

### **NEW COURSE**

# **Engineering and Physical Sciences**

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Dentritic microstructure of a cobalt-based casting

Forensic investigation of a car steering gear

## MSC/POSTGRADUATE DIPLOMA IN ENGINEERING MATERIALS DESIGN AND APPLICATIONS

#### SUBJECT BACKGROUND

All areas of engineering; mechanical, electrical, chemical, civil, aerospace, marine and electronic engineering are critically reliant on an understanding of engineering materials for their efficient and effective use. Engineers and scientists continuously seek to push the boundaries of industrial designs to higher performance, whether this arises from stress, temperature, or increased durability and endurance. Materials engineering thus holds the key to meeting design challenges for hostile environments and higher performance. This course aims to equip engineers and scientists with the necessary tools and knowledge to tackle these design challenges in modern engineering. The course is generic and applies equally to the aerospace, marine, automotive, microsystems, electronic, textile, construction, process and biomedical industries

### **GRADUATE OPPORTUNITIES**

The multidisciplinary nature of this course makes its graduates attractive to a variety of industrial and research based organisations. The integration provided by materials engineering at post-graduate level and a core science or engineering discipline at an undergraduate level thus provides a unique blend of expertise suitable for solving problems at the design, manufacturing or operational stages.

Applicable industries include microelectronics, marine, aerospace and automotive technologies, and the process and manufacturing industries. Graduates could find themselves in private or government sectors as design or production engineers, consultants or researchers.

#### **COURSE STRUCTURE**

The MSc can be taken either full time (over one year) or part time (over two years), whereas the Diploma is offered over a 10 month (full time) or 24 month (part time) period. Both full and part time students start their course in October and complete the taught modules by April. Successful completion of these modules is followed by a dissertation project for MSc students and a shorter project for diploma students. These research projects can be university- or industry- based which give students the opportunity to develop specific skills to enhance their employability.

The degree of MSc is awarded to students passing eight taught modules each involving 120 effort hours and a dissertation, which involves 840 effort hours. Passes in six taught modules and a project equivalent to 240 effort hours will merit the award of a Diploma. Part time students are required to complete the taught modules successfully before the start of their dissertation or diploma project.



Part of UV LIGA fabricated micromotor stator



## **SCHOOL OF Engineering and Physical Sciences**

#### **COURSE STRUCTURE**

The course is based on emerging research knowledge on the applications and performance of materials underpinned by advanced level principles of engineering science. Core modules address the types of materials in turn and also key elements of performance required for design, manufacturing and service performance engineering. Optional modules deal with key materials aspects of the emerging technology of microsystems.

Students undertake a total of eight taught modules. Two of these modules are picked from the choice of four whilst the other six are compulsory core modules. Core modules are designed to suit the background requirements of students from various core disciplines in engineering or physical/chemical sciences.

#### **CORE MODULES**

- Introduction to the Properties and Applications of Metals, Ceramics and Composites Structure property relationship and phase diagrams of metallic, ceramic, cermet and composite materials at an advanced level
- Polymers and Composites Microstructure, properties and phases of industrial polymers, polymer flow, viscoelasticity, polymer processing and polymerisation methods
- Durability of Engineering Materials Tribological design analysis including surface topography, Hertzian stress analysis, lubrication, friction, wear and corrosion
- Computing and Numerical Techniques Numerical techniques including finite element analysis, Eigen value problems, linear and nonlinear programming, genetic algorithms and simulated annealing
- Surface Engineering Characterisation and Analysis Surface characterisation techniques including XRD, EDX, EPMA, SEM, AFM analysis of surface engineered components including vapour deposition and thermal spraying
- Forensic Materials Engineering Forensic engineering investigations based upon case studies and failure investigations of various accidents/incidents including space shuttle, Comet airlines and Tay Bridge

#### **OPTIONAL MODULES** (choose two from)

- Assembly Packaging and Testing of Microsystems
- Fundamental Principles of Actuation and Sensing
- Laser Microengineering
- Fundamentals of Microengineering for Biotechnology

#### ENTRANCE REQUIREMENTS

For MSc level entry, students must hold a good (first or second class) honours degree in an engineering discipline or in the physical or chemical sciences. Prospective postgraduate diploma students should contact the school to discuss the suitability of their qualifications.



Component of a micromotor 1mm in diameter

Contact stress contours (Von-Mises) simulating stress distribution in a rolling element hybrid ceramic bearing



Functionally graded thermal spray cermet coating.

#### SCHOLARSHIPS AND AWARDS

UK and non-UK EU students should contact the school about studentships or other scholarship opportunities at **pgt@eps.hw.ac.uk**. Overseas students should contact the school for further details of the Overseas Scholarships Awards Scheme at

ospgt@eps.hw.ac.uk

#### APPLICATION PROCEDURE/ CONTACT INFORMATION

Application forms can be found on the University's online postgraduate prospectus at

#### www.postgraduate.hw.ac.uk/apply

or alternatively for application form and further enquiries contact the EPS Graduate School at the address below.

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