

Engineering

www.warwick.ac.uk/go/engineering

PROFILE

RESEARCH DEGREES

MSc, PhD, EngD

TAUGHT COURSES

MSc in Biomedical Engineering

MSc in Electronic Systems

MSc in Electronic Systems with Communications

MSc in Electronic Systems with Sensor Technology

MSc in Engineering Systems

MSc in Energy and Power Electronic Systems

MSc in Mechanical Engineering Systems

WMG Courses:

MSc in Digital Manufacturing Management

MSc in e-Business Management

MSc in Engineering Business Management

MSc in International Technology Management

MSc in Management for Business Excellence

MSc in Manufacturing Systems Engineering

MSc in Process Business Management

MSc in Programme and Project Management

MSc in Supply Chain and Logistics Management

Post-experience Certificate/Diploma in Engineering Business Management (part-time)

Postgraduate Award/Certificate/Diploma in selected subjects

DEAN OF SCHOOL

Professor J P K Seville, MEng, MA Camb, PhD Sur, CEng, FREng, FICHEM

POSTGRADUATE ADMISSIONS TUTORS

Engineering (excluding Manufacturing) Research Degrees (MSc, MPhil, PhD):

Professor N G Stocks, BSc, PhD Lancaster

Manufacturing Systems Research Degrees

(MSc, MPhil, PhD, EngD):

Dr K Neailey, BSc Leeds, PhD Liv

TAUGHT COURSES

MSc: Professor P J Thomas, Dip.I.Phys, Dr.rer.nat., Göttingen

WMG Courses: John Waller

FURTHER INFORMATION

For brochures on the courses offered by the School of Engineering, please contact the following at The University of Warwick, Coventry CV4 7AL:

Research Degrees and Taught Courses in Engineering (excluding Manufacturing)

Postgraduate Admissions Secretary,

School of Engineering

Tel: +44 (0)24 7652 2046

Fax: +44 (0)24 7641 8922

E-mail: pgadmissions@eng.warwick.ac.uk

Website: www.warwick.ac.uk/go/engineering

Research Degrees (Manufacturing)

Barbara Boneham, Research Degrees Office, WMG, International Manufacturing Centre

Tel: +44 (0)24 7652 4357

Fax: +44 (0)24 7652 4307

E-mail: engd@warwick.ac.uk

Websites: www.warwick.ac.uk/go/engd or www.wmg.warwick.ac.uk

Full-time MSc (Manufacturing)

Course Secretary,

WMG, International Manufacturing Centre

Tel: +44 (0)24 7652 3691

Fax: +44 (0)24 7652 2943

E-mail: wmg-masters@warwick.ac.uk

Website: www.go.warwick.ac.uk/wmgmasters

Part-time MSc and Post-experience Diploma (Manufacturing)

Professional Programmes Administrator, WMG,

Engineering Management Building, Westwood

Tel: +44 (0)24 7652 3976

Fax: +44 (0)24 7652 4144

E-mail: wmgptmasters@warwick.ac.uk

Website: www.go.warwick.ac.uk/wmgptmasters

Overseas Courses

Contact relevant overseas partner directly, or, for more information, including contact details, visit www.go.warwick.ac.uk/wmgmasters and click on 'Study Overseas' link on the left-hand side of the page.

THE SCHOOL

The School of Engineering at Warwick is one of the largest of its type in the UK. There are approximately 200 academic teaching and research staff, with 800 postgraduates following taught courses or undertaking research. The School has become firmly established as one of the best of its kind in the UK, performing highly in the 2008 Research Assessment Exercise. Research is managed within 10 research groups: Civil; Digital Technologies; Electronics, Power and Microsystems; Fluid Dynamics; Information and Communication Technologies; Manufacturing Technologies; Materials & Sustainability;

Innovative structural forms – research in
the School of Engineering



Operations & Business Management; Sustainable Energy Engineering & Design; and Systems, Measurement & Modelling.

The School has a unified philosophy that spans, and wherever possible integrates, most branches of Engineering. It is large, thriving, well-equipped and active in many fields of teaching and research. Key research areas within the above groups include sensors, biomedical engineering & modelling, nanotechnology, water and environmental management, intelligent systems, technology for developing countries, image processing, optical systems, power distribution systems and automotive control. Engineering staff participate in the Centres for Scientific Computing, Molecular Organisation and Assembly in Cells (MOAC), Systems Biology and Cognitive & Neural Systems. Collaborations exist with other departments such as the Warwick Medical School, Warwick Horticulture Research International, Chemistry, Physics and Mathematics and the School also maintains extensive industrial links.

External Links

A substantial proportion of the research carried out is in close collaboration with international industry (e.g. BAE Systems, Ford, Sony, Honeywell, Philips Semiconductors, Hewlett-Packard, Jaguar and Land Rover), and many local companies, including those based on the University of Warwick Science Park and involved in the International Automotive Research Centre.

Research in the School is currently supported by over 150 grants and industrial contracts of a total value of about £20 million pounds.

RESEARCH INTERESTS

Civil Engineering

Group Leader: Professor I Guymer, BSc, DIS, PhD Birm, MCIWEM, CEng

Key research areas: *Structures/materials:* characterisation of components, joints and whole structures of new and traditional materials, innovative or unusual forms. Structural performance of pultruded FRP shapes, systems and connections; flexible building systems for modular construction; design guidance. Human-structure interaction, health monitoring and smart structures. *Water engineering:* the environment and sustainability; transport processes; urban drainage and coastal hydraulics; environmental management tools; fate of soluble pollutants and contaminated fine sediments within rivers, urban drainage systems and the coastal environment; Hyporheic exchanges, transient storage and impact of discharges on receiving water ecology; Nearshore, wave enhanced mixing and estuarine processes. *Geotechnical Engineering:* disturbances caused by ground engineering methods and the impact of environmental change on soil behaviour. Visualization using digital imaging and Particle Image Velocimetry for natural granular and

cohesive materials. Novel clay-like “transparent soils” developed to quantify movement around structures, machines and tools, e.g. augers, piles.

Development Technology Unit: technologies appropriate to rural areas of tropical countries and “bottom up” industrialisation. Water lifting devices for irrigation and drinking water, very low cost pumps for water extraction from rainwater harvesting tanks. Domestic roofwater harvesting. The impact of urban drainage (storm water management options) and pollutants from agricultural farming and aquatic farming on the water quality and water ecology in Asia.

Fluid Dynamics

Group Leader: Professor P J Thomas, Dipl-Phys, Dr. rer.nat. Göttingen

Research in this area is co-ordinated through the Fluid Dynamics Research Centre. The Centre promotes the collaboration of engineers, mathematicians and physicists through an active programme of seminars and meetings.

We conduct experimental, computational and theoretical research on a wide range of fundamental and applied industrial problems in fluid dynamics, including: drag reduction; laminar-turbulent transition and flow-stability; fluid-structure interactions; aeroacoustics; vehicle aerodynamics; turbulent flows; bluff body aerodynamics; high-speed aerodynamics; dynamical systems (chaos and complexity); bio-medical mechanics; rotating flows; geophysical flows; particle-laden flows.

Information and Communication Technologies

Group Leader: Dr E L Hines, BSc CNA, GDMA, PhD Brad, DSc Warwick,

Key Research areas: Communications and signal processing, spanning diverse topics bound together by core mathematical and experimental methods. Our four laboratories are:

Communication Systems Laboratory: One of the UK’s leading centres for free space optical transmission or optical wireless, which offers high bandwidth without spectrum congestion. Conducts research in signal optimisation for mobile multimedia communications, novel receiver enhancements and advanced modulation methods. Also pioneering work on intelligent network coding to increase communication network capacity. Other activities include ultra-wide bandwidth transmission, spreading transmission power over a very large bandwidth. “Smart” or cognitive radio to optimise spectrum usage is also a rapidly expanding area. Future work will focus on the development of energy efficient modulation schemes and optoelectronic signal processing in imaging and remote spectroscopy applications for medical and security scanning applications.

Applied Electromagnetics and High Frequency

Telecommunications Laboratory: Computational and experimental research in the areas of microwave

engineering and electromagnetics. Current research focuses on the finite element method and periodic structures. Future research will include work on absorbing boundary conditions in the finite element method and novel frequency selective surfaces.

Image Processing and Expert Systems Laboratory:

Development of algorithms to analyse images and video sequences, including: multiscale classification of image textures; recovery of 3D scene information via structure-from-motion and shape-from-silhouette approaches; formulation of lens transfer functions in tandem with depth-from-defocus approach for acquiring image depth; hexagonal 2D image sampling for accurate machined surface height measurements; and self-evaluation fuzzy expert systems. Further theoretical studies will include 3D object tracking/navigation/verification and medical diagnoses.

Intelligent Systems Engineering Laboratory: Intelligent Systems/Computational Intelligence and their applications. Current and ongoing work includes projects with Warwick HRI (WHRI) and other European partners: Sustainable crop production; Civil Engineering – streamlined models of contaminant dispersion in rivers; Warwick Manufacturing Group (WGM) – identifying acoustic emission (AE) failure signals; CERN – fault tolerant methods for the Large Hadron Collider; the UK Ambulance service and the Warwick Medical School (WMS) – development of serious games and mobile learning; Warwick Psychology Department – classification of data and extraction of rules from Electroencephalogram (EEG) data; WMS – identification of clinically recognisable patient subgroups in non-specific lower back pain data and diabetes data; Safe Medical Systems Limited – design of Anaesthetist Decision Support System. In telecommunications, development of protocols for mobile ad hoc networks (MANETs); benchmark multi-wavelength resilient optical networks; optimised phase compensating microwave dielectric lenses. Future areas of activity include security, food security, energy and medicine.

Electronics, Power and Microsystems

Group Leader: Professor Philip A Mawby

Key research areas: Next generation silicon carbide technology – this material has many advantages over silicon, such as high temperature and high power handling capabilities. Fully operational power metal oxide silicon field effect transistor (MOSFET) switches can operate at voltages in excess of 3.3kV, with applications ranging from rail transport to wind power generation. The group also has research interests in power IC technology, with energy management applications in areas as diverse as PC power supplies, mobile telecommunications, electric vehicles, displays etc. Effective energy management in these volume chip applications can deliver step change reductions in energy waste. Current research involves developing 100V devices compatible with the 0.6 microns CMOS technology.

Sustainable Energy Engineering and Design (SEED)

Group Leader: Professor R Critolph, DSc Warw, BSc, PhD, S^{ton}

Key research areas: Energy efficiency; energy in the built environment; sorption and heat pumps and refrigeration/cooling systems; renewable energy technologies, in particular solar energy systems; thermal energy storage; advanced heat transfer, sustainable design for the built environment.

Systems, Measurement and Modelling

Group Leader: Dr R. Peter Jones, BSc, MScTech, PhD Sheff, CEng, FlinstMC, CMath, FIMA

Key research areas:

This group comprises academic staff drawn from the areas of engineering concerned with systems, measurement and modelling. The research group was created to encourage synergistic activities across the three areas and stimulate opportunities for interdisciplinary research work. The group's activities are categorised under three laboratories that identify its major research strengths: **Biomedical and Biological Systems:** dynamics of metabolic, pharmacokinetic and pharmacodynamic systems; dynamic human modelling; metal ion uptake and effects on neuro-degenerative disease; and nano-bioengineering.

Precision Engineering and Surfaces: nanotechnology and metrology, tribology and surface characterisation, micro-systems, novel instrument design.

Stochastic and Complex Systems: applied stochastic and nonlinear systems; cochlear implants; fault-tolerant network design; biomimetics; system modelling and identification; automotive systems engineering.

WGM

Director: Professor Lord Kumar Bhattacharyya, KB, CBE, BTech Kharagpur, MSc, PhD Birm, HonD(Univ) Sur, HonDEng UTM Malaysia, FREng, FIEE (Head of Group)

WGM is the largest academically-based manufacturing group in Europe. There are over 200 staff actively involved in industrially oriented research. We work with industry to improve competitiveness by establishing national and international partnerships; developing an enterprise culture unfettered by traditional approaches, and continually upgrading the knowledge base.

Since its creation in 1980, WGM has pioneered new ways of working involving close partnerships between the industrial and academic base. Our approaches and processes are now being adopted by many organisations around the world.

Our research interests are multi-disciplinary, ranging through strategy, engineering management and operational analysis, product design, materials, sustainability and the

environment, information technology and e-commerce, manufacturing processes and automation, customer interface, experiential engineering and surface analysis. We have also moved into new sectors including healthcare, financial services and the built environment. The total value of current research projects is over £12m.

WMG runs four main buildings: the International Manufacturing Centre (IMC), the International Automotive Research Centre (IARC), the Engineering Management Building and the new International Digital Laboratory, which houses a £50m programme of digital research, education and knowledge transfer. It hosts the Institute of Digital Healthcare, created in partnership with NHS West Midlands.

Major UK-Government sponsored research programmes housed in WMG include:

The Engineering and Physical Sciences Research Council (EPSRC)-sponsored Warwick Innovative Manufacturing Research Centre with a five-year consolidated programme of innovative research in design and new product introduction, agile manufacturing technology, materials, systems engineering, and strategy and operations.

The Department of Trade and Industry-sponsored National B2B Centre, which offers free consultancy and impartial advice to help small and medium sized businesses across the West Midlands adopt e-business technology and practices. The Centre is a partnership between industry, Advantage West Midlands, the European Regional Development Fund and WMG.

The IMC is home to WMG's Engineering Hall – a unique facility housing state-of-the-art robots, machine tooling equipment, lasers and automotive projects. The total value of equipment is in excess of £18m.

The IARC houses the Premium Vehicle Centres of Excellence which build on the recently-completed £72m Premium Automotive R&D Programme which enabled the development of leading edge capability in the premium automotive industry.

The Engineering Management Building is the centre for high-quality professional development programmes including post-graduate, post-experience and bespoke courses.

WMG is also a Knowledge Transfer Partnership and its programme is one of the largest in the UK. Knowledge Transfer Partnership schemes are being undertaken with companies in the Midlands, in which associates work full-time in industry under the joint supervision of a member of the firm and a member of the academic staff, and may register for a higher degree.

WMG's extensive research portfolio is configured into four thematic areas – Materials and Sustainability, Digital Technologies, Manufacturing Technologies, Operations and Business Management.

Materials and Sustainability

Group Leader: Professor Richard Dashwood

The group is conducting research into understanding materials, and their effective processing and usage. These are core industrial requirements which underpin much of the manufacturing industry. Metals, plastics, composites and special materials are all covered. Work on metals includes casting, machining and laser processing of aluminium, magnesium, steel and titanium. Polymers research includes a major programme on injection moulding of plastics with in-built functionality. Modelling of the processes and their integration with design are given particular emphasis. WMG also undertakes a wide range of research into small-scale and distributed process technologies developing materials preparation techniques including solid state reaction, sol-gel technology, gel-decomposition, solvent extraction and near room-temperature synthesis. Application areas include catalysis, electromagnetic applications, and thermophotovoltaics.

Research projects include: Novel joining processes, Lightweight Materials, Medical Materials, Thermoplastic and Thermoset Processing, Laser Machining and Joining, Casting Design.

WMG is conducting research to enable companies to both benefit from the opportunities afforded by 'green' technology and to be ready to face impending environmental legislation. Issues include design for re-use and the appropriate choice of materials, the use of more environmentally friendly/recyclable materials in products and the development of processes to enable the re-use of waste materials and air quality, particularly in-vehicle. A showcase for the research is the World First EcoF3 motor racing platform. Much of the work is in collaboration with Warwick HRI.

Research projects include: Hybrid Vehicles, Recycling, Sustainable Manufacturing, Biodegradable Materials, Clean Manufacturing Technologies.

Key staff include: Biomaterials and Sustainable Development (Dr Kerry Kirwan, Dr Kajal Mallick, Dr Steve Maggs, Dr Geraint Williams); Metals and Alloys (Professor Richard Dashwood, Dr Stuart Barnes, Dr Kevin Neailey); Hybrid Vehicles (Professor Paul Jennings); Polymers and composites (Professor Gordon Smith); Cutting Processes (Dr Stuart Barnes and Dr Jim Wallbank).

Digital Technologies

Group Leader: Professor Sadie Creese

The International Digital Laboratory is a new £50 Million state-of-the-art capability designed to facilitate major collaborative research opportunities, create effective knowledge transfer between academia and industry, generate new knowledge, skills and content with an impact on business, society and the economy. It is a multi-

disciplinary research centre combining Warwick Manufacturing Group's expertise with that in other disciplines including psychology, neuroscience, medicine, computer science, mathematics, digital media and the related fields of visualisation, and digital sound. Leading UK companies and public bodies with an interest in innovative research have come together to support the growth of the Digital Lab. We have major collaborative activities with organisations including Bruel & Kjaer, IBM, Jaguar & Land Rover, NHS West Midlands, Siemens and PTC. Clear links have been demonstrated between the effective exploitation of ICT and the achievement of competitive edge. The need is to create ICT infrastructures that support and enable new, more effective routes to market.

Research projects include: applied neuroimaging, CAD/CAM, digital innovation, digital product lifecycle management, e-business, e-portals, e-security, enterprise modelling, experiential engineering, health informatics, high fidelity graphics, informatics, modelling and simulation, object-based application integration techniques, positive soundscapes, systems of systems, visualisation and virtual reality.

Key staff include: Applied Neuroimaging (Professor Gemma Calvert); Digital Innovation (Professor Lucy Hooberman); Digital Product Lifecycle Management (Professor Darek Ceglarek, Dr Eduardo Izquierdo); e-business (Dr Jay Bal); e-security (Professor Sadie Creese, Dr Michael Goldsmith); Hybrid Vehicles (Professor Paul Jennings, Andrew McGordon); Informatics and Health Informatics (Professor Vinesh Raja); Modelling and Simulation (Professor Rajat Roy); Systems Integration (Ross McMurrin); Visualisation and Virtual Reality (Professor Alan Chalmers, Dr Silvester Czanner, Dr Kurt Debatista).

Manufacturing Technologies

Group Leader: Professor Ken Young

Research ranges from the development of innovative high-technology manufacturing and assembly processes, through to the improvement and control of long-established processes. Activities combine modelling and experimentation to address issues in manufacturing processes including forming and forging, casting and moulding, machining, surface engineering, and energy-beam (primarily laser) processing. Assembly processes research includes the use of robotics, and novel joining techniques. Research is being carried out to enable the quick and accurate production of prototypes, low-cost/flexible and sustainable tooling, and low-volume products. The research builds on, and further develops the applicability of, emerging technologies in rapid prototyping (including selective laser sintering, stereolithography and laminated object manufacturing) thermal spraying, reverse engineering, and virtual reality. Facilities include all of the major fast prototyping and tooling processes.

Research projects include: Flexible Production Processes, Structural Integrity, Non-Destructive Testing, Automation and Robotics, Prototyping Processes, Rapid Product Introduction and Medical Engineering.

Key staff include: Automation and Robotics (Professor Ken Young, Dr Li Han); Customer Interface Technologies, Haptics and Vehicle Craftsmanship (Dr Mark Williams); Experiential Engineering – including the subjective evaluation of products and environments (Professor Paul Jennings, Dr Rebecca Cain); Manufacturing Processes (Professor Ken Young, Dr Steve Maggs) and Rapid Prototyping (Dr Greg Gibbons).

Operations and Management

Group Leader: Professor Rajat Roy

WMG is undertaking a number of research projects addressing the strategic choices facing companies. Activities range from globalisation approaches, processes to developing business, manufacturing and technology strategies and associated performance measurement, benchmarking and costing techniques, through to the understanding and operationalisation of 'next generation manufacturing paradigms'. The practical utility of currently fashionable terms including lean, agile, flexible, virtual, and customised is being explored through a series of research activities.

Research to enable companies and other organisations to effectively implement manufacturing strategies includes organisational structures, manufacturing layout, lean and agile approaches, maintenance and asset management, simulation and scheduling, quality management and data collection, and knowledge based systems.

Research projects include: Complexity, Data Analysis, International Collaboration, Lean Agile Aerospace, Next Generation Manufacturing, Organisational Change, Risk and Simulation.

Key staff include: Data Analysis (Dr Ian Tuersley); Globalisation, Outsourcing and Offshoring (Professor Sujit Banerji); Industrial Economics (Christopher Moir); Integration (Dr John Garside, Jane Marshall, Jeff Jones); Lean (Mairi Macintyre, Mike James-Moore); Operations – Management (Professor Rajat Roy, Dr Laura Martinez-Solano and Dr Dawei Lu); Quality and Leadership (Paul Roberts).

RESEARCH DEGREES

PHD and MSc by Research

Postgraduate students are accepted to study for an MSc by research (1 to 2 years) or a PhD (3 years). Part-time registration is also possible, requiring, of course, a longer period of study. An outline of current work has been given above; new research topics are regularly adopted. The coverage of most branches of engineering within a single large School makes it easy to pursue inter-disciplinary research at Warwick. Research degree courses do

not contain any interim examinations, but students are expected to attend lecture modules on appropriate topics. Students are required to submit annual progress reports. Regular meetings are held with a progress panel, established for each student to monitor progress and give advice. Research students are encouraged to give seminars, publish their findings and to undertake (paid) laboratory demonstrating work.

Recent Theses

- 📖 *An Experimental Investigation of Transition in the 3D Boundary Layer over a Compliant Disk*
- 📖 *Power-control Design of Resonant Converters*
- 📖 *Pressure Pulse Propagation in the Human Spinal System*
- 📖 *Lubrication Aspects of Mineral Oil and Sulphur Additive on Machining of Medium Carbon Steel at Low Cutting Speeds*
- 📖 *Novel Pin Tooling*

The Engineering Doctorate

The Engineering School also offers a radical alternative to the PhD: the Engineering Doctorate (EngD), which is aimed directly at industry's needs. It is extremely flexible and can suit senior and junior staff alike. The participants can be company employed or University employed and credit can be given for industrial experience. Applications from people currently working in, or sponsored by, a manufacturing company are particularly welcome.

Warwick was one of the original pilot universities for this relatively new degree. There are now 20 centres – each with a different theme – in the UK, with Warwick concentrating on manufacturing topics.

The full EngD course runs for four years and is based on a project, or series of projects, normally carried out in a company. The projects must demonstrate innovation in the application of knowledge to the engineering business. The work has to make a significant contribution to the performance of the company and thus has to be in the mainstream of operations. A crucial hallmark is that projects must include a thorough analysis of options, based on best practice elsewhere, and demonstration of key competencies such as project planning and control.

Approximately 20% of the time is spent on modules (selected from the modular masters courses described under Taught Courses) to develop a wider range of competencies. The post-module assignments and reports on the research project are all submitted as a final portfolio, rather than the traditional single subject thesis. There are about 60 candidates on the EngD course, with the main emphasis being on manufacturing. Preference is given to candidates with industrial experience.

The Engineering and Physical Sciences Research Council is supporting this course and a number of studentships are available each year to those who meet the EPSRC requirements for research studentships.

Recent Portfolios

- » *Supply chains in aviation repair*
- » *Management of complexity*
- » *Market-led house building processes*
- » *Novel laser welding processes*
- » *Sound quality engineering*

TAUGHT COURSES

MSc IN BIOMEDICAL ENGINEERING

MSc IN ELECTRONIC SYSTEMS

MSc IN ELECTRONIC SYSTEMS WITH COMMUNICATIONS

MSc IN ELECTRONIC SYSTEMS WITH SENSOR TECHNOLOGY

MSc IN ENERGY AND POWER ELECTRONIC SYSTEMS

MSc IN ENGINEERING SYSTEMS

MSc IN MECHANICAL ENGINEERING SYSTEMS

Full-time: 1 year

OBJECTIVES

The objectives of the various MSc courses above in Engineering are: to provide training in advanced research methods; to bring you to a high level of knowledge and understanding in topics central to advanced engineering; to enable you to undertake research; to allow you freedom to choose from a substantial range of topics in order to match your individual background and career interests; to provide the experience of a substantial piece of original research or innovative design. The courses are particularly suitable if you intend to progress either to industrial research and development, or to a PhD course. They are also suitable for the Master's level training, required as part of any application for Chartered Engineer (CEng) status through the various institutions within the UK.

The **MSc in Biomedical Engineering** is designed for students from either a Science or Engineering background, who wish to study advanced topics in this area. It is also suitable for candidates with a Biology or Biomedical background. The aim is to demonstrate how Engineering techniques can be applied in this area.

The **MSc in Electronic Systems** aims to give advanced-level training and experience in various topics in Electronics, with choices from a wide range of modules in the Electronics area, plus the ability to choose modules in more specialist topics. There are also variants in this choice, with an additional specialisation from core modules. These are the **MSc in Electronic Systems with Communications**, and the **MSc in Electronic Systems with Sensor Technology**.

The **MSc in Energy and Power Electronic Systems** aims to give more background in these areas, with modules in power electronics and energy and sustainability. It is suitable for those students with

some Electronics background, who are interested in these topics in particular.

The **MSc in Engineering Systems** aims to give the student the maximum choice of master's-level modules across the whole Engineering discipline, so that knowledge is gained across a wide spectrum of Engineering topics.

The **MSc in Mechanical Engineering Systems** will be of interest to those students wishing to obtain advanced level training in Mechanical Engineering.

ENTRY SPECIFICATIONS

Normally, you should have obtained at least a second class honours degree in a suitable branch of Engineering, or the equivalent in a suitable Science/Engineering degree. Overseas applicants should have IELTS 6.5 or TOEFL.

COURSE OUTLINE

The formal coursework is based on the modular system. Students are required to take a number of core taught modules, plus additional optional modules, depending on the MSc course chosen. In all cases, a Research Project has to be completed, and a dissertation submitted at the end of the project. The project may either be supervised directly by a member of staff from the School of Engineering, or, subject to the approval of the Course Director, be undertaken outside the University in a suitable industrial or other research laboratory. When the project is undertaken outside the University, an academic supervisor from the School of Engineering will be appointed to advise on the scope of the investigation. Initial project work is integrated with the Research Methods module during the first term of the course. Work on the project continues throughout the full period of the full-time course.

Teaching of all modules within the taught component of the chosen course is completed before the beginning of the Summer Term. Candidates who satisfy the examiners in the taught part of the course then pass on to full-time work on the project. The exact module choices within each of the MSc course variants listed above can be found on our website, www.eng.warwick.ac.uk/postgrad/ where details of the admissions procedure can also be found.

Should a candidate not reach the standard required for the MSc in the taught component of the course, a reduced project may be assigned. Satisfactory completion of this project would lead to the award of a Postgraduate Diploma. Assessment of each module may be by one or more of a number of methods, including written tests, presentations, essays, reports on laboratory or computational investigations and design exercises, as detailed in each module syllabus. Assessment of the project work is by a dissertation and presentation.

The MSc with distinction is awarded for outstanding performance in the modules and in the project.

ASSESSMENT

The modules will be assessed by assignments to be completed soon after each module, and the project will be examined based on a dissertation and presentation.

PART-TIME STUDY

Students who wish to study part-time for the Engineering courses described above, are encouraged to apply.

WMG

WMG runs an extensive programme of postgraduate and post-experience taught courses. The courses can lead to a Master's Degree (with sub-qualifications of Postgraduate Diploma, Postgraduate Certificate or Postgraduate Award), or a Post-experience Diploma (with a sub-qualification of a Post-experience Certificate). The courses are modular, each module being usually of one week's duration for the Master's level courses, and half a week's duration for the Post-experience level courses.

The courses are run in close collaboration with companies. In some circumstances, modules may be taken as stand-alone short courses.

There are currently some 100 full and half-week modules which can be combined to achieve one of the following degrees:

MSc IN DIGITAL MANUFACTURING MANAGEMENT

MSc IN E-BUSINESS MANAGEMENT

MSc IN ENGINEERING BUSINESS MANAGEMENT

MSc IN INTERNATIONAL TECHNOLOGY MANAGEMENT

MSc IN MANAGEMENT FOR BUSINESS EXCELLENCE

MSc IN MANUFACTURING SYSTEMS ENGINEERING

MSc IN PROCESS BUSINESS MANAGEMENT

MSc IN PROGRAMME AND PROJECT MANAGEMENT

MSc IN SUPPLY CHAIN AND LOGISTICS MANAGEMENT

Postgraduate Diploma, Certificate or Award available in the above subjects.

Full-time: 1 year (MSc)

Part-time: 3 years (for the MSc, less for the sub-awards)

POST-EXPERIENCE CERTIFICATE/DIPLOMA IN ENGINEERING BUSINESS MANAGEMENT

Part-time (only): 18 months/2 years

OBJECTIVES

The aim of the **Digital Manufacturing Management** course is to provide you with the knowledge, understanding and skills needed to play an active role in planning, implementing and managing the use of digital manufacturing systems in industry and to understand the integration benefits from linking business IT systems with operational systems.

The overall aim of the **e-Business Management** course is to provide technology and service-based companies with employees who can lead the e-Business transformation. You will graduate with the underpinning knowledge and theory in e-Business Management and technologies enabling you to adopt enterprise management roles.

The **Engineering Business Management** course aims to provide personal and vocational development for potential and experienced managers, giving a thorough understanding of an integrated approach to the operation and management of engineering and manufacturing focused businesses.

The **MSc in International Technology Management** provides a world-class international graduate development course encompassing both the technical aspects and the operational, economic, human and political perspectives of modern international technology-based business.

Management for Business Excellence is a combination of internal excellence in how things are done (enablers) leading to outstanding business performance (results). Excellence is recognised worldwide through awards such as the European Quality Award, the Baldrige Award and the Deming Award as well as national awards that are based on these. This programme has been designed to deliver a detailed understanding of the philosophies, strategies, processes and techniques that enable and deliver enterprise excellence in technology-based organisations.

The **Manufacturing Systems Engineering** course aims to provide a thorough understanding of the technical, economic and organisational constraints, and their interaction, in the operation of the whole manufacturing system. The objective is to produce a competent manufacturing engineer capable of combining a technical function with both decision-making and implementation abilities.

The **Process Business Management** course aims to provide you with knowledge and understanding of the key technical, business and societal issues relevant to the operation and development of globalised process industries at an advanced level that equips you to make original and informed contributions to advance and develop these industries.

The **Programme and Project Management** course aims to support the development of personnel for engineering, manufacturing, IT services, process-based and other organisations by developing your capability to manage and lead single and multiple projects (i.e. programmes) in technology-based and other organisations.

The **Supply Chain and Logistics Management** course is structured around the key value creating processes within sets of manufacturing and service companies which constitute a complete supply chain; and the contracts and relationships and technologies which enable these processes. These core competencies are placed within the context of

the global economy. The central content is the concept of a supply network, constructing the relationships which bring it into being, commissioning the technologies which enable it to operate, managing the input, the material and information flow, and distributing the product.

All the courses consider the design and operation of core processes within engineering/manufacturing and technology-based businesses and both personal and business improvement through the management of change.

ENTRY SPECIFICATIONS

For the MSc, the normal entry requirement is a second class Honours degree, or equivalent qualification, preferably in an engineering or scientific discipline. Other qualifications combined with relevant industrial or business experience will also be considered.

For the Post-experience Diplomas, you should be able to demonstrate, through your work activities, that you have the intellectual and personal abilities required for the course. While formal academic qualifications for entry are not necessarily required, you are expected to be in, or being prepared for, a position of responsibility, and you will have the opportunity to demonstrate the application of the acquired skills within your sponsoring organisation.

COURSE OUTLINE

For details of the modules available for each of the courses, see our website www.wmg.warwick.ac.uk

Courses are constructed by making appropriate selections from the available modules, in the light of specific balance of core subjects suitable for the award for which you are registered. In addition, your previous experience, current needs and future aspirations and (where appropriate) sponsoring bodies are taken into account in consultation with the respective course tutor and the Academic Director of Graduate Studies. The courses also include a substantial industry-based or related individual project component.

ASSESSMENT

On all the courses assessment is continuous, with, for part-time participants, a substantial work-based element. For part-time participants the project work is supervised and assessed by industrialists as well as academic staff. There are no formal examinations.

INDUSTRIALLY SPONSORED COURSES

WMG offers a range of study modes and levels for company sponsored participants. The courses are designed for engineers, technicians and managers. Engineering Business Management (EBM) is the generic title used for courses focused on developing a participant's capability to manage in an engineering/manufacturing or technology-based company.

The part-time Master's programme is aimed at developing leaders of change. This is an intensive course that requires significant commitment from the sponsoring company and the individual.

Participants will typically be aged between 25 and 35 years with an engineering or science background, or management experience in technology-based companies.

The part-time Post-Experience courses are for existing managers and team leaders who may not necessarily have formal qualifications but do have significant industrial experience.

Short courses and bespoke courses are designed to meet specific individual or company needs. Additionally, courses can be tailored from the Master's or Post-experience modules.

Company managers assist in and approve the definition of an individual participant's module selection. This ensures that a participant's programme is both personally and industrially relevant.

These industrially-sponsored activities are based at Arden House, a specially-designed self-contained centre with integral seminar and syndicate rooms, dining and social facilities and over 120 individual study bedrooms. This is available throughout the year.

OVERSEAS COURSES

In addition to the UK-based courses we offer several of our courses overseas, in conjunction with locally based partners. These are in:

China and Hong Kong, with Hong Kong Polytechnic University

EngD, MSc in Engineering Business Management and MSc in Manufacturing Systems Engineering (both MScs awarded jointly with Hong Kong Polytechnic University), Postgraduate Awards in e-business Management, Supply Engineering and Logistics. The taught courses are offered on a part-time basis only.

www.igds.polyu.edu.hk

Hong Kong, with VTC

MSc in Programme and Project Management on a full-time basis.

www.vtc.edu.hk/wmg

N Cyprus, with European University of Lefke

MSc in Engineering Business Management on a full-time basis.

www.lefke.edu.tr

India, with Confederation of Indian Industry

MSc in Engineering Business Management on a part-time basis.

www.ciionline.org (follow links to Naoraji Godrej Centre of Excellence)

Malaysia, with BATC, Universiti Teknologi Malaysia

MSc in Engineering Business Management and MSc in Supply Engineering and Logistics on a part-time basis.

www.batc.edu.my

Russia, with the Bonch-Breuvich Saint-Petersburg State University of Telecommunications

MSc in Engineering Business Management on a part-time basis.

www.sut.ru

Singapore, with SIM and SIMTech

MSc in Engineering Business Management on a part-time basis over 2 years.

www.sim.edu.sg

Thailand, with Chulalongkorn University

MSc in Engineering Business Management on a full-time or part-time basis.

www.rcmse.eng.chula.ac.th