutorials, to self-study and peer group learning (for example preparing and delivering presentations with your classmates).

To begin with you may find this way of working challenging, but rest assured that we?ll enable you to make this transition. You will have access to a comprehensive support system that will assist and encourage you, including personal tutors and welfare tutors who can help with both academic and welfare issues, and a formal **transition review (https://intranet.birmingham.ac.uk/student/transitionreview/index.aspx)** during your first year to check on your progress and offer you help for any particular areas where you need support.

Personal Tutor: At the start of your degree, you will be assigned a Personal Tutor who will remain with you throughout your studies to help you in three important areas: supporting your academic progress, developing transferable skills and dealing with any welfare issues.

Delivery of the course
In your first and second years, the course is delivered as lectures, small group workshops, laboratories, computer-based activities, enquiry-based learning and tutorials. A strong emphasis is placed on design and research project work in your third and fourth years respectively.

Laboratory-based practical work forms an integral part of the School's degree programmes. Laboratory classes are embedded within a module and used, not only to develop your experimental practical skills, but also to reinforce concepts introduced in lectures or to explore a particular phenomenon. First year practical sessions, typically, last two hours and increase in length in subsequent years to allow for more advanced experiments.

Small-group tutorials/personal tutorials run alongside the lecture course, addressing any individual problems you may have and allowing you to consolidate the lecture material, as well as test your understanding through problem-solving exercises.

Enquiry Based Learning (EBL) provides an environment where your learning process is driven by enquiry and the lecturer's role is purely as a facilitator. EBL is typically a group activity.

This requires working in a team and you can be assessed in a variety of ways: in either a group or individually, by written reports and/or oral presentations. EBL will give

you a research-orientated approach to a problem, and has a synergy within research-led institutions like the University of Birmingham.

Project work: A strong emphasis is placed on project work in your final year. The range of projects includes practical work in the laboratory, or computer-based projects. You can choose the topic of your project from a pool of titles and work with your project supervisor to tailor the project to your particular research interests.

Assessment methods

The course modules are taught through lectures, tutorial problem classes, case studies, laboratory and/or project work. You will be assessed through a mixture of written examinations and continually assessed coursework. Examinations are taken in May and June.

Assessment methods used include end-of-year examinations, written assignments, and oral presentations, computer-based tests, laboratory and project reports. Each module is assessed independently and most contain some components of continuous assessment, which usually account for 15% to 40% of the marks. Some modules are completely assessed by either examination or coursework.

We place strong emphasis on providing prompt and informative feedback on all pieces of work that you submit during your studies. Feedback comes in a variety of forms, including written feedback on pieces of assessment, class feedback sessions and one-on-one discussions with your tutors. In all cases, the feedback will highlight the good points as well as those areas that require more attention.

As your degree progresses, you will attend fewer lectures and perform more independent studies and practical work in preparation for your final year project.

During your first year the University will require you to undergo a formal 'transition' review, mentioned above, to see how you are getting on and if there are particular areas where you need support. This is in addition to the personal tutor who is based in the School and can help with any academic issue you encounter. Our Academic Skills Centre also offers you support with your learning. The centre is a place where you can develop your mathematical, academic writing and general academic skills. It is the centre?s aim to help you to become a more effective and independent learner through the use of a range of high-quality and appropriate learning support services. These range from drop-in sessions with support with mathematics and statistics based problems provided by experienced mathematicians, to workshops on a range of topics including note taking, reading, writing and presentation skills.

At the beginning of each module, you will be given information on how and when you will be assessed for your particular programme of study. You will receive feedback on each assessment within four weeks, so that you can learn from and build upon what you have done. You will be given feedback on any exams that you take; if you should fail an exam, we will ensure that particularly detailed feedback is made available to enable you to learn for the future.

Employability

Feedback shows that 85%-95% of our students go on to work or study on graduation. Of those in employment, around 95% gain graduate-level jobs and are earning salaries in the region of £23,000-£29,000 pa six months after graduation.

Preparing for your future career should be one of the first things you think about as you start university. As one of our Materials students, exciting career choices will open up to you when you graduate with an accredited degree such as this. You could pursue a career in one of the automotive, aerospace or energy sectors; one of the manufacturing industries; or you could work in other areas of science and technology, such as materials testing or failure analysis. Other areas that favour the problem-solving skills you will acquire are finance, law and marketing as well as teaching and/or research.

Superb opportunities exist for you to gain industrial experience before you graduate. You will gain relevant work experience, and earn money putting into practice the skills and knowledge gained from your degree. Students on placement get involved in serious projects which ask difficult questions that require good engineering answers - and which often lead to sponsorship and/or the offer of a graduate job.

Another option is to join our MEng programme with industrial experience and spend up to six months with one of our industrial partners; usually between your third and fourth study years.

A rich vein of expertise will be available for you to tap into, not only through the University's dedicated Careers Network, but from the School's own industrial liaison officer. From these careers professionals you will gain the skills to help you secure a range of placements from vacation jobs to, eventually, your graduate job.

At School-level, you can opt to add a year to your programme, whatever the course you are studying, and spend this time on placement in industry. You will gain relevant work experience, and earn money putting into practice the skills and knowledge gained from your degree. Students on placement get involved in serious projects which ask searching questions that require good engineering answers - and which often lead to sponsorship and/or the offer of a graduate job. On successful completion of a placement in industry organised by the School, and success in your studies, you will be awarded the Certificate in Industrial Studies to add to your degree and improve your employability prospects.

At University-level, our unique careers guidance service is tailored to academic subject areas, offering a specialised team (in each of the five academic colleges) who can give you expert advice. Our team sources exclusive work experience opportunities to help you stand out amongst the competition, with mentoring, global internships and placements available to you. Once you have a career in your sights, one-to-one support with CVs and job applications will help give you the edge. In addition, our employer-endorsed award-winning Personal Skills Award (PSA) recognises your extra-curricular activities, and provides an accredited employability programme designed to improve your career prospects.

We also offer voluntary work which complements your studies by helping you gain practical experiences in occupational settings while contributing back to society. This can bring new skills that will be useful throughout your future and can make a positive impact on your learning whilst at university. Volunteering enables you to develop skills such as communication, interpersonal skills, teamwork, self-confidence and self-discipline all of which can be transferred into your studies.

Whichever of the above forms of careers guidance, or combination of such, you select you will find your prospects for employment after graduation considerably enhanced. If you make the most of the wide range of careers advice we can offer, you will be able to develop your career from the moment you arrive.

Career destinations of previous graduates include:

- Rolls Royce,
- AeroEngine Controls,
- Jaguar Land Rover,
- BMW Group,
- BP,
- Tata Steel,
- Schlumberger,
- Doncasters Limited,

- Sandvik,
- BAe Systems

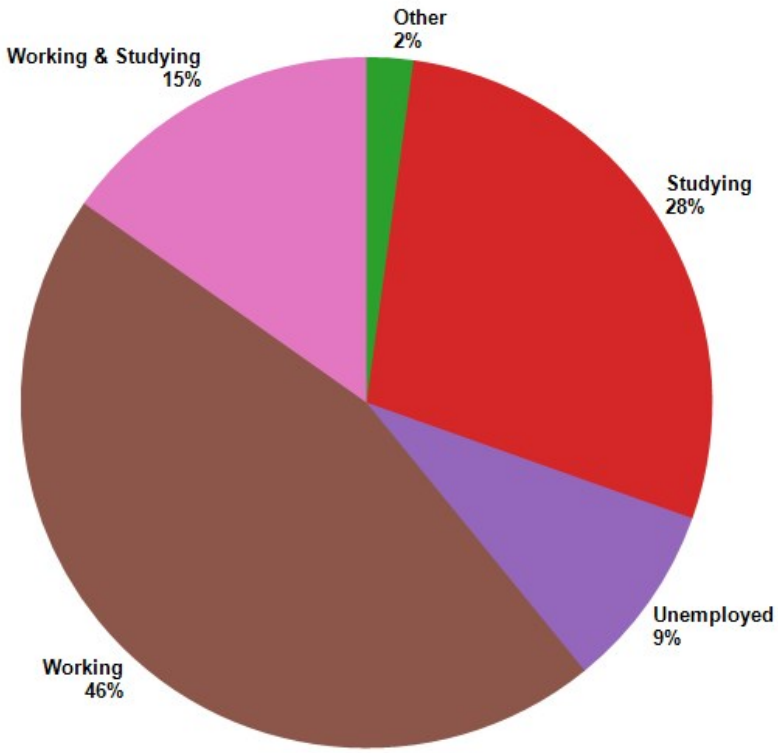
University Careers Network

Preparation for your career should be one of the first things you think about as you start university. Whether you have a clear idea of where your future aspirations lie or want to consider the broad range of opportunities available once you have a Birmingham degree, our Careers Network can help you achieve your goal.

If you make the most of the **wide range of services (https://intranet.birmingham.ac.uk/as/employability/careers/college/eps/index.aspx)** you will be able to develop your career from the moment you arrive.

Destinations of Leavers from Higher Education (DLHE) 2011/12

The DLHE survey is conducted 6 months after graduation.



Examples of occupations

- Applications Engineer
- Engineering Officer Cadet
- Mechanical Engineering
- Advanced Manufacturing Engineer
- Junior Accounts Manager
- Graduate Consultant Engineer
- Teaching Assistant
- School Sports Partnerships Coach
- Product Development Engineer

Further study - examples of courses

- MSc Advanced Materials
- MSc Material Science
- MSc Diagnostic Radiography
- MSc Energy Engineering
- MRes Science and Engineering
- PhD Metallurgy and Materials

Visit the **Careers section of the University website**

(https://intranet.birmingham.ac.uk/as/employability/careers/college/eps.aspx) for further information.

Professional accreditation

Accredited by the Institute of Materials, Minerals and Mining (IOM3) towards CEng status. Also accredited by the Energy Institute (EI).

The Institute of Materials, Minerals and Mining

Additional accreditation **No**

BEng (Hons) Materials Science and Energy Engineering
Full time

To see more details and compare with other courses

Visit UNISTATS

Official data collected by HEFCE

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2014 Website of the Year