

Science and Engineering of Materials MRes

Postgraduate combined research and teaching degree programme Science and Engineering of Materials MRes:

This EPSRC-sponsored programme comprises a major research project, which can be based in the University or in industry, and six taught modules, four compulsory and two optional.

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

Course fact file

Type of Course: Combined research and taught

Study Options: Full time, part time

Duration: 1 year full-time, 2 years part-time

Start date: Contact the School directly for further information

Related courses

[Biomaterials MRes \(/postgraduate/courses/combined/metallurgy-materials/biomaterials-mres.aspx\)](/postgraduate/courses/combined/metallurgy-materials/biomaterials-mres.aspx)

[Materials for Sustainable Energy Technologies MRes \(/postgraduate/courses/combined/metallurgy-materials/materials-sustainable-energy-technology-mres.aspx\)](/postgraduate/courses/combined/metallurgy-materials/materials-sustainable-energy-technology-mres.aspx)

[Postgraduate programmes - School of Metallurgy and Materials \(/schools/metallurgy-materials/postgraduate-courses/index.aspx\)](/schools/metallurgy-materials/postgraduate-courses/index.aspx)

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

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

Details

This EPSRC-sponsored programme can be taken on a full- or part-time basis. The programme comprises a major research project, which can be based in the University or in industry, and six taught modules, four compulsory and two optional.

The four compulsory modules are:

- Introduction to Materials*
- Effective Project Management
- Materials Characterisation
- Presentation and Communication Skills/Team Skills Development

You may choose two (or three*) options from:

- Electron Microscopy
- Biomaterials
- Design Against Failure
- Environmental Degradation of Alloys
- Functional Materials
- Intermetallics, Metal Matrix Composites and Ceramic Matrix Composites
- Materials for Sustainable Environmental Technologies
- Net Shape Manufacturing
- Polymer Science and Soft Matter
- Sensors and Composites
- Surface Engineering

*If you have a background in Materials Science, you will take an additional option in place of Introduction to Materials.

We recommend that you start the course at the beginning of the academic year. However, if your background is in Materials Science, then you may start at any time of the year.

Related links

- [Postgraduate programmes - School of Metallurgy and Materials \(\[/schools/metallurgy-materials/postgraduate-courses/index.aspx\]\(http://www.birmingham.ac.uk/schools/metallurgy-materials/postgraduate-courses/index.aspx\)\)](http://www.birmingham.ac.uk/schools/metallurgy-materials/postgraduate-courses/index.aspx)

Why study this course



The quality of the research work in the Department of Metallurgy and Materials has been confirmed by our outstanding performance in successive Research Assessment Exercises.

We are justly proud of this international reputation and are keen to maintain it by encouraging high quality students from materials, physics, chemistry, life sciences or engineering backgrounds to apply to undertake research with us.

We are prepared to help in finding financial support, if needed. If you are interested in coming to do research with us, or with the [Interdisciplinary Research Centre \(IRC\) in Materials Processing \(<http://www.birmingham.ac.uk/research/activity/irc-materials-processing/index.aspx>\)](http://www.birmingham.ac.uk/research/activity/irc-materials-processing/index.aspx), write directly to me or to the contacts given on our website. I look forward to hearing from you.



Professor Paul Bowen, Head, Metallurgy and Materials

[Metallurgy and Materials \(<http://www.birmingham.ac.uk/research/activity/metallurgy-materials/index.aspx>\)](http://www.birmingham.ac.uk/research/activity/metallurgy-materials/index.aspx) and the [IRC in Materials Processing \(<http://www.birmingham.ac.uk/research/activity/irc-materials-processing/index.aspx>\)](http://www.birmingham.ac.uk/research/activity/irc-materials-processing/index.aspx) together make up the largest centre for materials research in the UK. Our Research School comprises more than 20 full-time academic staff in addition to 30 honorary and visiting staff, 30 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 UK and overseas industry. Our research income is around ?4 million per annum.

Most of our research projects involve active collaboration with industrial partners.

Fees and funding

Tuition fees for home/EU students (2015/2016)

Research programmes (including Masters by research) **£4,090***

*Research fees are yet to be confirmed by Research Councils UK, and may change.

Part-time programmes

Most part-time programmes run for two years and their fees are one half of the standard full-time programme fees.

Tuition fees for international students (2015/2016)

International student tuition fees are set at **£17,365**.

For further information please view the [fees for international students \(<http://www.birmingham.ac.uk/international/students/finance/fees.aspx>\)](http://www.birmingham.ac.uk/international/students/finance/fees.aspx) page.

Part-time programmes

UK student visa regulations mean that students classed as overseas for fees purposes may normally only register on a full-time basis.

Learn more about [fees and funding \(<http://www.birmingham.ac.uk/postgraduate/pgt-fees/index.aspx>\)](http://www.birmingham.ac.uk/postgraduate/pgt-fees/index.aspx)

Scholarships and studentships

Scholarships may be available. International students can often gain funding through overseas research scholarships, Commonwealth scholarships or their home government.

For further information contact the School directly or email sfo@contacts.bham.ac.uk (<mailto:sfo@contacts.bham.ac.uk>)

Entry requirements

An upper second-class Honours degree or equivalent in Physical Science or Engineering

Learn more about [entry requirements \(<http://www.birmingham.ac.uk/postgraduate/requirements-pgt/index.aspx>\)](http://www.birmingham.ac.uk/postgraduate/requirements-pgt/index.aspx)

International students

We accept a range of qualifications from different countries – learn more about [international entry requirements \(<http://www.birmingham.ac.uk/postgraduate/requirements-pgt/international/index.aspx>\)](http://www.birmingham.ac.uk/postgraduate/requirements-pgt/international/index.aspx)

[Standard English language requirements \(<http://www.birmingham.ac.uk/postgraduate/requirements-pgt/international/index.aspx>\)](http://www.birmingham.ac.uk/postgraduate/requirements-pgt/international/index.aspx) apply

How to apply

Learn more about [applying \(<http://www.birmingham.ac.uk/postgraduate/courses/apply-pg/index.aspx>\)](http://www.birmingham.ac.uk/postgraduate/courses/apply-pg/index.aspx)

When clicking on the Apply Now button you will be directed to an application specifically designed for the programme you wish to apply for where you will create an account with the University application system and submit your application and supporting documents online. Further information regarding how to apply online can be found on the [How to apply pages \(<http://www.birmingham.ac.uk/students/courses/postgraduate/apply-pg/index.aspx>\)](http://www.birmingham.ac.uk/students/courses/postgraduate/apply-pg/index.aspx)

[Apply now \(<https://pga.bham.ac.uk/lpages/EPSo43.htm>\)](https://pga.bham.ac.uk/lpages/EPSo43.htm)

[Apply now \(<https://pga.bham.ac.uk/lpages/EPSo43.htm>\)](https://pga.bham.ac.uk/lpages/EPSo43.htm)

Learning and teaching

Examples of MRes in the Science and Engineering of Materials Research Projects

- Reliability of optical fibre sensors for smart structures – S. N. Kukureka
- Mechanical reliability of optical fibres for telecommunications – S. N. Kukureka
- Chemistry and stability of localised corrosion sites – A. J. Davenport
- High Resolution Synchrotron X-ray studies of pitting corrosion – A. J. Davenport, T. Rayment
- Simultaneous thermal (DSC), spectral (FTIR) and physical (TMA) analyses of polymers – G. Fernando
- Design, fabrication and evaluation of a novel fibre optic acoustic emission sensor – G. Fernando
- Detection (and modelling) of moisture ingress in composites using optical fibre sensors – G. Fernando
- Self-sensing glass fibre composites: Chemical process monitoring – G. Fernando
- Self-sensing glass fibre composites: Damage detection – G. Fernando
- Characterisation of photo-curable dental resins using a non-contact probe – G. Fernando

Additional projects may be available; contact academic staff in Metallurgy and Materials, Chemistry, Mechanical Engineering, or Chemical Engineering.

Research overview

Our research facilities for materials preparation range from vacuum melting and casting for special alloys, through crystal growth equipment for rare-earth and very reactive alloys to melt-spinning facilities for the production of rapidly cooled alloys, atomizers to make metal powders and laser ablation equipment for the production of multilayer and superconducting materials.

Surface engineering facilities allow plasma nitriding, boriding, carburising and other surface treatments to be carried out on a range of alloys under controlled conditions, and we have recently installed plasma-spray equipment to produce coatings. There are polymer-processing laboratories and the IRC possesses a large plasma-melting furnace, HIP equipment, direct laser fabrication, a laboratory for the hydrothermal synthesis and colloidal processing of ceramics, and the £8 million Net Shape Manufacturing Laboratory.



The physical techniques laboratory contains a range of equipment for processes including VSM, dilatometry, differential scanning calorimetry, electrical resistivity and density measurements. The world-class mechanical testing laboratories consist of approximately 30 facilities for fracture and fatigue studies over the temperature range of -196 to 1,500°C, and are accredited by Rolls-Royce for the acquisition and interpretation of data.

Seven creep machines from Nuclear Electric form the basis of a creep-testing laboratory, and thermogravimetric balances, also donated by Nuclear Electric, allow sensitive oxidation measurements to be made at temperatures up to 1,400°C. There is specialised mechanical testing for polymers and foams, at strain rates from creep to impact. X-ray diffraction facilities provide essential back-up to the crystal growth and alloy preparation activities.

Microstructural assessment is well provided for, with a wide range of optical microscopes and quantitative image analysis, and extensive electron microscope facilities. The Electron Microscope Centre provides a service to all schools in the University, as well as to the Midlands region. The five SEMs include

- a JEOL 7000F with WDX, EDX and EBSD;
- an FEI FEG ESEM with cryo and heating (1500°C) stages.

The TEMs include

- a 200 kV FEI Tecnai F20 FEG(S)TEM with PEELS, EDX and HAADF.

A scanning Auger facility with an X-ray photo-electric spectrometer (XPS) is available for a wide range of surface studies and we also have an atomic force microscope.

The new hydrogen technology laboratory has a range of equipment to characterize the properties of materials in hydrogen. This includes two constant pressure Thermogravimetric Analysers, and a volumetric PCT system to measure the uptake and sorption kinetics of hydrogen storage materials.

A recent addition has been the Netzch differential scanning calorimeter (DSC) with simultaneous thermal analysis (STA). Nicolet Magna-IR infrared and Raman spectrometers are being used to study polymer and ceramic-type materials. Other novel analytical equipment in this category include simultaneous DSC and FTIR, DSC and non-contact thermo-mechanical analysis.

The Department has good facilities for the fabrication and characterization of optical fibre sensors including sensor systems for strain, temperature, vibration, acoustic emission and chemical sensing. The autoclave-based processing of advanced fibre reinforced composites is carried out in the Astro-Physics Department.

We have excellent workshop facilities and a large suite of networked PCs, housed in a computing laboratory provided by Corus, which supplements the extensive computer facilities in individual research groups.

Related staff

[Dr Artemis Stamboulis \(/staff/profiles/metallurgy/stamboulis-artemis.aspx\)](/staff/profiles/metallurgy/stamboulis-artemis.aspx)

Employability

University Careers Network

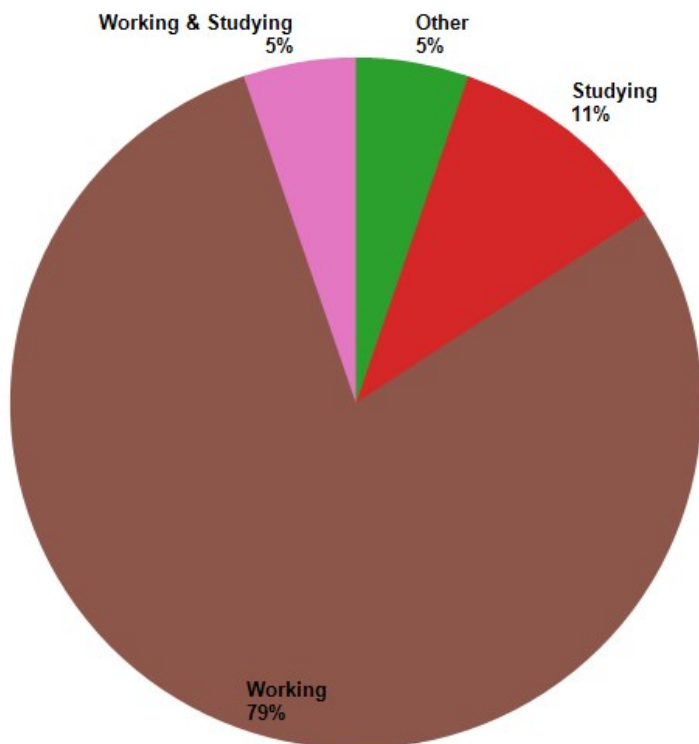
Preparation for your career should be one of the first things you think about as you start university. Whether you have a clear idea of where your future aspirations lie or want to consider the broad range of opportunities available once you have a Birmingham degree, our Careers Network can help you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

Our unique careers guidance service is tailored to your academic subject area, offering a specialised team (in each of the five academic colleges) who can give you expert advice. Our team source 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.

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 (postgraduate taught graduates)

The DLHE survey is conducted 6 months after graduation.



Examples of employers

- Burhill Group Limited
- BAE Systems
- Softcat
- Royal Air Force
- Decathlon UK
- Ministry of Defence
- Corona Technology Limited
- BP
- KBR

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.

