University of Birmingham

Sports and Materials Science Joint Honours BSc

Undergraduate degree programme Sports and Materials Science Joint Honours BSc CF62:

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!

Study here and find out why the University of Birmingham was awarded The Times and The Sunday Times University of the Year 2013-14 (http://www.birmingham.ac.uk/news/latest/2013/09/20-sep-Birmingham-announced-as-University-of-the-Year.aspx)

Course fact file

UCAS code: CF62

Duration: 3 years

Places Available: 35 across 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

Related courses

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

Contact

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School of Sport, Exercise and Rehabilitation Sciences (/schools/sport-exercise/index.aspx)

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

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

Details

This three-year, accredited, programme has an NSS student satisfaction rating of 100% (on Unistats this is 95%) and covers all areas in depth.

Success in all sports is increasingly dependent on athletes selecting the best equipment for the conditions. This three-year Joint Honours programme, taught by the School of Metallurgy and Materials and the School of Sport and Exercise Science, gives you an understanding of design and materials in sports equipment in relation to the athlete's behaviour during sport and exercise that is essential to peak performance.

Course structure
The course offers a modular programme of study which normally leads to the award of Bachelor of Science (BSc) in three years .

First and second years

A careful mix of lectures, practicals and case studies during the first two years, develops your understanding of the effects of exercise on the human body, through subjects including:

- Psychology
- Physiology
- Biochemistry
- Biomechanics

In parallel, the properties, selection and processing of metals, polymers and composites are covered using a range of sports equipment examples including shoes, bicycles, rackets and balls. Case studies develop teamwork, communication and IT skills, whilst interaction with the sports industry emphasises the practical importance of your skills.

Third year

In the third year you can specialise in topics that most interest you in Sports Science, whilst expanding into areas such as advanced materials, and design and failure analysis in Materials Technology. These topics lead to your final-year materials-related research project, which will be at the forefront of equipment development – from artificial pitches to Formula 1.

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

Related links

- **Metallurgy and Materials undergraduate degree courses (/schools/metallurgy-materials/undergraduate-courses/index.aspx)**
- **School of Sport and Exercise Sciences undergraduate courses (/schools/sport-exercise/courses/undergraduate/index.aspx)**

Why study this course

- 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.
- The **School of Sport and Exercise Sciences (http://www.birmingham.ac.uk/schools/sport-exercise/index.aspx)** occupies a modern £16.4 million building that houses teaching and research laboratories for physiology, biochemistry, biomechanics, psychology, motor skills, functional anatomy, muscle mechanics and the neurophysiology of movement.
- Our students enjoy exceptionally high employment prospects

If you like the idea of joining our team, please don't hesitate to come and talk to us.

What our students say:

"It's absolutely brilliant – the course is exactly what I wanted to do. I wanted to combine physical science and sport. I love the case studies; for example we did one on tennis rackets and not only did we look at the materials in the racket but also all the marketing aspects of the product."
– Ruth Deaville

"The most enjoyable aspect of my degree programme is that I get to enjoy the benefits of the two different departments. I also know that I'm on a unique programme that I'll be able to use fully when I leave"
– Sian Halliwell

"Having joined the course through my interest in sports science, I found myself increasingly involved in the materials side of the degree. The support and guidance from the staff in the department is second to none, and I ended up doing aerospace research for my dissertation with BAE Systems. I found the experience so rewarding, I stayed on in the department for postgraduate study on the MRES course"
– Malcolm McCardle

"The Sports and Material Science course at the University of Birmingham seemed perfect for me. I had always been interested in sport but also enjoyed studying science at school. After doing my A Levels in PE, maths and physics the course at Birmingham felt like a good way to continue learning in these subjects but in relation to sport and sports equipment design.I thoroughly enjoyed my three years at Birmingham and can honestly say that a large part of that was down to the course.

In my year, there was around thirty students on 'Sportsmat', as its called, and so it was a very personal and interactive type of learning.Not only did the lecturers within the department know everyone on the course but you all get to know each other very well too. I met some of my best friends on that first daunting day in lectures! The course is divided between the metallurgy and materials department and sports science so you get the best of both worlds, the first year is quite general with everyone getting to the same level in all areas but after that options are available.

The materials modules aim to teach the basics of materials technology and the content is strongly linked to sports materials throughout the course, e.g. skis, tennis and formula 1 cars to name but a few. This brings the subject to life. The final year then allows you to specialise and independently research areas which interest you. I would strongly recommend this course to anyone."
- Katharine Mill

Modules

Course structure

The degree programme is split equally between the Schools of Metallurgy and Materials and Sport and Exercise Sciences. The course is structured to enable students to grasp the fundamentals of both halves of the course and subsequently integrate their knowledge through the study of sports equipment case studies in both the design and biomechanics modules of the degree.

The academic year is split into two teaching semesters and an examination session. Semester one is in the autumn and Semester two is in the spring. Exams are held in May. The academic content of the degree is divided into modules, each consisting of a range of components typically including:

- Lectures
- Laboratory sessions
- Class tutorials
- Case studies.

The laboratory sessions, class tutorials and case studies usually form the continuous assessment component of the module, which typically consists of 20 to 30% of the overall module mark.

The course is structured to enable the fundamentals of each half of the course to be introduced in the first year (level 1) and be subsequently developed in later years.

Module outlines of years two and three are available on our UCAS open days.

Module outline

Year One

Properties and Applications of Materials (10 credits)

This module introduces the range of materials used in engineering applications along with some basic selection rules for determining the appropriate materials for a given application. The module also introduces fundamental science that determines the properties of materials, such as bonding types and atomic / molecular structures.

Biomechanics (10 credits)

The module aims to introduce the concepts and principles relating to statics and dynamics. This is accomplished by considering a wide range of sporting examples. The module examines biomechanics from a materials perspective and is focused on the equipment and interactions with the athlete.

Polymers, Composites and Ceramics (10 credits)

The module aims to develop depth of knowledge in the areas of polymer science, composites technology and structure/property relationships in ceramics. The main focus will be to develop qualitative and conceptual understanding with emphasis on mechanical and physical properties. The module will develop concepts introduced in 'Properties and Applications of Materials'

Design and Professional Skills (20 credits)

This module begins with a formal introduction to the design process, computer aided design techniques and project management. The module then develops by considering the material selection process and manufacturing methods associated with equipment production.

Fundamentals of Materials: Shaping (10 credits)

This module concerns the methods by which materials can be processed in the manufacturing stage of production. Casting, forging and welding of metals is considered together with injection moulding, extrusion and adhesive bonding of polymers.

Anatomy and Biomechanics in Sport (20 credits)

The anatomy of the musculoskeletal system are taught with an emphasis on the function of muscles in movements. Specific joint movements are analysed using electromyographic and biomechanical techniques. The principals of movement analysis in sport are discussed to develop an understanding of the theories and procedures that are used in biomechanical analysis of the musculo-skeletal system.

Human Physiology (20 credits)

An introductory course covering the human nervous, cardiovascular and respiratory systems as well as renal, muscle and thermoregulatory physiology.

Psychological foundations of sport and exercise (20 credits)

This module offers a broad survey of the sport and exercise psychology literature comprising four parts. The first part examines individual participants in sport and exercise. The second part of the module covers relevant research on groups, group processes, and intergroup relations. The third part of the module focuses on strategies for performance enhancement. Finally, the fourth part of the module covers material on psychological health and well-being.

Year Two

- Polymer science and Materials Case study (20 credits)
- Materials Engineering Design (20 credits)
- Polymer Engineering and Composites (10 credits)
- Fracture, fatigue and corrosion (10 credits)
- Exercise physiology (20 credits)
- Biochemistry (20 credits)
- Psychology of human movement (20 credits)

Year Three

- Final Year Project (40 credits)
- Design for Manufacture (10 credits)
- Advanced Materials in Sports Equipment (10 credits)
- Literature Review (20 credits)
- Applied Mechanics in Sport (20 credits)
- Option (20 credits)

Final year projects

In addition to our teaching excellence, we have been awarded the prestigious and exclusive award of 6* for our ‘internationally outstanding’ research. We are keen for our undergraduates to get the maximum benefit from our leadership in research and our final year project component of our courses facilitates this.

Research excellence

Metallurgy and Materials and the Interdisciplinary Research Centre (IRC) in Materials Processing together make up the largest centre for materials research in the UK. We have over thirty full-time academic staff in addition to thirty honorary and visiting staff, fifty research fellows and close to 130 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 is in the region of £4.1 million per year. Success in joint research with industry has been recognised by the award of the Secretary of State for Industry’s University/Industry Partnership Prize and the extremely prestigious award of 6* in the Research Assessment Exercise.

Research skills

The students’ research skills are developed and refined in the final year project. This module is a major undertaking and typically consists of up to 2 days work per week for 22 weeks. The research is carried out in a research laboratory and is supervised by a research active member of staff. There is a wide variety of projects of offer each year in a wide range of areas including sports materials, biomaterials, aerospace, automotive (and motorsport).

Examples of recent projects

- Development of carbon fibre composite components for Formula 1 racing cars (Jordan Grand Prix Ltd)
- 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 for golfing applications
- 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 Polyethene for skis and snowboards
- Gripping and slipping in tennis grip tapes
- Development of carbon fibre wheels for high performance track bicycles
- Creation of smart skis using piezoelectric materials
- Suitability of head protection in kickboxing
- Shock absorption in running shoes

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
Scholarships and paid research placements are available for eligible students. Please visit the **scholarships, grants and bursaries page (/undergraduate/fees/funding/index.aspx)** for details; 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)** .

Further queries may be directed to the School of Metallurgy and Materials Undergraduate Admissions Tutor **Mark Ward (mailto:met-admissions@bham.ac.uk)** .

Entry requirements

Number of A levels required: 3

Typical offer: AAB

Required subjects and grades: Must include an A level in one of Mathematics, Biology, Chemistry, Physics, Design and Technology, PE/Sports Science

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: 35 points one subject from Mathematics, Physics, Biology, Chemistry or Design Technology at HL 5 points.

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)

Sports Science brochure (pdf) (/Documents/college-eps/metallurgy/ug/SportsSci.pdf)

Related news and events

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 80%-90% 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 £18,000-£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

"BAE SYSTEMS has collaborated with several Sports and Materials Science students through final year projects. We have consistently been impressed by the quality of their work and these projects have been very useful in opening up new avenues of research to us".
– Deborah Price, Principal Scientist, The Advanced Technology Centre, BAE Systems

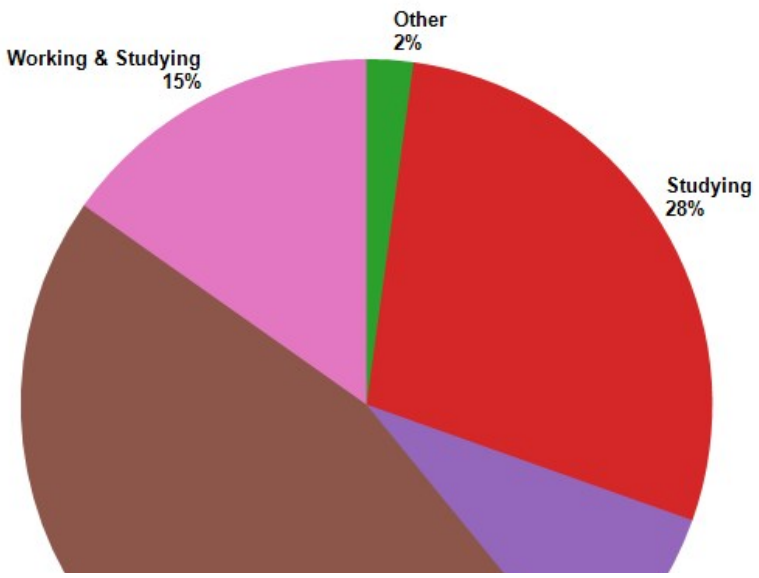
University Careers Network

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.

The Institute of Materials, Minerals and Mining