Welcome to Warwick

Warwick is a world-leading university, consistently ranked in the top ten in the UK league tables and the last Research Assessment Exercise.

At Warwick you’ll become part of a thriving postgraduate community that accounts for 43% of our student population. The campus is home to staff and students from 145 different countries – a truly cosmopolitan environment, where internationalism is promoted and celebrated in a large number of student-led events.

Our research-led teaching develops continuously to reflect cutting-edge technology and the emerging needs of industry. Our proactive multi-disciplinary approach ensures you will gain technical knowledge and skills in problem-solving, management and communications. You will leave with the ability to transfer and apply your knowledge in fields such as biomedicine, energy technologies, power networks and wireless communications and tunnelling.

Contents

<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postgraduate study in the School of Engineering</td>
<td>03</td>
</tr>
<tr>
<td>Research overview</td>
<td>04</td>
</tr>
<tr>
<td>Example research activities</td>
<td>05</td>
</tr>
<tr>
<td>Campus life</td>
<td>06</td>
</tr>
<tr>
<td>International students</td>
<td>07</td>
</tr>
<tr>
<td>Advanced Mechanical Engineering</td>
<td>08</td>
</tr>
<tr>
<td>Biomedical Engineering</td>
<td>10</td>
</tr>
<tr>
<td>Communications and Information Engineering</td>
<td>12</td>
</tr>
<tr>
<td>Energy and Power Engineering</td>
<td>14</td>
</tr>
<tr>
<td>Tunnelling and Underground Space</td>
<td>16</td>
</tr>
<tr>
<td>Applying to Warwick</td>
<td>18</td>
</tr>
<tr>
<td>Frequently asked questions</td>
<td>19</td>
</tr>
</tbody>
</table>
Postgraduate study in the School of Engineering

When you join the School of Engineering, you will become part of Warwick University’s dynamic international community of postgraduates who are following taught programmes, or undertaking research.

An Integrated approach

As one of the largest integrated engineering departments in the UK, the School of Engineering covers the majority of major engineering disciplines. The courses are structured, developed and delivered by academic staff who are experts in their fields and passionate about what they do. They often draw on individual research experience, so you can be sure you are benefiting from the very latest knowledge on the subject.

Flexibility

Our taught Masters courses normally take a year to complete as a full-time student. We offer a selection of optional modules within each course, allowing you to tailor your studies to your specific requirements. Throughout your course you will develop an impressive range of transferable skills to equip you for the future.

The Graduate School

The Graduate School is here to ensure that you grow intellectually and personally and to help you participate fully in the academic community that you’re joining.

At Warwick we provide you with unique opportunities to develop your own ideas from across subject boundaries. You can get involved in workshops, conferences and postgraduate lunches, as well as social events, where you you can network and have fun.

Learning resources

The library is situated in the middle of campus, only a short walk from Engineering. Recently transformed by a £3.5 million refurbishment, it houses over 1.2 million volumes. There are also extensive online resources available, including 30,000 electronic journals. You can use the library electronically, on or off campus.

The Postgraduate Hub is a facility where you can work, study and participate in a variety of events, such as workshops, conferences and seminars. You can also access support for writing your dissertation.

The Grad Deck is a purpose-built space for postgraduate students. With a fully-equipped self-catering kitchen, it can be used for independent group study meetings, social events, or simply to relax.

Industry links

A substantial proportion of the research carried out is performed in close collaboration with companies from the main sectors of engineering, examples include Arup and Morgan Sindall in construction, AstraZeneca in pharmaceuticals, GE Power Conversion (Converteam) in energy efficiency, Thales and Airbus from aerospace to name a few.

Student Careers and Skills Centre

Our careers representative hosts regular careers clinics in Engineering, so you can drop-in and seek advice on a variety of topics, such as career opportunities, job applications and CVs. The University of Warwick is widely recognised by employers as an ideal recruiting ground.
Research overview

The School of Engineering encompasses a wide-range of high-quality research activities, covering the main disciplines of civil, electrical and electronics, mechanical and chemical engineering.

As an integrated department we are able to promote and pursue cross-collaborative research on a wide scale. Our research strengths are the foundation for all our research and research-led teaching. We have more than 60 research-active academics and over 50 postdoctoral research staff, and have achieved £30M research income in the past 5 years. Of the unified engineering departments, we were the 3rd highest rated in the 2008 Research Assessment Exercise for General Engineering.

Our research groups consist of Sensors and devices; Electrical Power; Communications and Signal Processing; Civil Engineering; ThermoFluids; Systems Modelling and Measurement; and Chemical Engineering. We have three overarching themes: Biomedical Engineering, Energy and Cities, which allow for interdisciplinary research and ally with the University’s Global Research Priorities. We undertake research in collaboration with other Warwick departments, as well as institutions and companies world-wide.

The School houses several specialist research facilities including a world-class clean room facility, a large environmental chamber, specialist biomedical and chemical labs, and a state-of-the-art solar simulator.

A new £3M ‘research exchange’ is planned for 2015 that will provide 1000m² to house cross-faculty interdisciplinary research. This high-quality environment will: co-locate academic, research and visiting staff and research students; provide state-of-the-art IT and video conferencing facilities and promote interaction through meeting rooms and a social area.

Many of our staff are key members of wider activities and networks including: Warwick Institute for the Science of Cities (WISC) and Warwick Medical Imaging Network (W-MIN).
Example research activities

Warwick FIRE

Led by Professor Jennifer Wen, Warwick FIRE is a multidisciplinary research laboratory for both fundamental and applied research into fire and explosion hazards, as well as accidental release of hazardous materials. The laboratory was formed in May 2013 and is supported by substantial funding from the EPSRC, the European Commission, the Technology Strategy Board and industrial organisations from both within the UK and abroad.

There are three main threads in our research activities:

- Fundamental research through model development and study of generic flow configurations.
- Cross cutting safety issues related to energy.
- Cross cutting safety issues related to buildings and the environment.

Warwick FIRE draws on resources in terms of facilities and academic staff from the Fluid Dynamics Research Centre (FDRC), the Centre for Scientific Computing (CSC) and the Sustainable Energy Engineering & Design Research Group (SEED). Academic colleagues from these groups are involved with the supervision of existing researchers as well as the development of new projects. Colleagues from FDRC are in particular providing considerable technical support in fundamental fluid dynamics and numerical modelling.

Food and Fermentation (FAMISHED project)

The principle goal of this work is to initiate strong, long-term collaborative activities between the Warwick Medical School, the School of Engineering and the University Hospital Coventry and Warwickshire (UHCW). Led by Dr James Covington, the group’s expertise is in smell – specifically artificial olfaction (so called electronic noses). These instruments work on a similar principle to the human nose, identifying smells by their ‘aroma’ instead of identifying all the chemical components. E-noses could meet existing and emerging healthcare needs.

The potential impact could be in three areas:

- Such instruments could provide key information, allowing clinicians to rapidly diagnose and treat patients.
- Rapid clinical diagnosis; reducing stress (from waiting for results) and monitoring response to therapies.
- E-noses have a relatively low unit cost and a very low running cost.

Their long term vision is to develop a new generation of non-invasive, rapid, portable instruments that will detect a broad spectrum of ailments. The team applies and evaluates this technology (developed at Warwick) to a variety of medical disorders, specifically the detection of digestive and metabolic disorders from the olfactory signature. This area was specifically chosen due to the inability of modern medical lab-based techniques to identify these diseases sufficiently early.

Interdisciplinary Centre for Storage, Transformation and Upgrading of Thermal Energy (i-STUTE)

Prof Bob Critoph is the lead for i-STUTE, a consortium project funded through the UK Research Councils’ Energy Programme. It brings together four institutions with an external academic, private and governmental organisation network. The Centre will develop technologies to reduce energy consumption and deliver cost-effective heating and cooling which will help the UK achieve its target of a reduction in greenhouse gas emissions of 80% by 2050.

The project brings together cutting-edge engineering advances with economic, behavioural and policy expertise to produce solutions that are both technically excellent but also appealing to business, end-users, manufacturers and installers.

The Centre involves technologists from the University of Warwick’s School of Engineering and researchers at Warwick Business School together with London South Bank University, the University of Ulster and Loughborough University.

warwick.ac.uk/engineering
Location

Our campus offers a great mix of urban and rural life. You are well provided for on campus with the Students’ Union and a wide-range of facilities including a supermarket, cafés, restaurants, post office, launderettes, banks and health centre. We’re easily accessible by road, rail or air from all parts of the UK and overseas. Birmingham International Airport is 20 minutes away, you can reach London in just over an hour by train and we are close to historic centres such as Stratford-upon-Avon - Shakespeare’s birthplace and home to the Royal Shakespeare Company (RSC).

Accommodation

Dedicated postgraduate accommodation is available on-campus at a range of rent levels. All halls are well furnished, maintained to a high standard and have high-speed internet access. We provide bed linen and blankets or duvets and look after basic cleaning. All accommodation halls have residential staff to ensure your wellbeing.

You are also well provided for off-campus, with nearly 400 properties in Coventry, Kenilworth and Royal Leamington Spa managed by Warwick Accommodation. They are all within easy reach via regular bus services, which run between the city/towns and campus. We also help students seeking accommodation suitable for couples and families.

Warwick Sport

During 2013 £1.5 million was invested in developing our sports facilities. There’s something to offer everyone, from a state-of-the-art gym, swimming pool and tennis centre, to athletics track, 60 acres of outdoor playing fields and three all-weather floodlit pitches. There are over 70 clubs, providing the opportunity to try something new or compete in your chosen sport.

Warwick Arts Centre

Situated in the middle of campus and housing two theatres, a concert hall, a cinema and an art gallery. Warwick Arts Centre showcases some of the best in UK and international drama, comedy, dance, art, film and live music. There are often great ticket deals for University of Warwick students. Many clubs and societies use these facilities to put on their own shows.

Students’ Union

Warwick Students’ Union is one of the largest in the UK with over 240 societies to choose from. There’s something to suit everyone, with a lively programme of events and some of the largest student festivals in the world, such as One World Week. ‘The Students’ Union is a great place to make new friends, develop essential skills and improve your employability.
International students

The School of Engineering is supported by the International Office who provide a personal contact while you are at the University.

The office will help you through the application process, arrival in the UK and throughout your time at Warwick. Help and advice is also available from the regional teams.

Coming to visit

If you are in the UK you are welcome to visit the campus while you are deciding where to study, or before you begin your studies. The best way to visit is through the weekly campus tours on Wednesday afternoons. Current students show you around and answer any questions you may have about studying at Warwick or life on campus.

warwick.ac.uk/study

Immigration advice

The Immigration Service within the International Office provides free, confidential advice and assistance to international students before and during their studies. Information and advice on the latest Immigration guidance can be found on their website.

warwick.ac.uk/immigration

Live chats

Each week, representatives from the International Office will be available to answer questions about studying at the University of Warwick. There will also be dedicated Engineering chats and information chats on immigration or orientation.

warwick.ac.uk/livechat

Orientation

An exciting and interactive residential programme is held each year in the week leading up to the start of Autumn term. The four-day programme is packed full of activities, trips, social events and information sessions to welcome students and help them adjust to living and studying in the UK.

warwick.ac.uk/orientation

In-country events

During the year, representatives from the University of Warwick will attend fairs, visit schools and universities and hold receptions for offer holders. Details of the events held in your country are available online.

warwick.ac.uk/international
MSc Advanced Mechanical Engineering

Our MSc in Advanced Mechanical Engineering MSc is designed for those wishing to develop the versatility and depth of knowledge to deal with new and unusual challenges across a wide range of disciplines within engineering and beyond. The course is suitable for graduate engineers and scientists who wish to pursue a career in industry using advanced engineering techniques, or those wishing to gain in-depth knowledge for a career in research.

The course places particular emphasis on the skills necessary for the correct application of computational methods and packages in mechanical engineering analysis. Through selecting modules from a wide range of options, you can tailor the course to your particular needs and interests.

The course fosters an independent learning ability, which is necessary for continuing professional development and acquiring new skills at the highest level.

The School of Engineering has strong research in three thematic areas of: Biomedical Engineering, Energy and Cities. These research themes are pursued within the optional modules of the Advanced Mechanical Engineering MSc, along with fluid mechanics for which Warwick has one of the largest research groups of its kind. As well as taking optional modules in highly topical and relevant subjects, you will be able to pursue a research project within one of these highly successful research groups.

**Individual project**

The individual project is often linked with industrially sponsored research within the School of Engineering. Projects include design, measurement and/or analysis of experimental data, or analysis of survey based research.

**Recent project titles include:**
- Modelling and Simulation of Biological Control Systems
- CFD for electric car battery cooling system design
- Sniffing out disease: The detection of human diseases by electronic nose
- Patterns of locomotion - towards advanced pedometry
- Gearbox design for wind turbines to withstand electrical faults
- Developing and testing an improved solar thermal collector (for hot water)

**Core Modules**

**Systems Modelling and Simulation**

This module provides an introduction to techniques in systems analysis and mathematical modelling for application to physical processes across a range of engineering disciplines. You will learn techniques for the simulation of systems models, in particular the approach to the application of physical laws to formulate appropriate dynamic systems representations, and their subsequent analysis using linear and non-linear methods. The module will also cover the application of computational tools for systems analysis and simulation.

**Precision Engineering and Microsystems**

This module provides a rigorous understanding of design from first-principles, which is then applied at the limits of practical performance. You will produce and defend conceptual design solutions for applications that make unusually high demands for mechanical stability, precise motion control or that benefit from high degrees of miniaturisation. Special manufacturing methods needed for high-precision systems and micro-devices are also covered.
Dynamic Analysis of Mechanical Systems

Progress in understanding natural mechanical systems and in designing new machines depends upon an ability to model and analyse them by the methods of classical mechanics.

This module introduces students to methods of mathematically describing kinematic and kinetic behaviour in three-dimensional mechanisms. It provides physical insight into their behaviour and shows how the concepts are applied to real systems in applications drawn from a variety of fields including robotics, aerospace, automotive, robotics and biomechanics.

Finite Element Methods

This module introduces the fundamental principles of finite-element analysis and modelling for static and dynamic problems. You will then learn how to apply the method in practice using commercial FE software (Abaqus) and to critically assess and evaluate the results. The module also provides an introduction to this important stress analysis technique and shows how it may be used to design components.

Computational Fluid Dynamics (CFD)

This module provides a fundamental understanding of the main numerical techniques and establishes a critical view on the use of CFD as part of the design process. The fundamental theory and numerical methods of CFD for the analysis of mechanical and aerospace engineering flows are covered. The method is then used to apply numerical partial differential equation (PDE) theories to fluid problems. Commercial software (STAR-CCM+) is used to solve complex problems in fluid engineering and to optimise design parameters.

Optional Modules

- Advanced Fluid Dynamics
- Fuel Cells and Energy Storage
- Heat Transfer Theory and Design
- Mathematical and Computational Modelling
- Renewable Energy

KEY FACTS

MSc Advanced Mechanical Engineering

Entry requirements
British Second Class Honours degree or overseas equivalent in Engineering

Language requirement
(apply to non-native English speakers only)
IELTS: 6.5
Toefl iBT: 92
PTE: 62
CAE: 60+

Course duration
12 months full-time

Study programme
5 core modules 75 credits
3 from 5 optional modules 45 credits
Individual research project 60 credits

Assessment
Exams, plus individual assignments, some group work and a research project.

Chartered Engineer status
This course meets the academic requirement for Chartered Engineer (CEng) status when combined with an accredited first degree.

Fees and funding
Fees information is available on our website.
warwick.ac.uk/pgfees

Further information
W: warwick.ac.uk/ame
T: (0)24 7652 2046
E: eng-pgadmissions@warwick.ac.uk
MSc Biomedical Engineering

The MSc in Biomedical Engineering offers a unique opportunity to study fundamental concepts in Biomedical Engineering adopting a systems approach, which is not commonly offered at other Universities within the UK. This unusual approach will enable you to consider new perspectives in tackling research problems in the sector and equipping you with skills that will make you highly employable in industry.

The course recognises that this is a fast-evolving subject area and therefore provides an overview of the research developments that have lead to established clinical practice and those areas that are still conceptual and experimental.

The Biomedical Engineering MSc is open to graduates in any physical science (such as engineering, maths, physics or chemistry), but is also suitable to graduates of the life sciences or medicine, providing you can demonstrate that you have appropriate mathematical ability.

Individual project

The individual project is often linked with industrially sponsored research within the School of Engineering. This entails an in-depth experimental, theoretical or computational investigation of a topic chosen in conjunction with an academic supervisor.

Recent project titles include:

- Bone Investigation using Infrared Detection
- Modelling Gas Exchange in the Human Respiratory System
- Modelling of Acute Hypercalcemia Immunotherapy Treatment
- The Proliferation and Differentiation of Osteoblast Cells on Engineered Biocomposite Surfaces

Core Modules

Systems Modelling and Simulation

This module aims to provide students with an introduction to techniques in systems analysis and mathematical modelling for application to biomedical processes. It will be illustrated how the techniques for the analysis of systems, and the general systems approach, are highly relevant to processes of a multi-disciplinary biomedical engineering nature.

Physiological & Compartmental Modelling

The module will illustrate how the computational and analytical mathematical tools currently available to mathematicians, physicists and engineers are being applied in the life sciences. The module will introduce the concept of creating appropriate models of human function, using both mechanistic and data based approaches. Computational packages will also be employed for data analysis and simulation (e.g. Matlab). It will also be illustrated how models can be developed and applied over a variety of scales, from the cell based microscopic level up to the macroscopic holistic level.
Biomedical Materials

This module provides an overview of natural and engineered materials employed in medical applications, with an emphasis on material properties, functionality, design and material response in the biological environment. You will gain an understanding of various classes of biomaterials (metals, polymers, ceramics, composites and biologic such as collagen), which are capable of mimicking/emulating complicated functions of hard and soft tissues. The module will cover implanted and tissue engineered materials of various descriptions, including prosthesis and external appliances (casts, braces etc). This will also include the replacement of human parts with artificial devices and engineered tissues, and the problems encountered with the design of these implants.

Directed Reading

For this module you will conduct an in-depth study related a specific biomedical topic through the use of journal papers and other research articles. Support for the project and input to the writing of a report will be received from leading academics within the School and also practicing clinicians within the chosen subject area.

Signal and Image Processing

This module equips students with the theoretical background and software skills for 1-dimensional digital signal processing and 2-dimensional image processing. You will develop an extensive knowledge of specific skills, such as the principles of digital filters coupled with transferable high-level programming skills.

Optional Modules

- ASICs, MEMS and Smart Devices
- Computational Fluid Dynamics
- Optical Engineering and Image Processing
- Precision Engineering and Microsystems

KEY FACTS

MSc Biomedical Engineering

Entry requirements

Good first degree in any physical science (such as engineering, maths, physics or chemistry). Also open to graduates of the life sciences or medicine, providing it can be demonstrated that they have appropriate mathematical ability.

Additional entry requirements

Applicants are expected to demonstrate appropriate mathematical ability. See our website for further details.

Language requirement

(appplies to non-native English speakers only)

IELTS: 6.5
Toefl iBT: 92
PTE: 62
CAE: 60+

Course duration

12 months full-time

Study programme

5 core modules 75 credits
1 from 4 optional modules 15 credits
Individual research project 90 credits

Assessment

Exams, plus individual assignments, some group work and a research project.

Chartered Engineer status

This course is accredited by the IET as meeting the academic requirement for Chartered Engineer (CEng) status when combined with an accredited first degree.

Fees and funding

Fees information is available on our website.

Further information

W: warwick.ac.uk/bioe
T: (0)24 7652 2046
E: eng-pgadmissions@warwick.ac.uk
MSc Communications and Information Engineering

The MSc in Communications and Information Engineering provides a comprehensive education in the essential elements of modern communication and information engineering. Information theoretic underpinnings are provided in conjunction with the physical layer aspects of both optical and radio transmission together with signal processing and contemporary radio networking.

The broad approach and wide-ranging expertise in the School of Engineering enables you to choose from topical and diverse optional modules encompassing the design of application specific integrated circuits, micro-electromechanical systems and optical engineering. We also offer cross-discipline optional modules (in conjunction with the Department of Computer Science), which provide an insight into the approaches used to handle the increasing amount of data being collected in modern society (big data).

Graduates will be well equipped for employment in the plethora of branches of the modern information and communication revolution. Recent graduates occupy positions in industries ranging from core network provision to software support, and the course is also the perfect platform for progression to a research degree.

**Individual project**

To complement the taught modules, a substantial individual project is also undertaken. This provides you with the opportunity to put your knowledge into practice with an in-depth experimental, theoretical or computational investigation on a topic chosen in conjunction with an academic supervisor.

**Recent project titles include:**
- Computational Modelling of Microwave Free-Space Filters
- Dynamic Noise Filter for Adaptable Wireless Communications Systems
- Ethernet Passive Optical Network Simulation
- Forward Error Correction for Spectrally Sliced Transmission
- Optimising Microstrip Antennas using Genetic Programming
- Underwater Acoustic Communications

**Core Modules**

**Advanced Wireless Systems and Networks**

This module focuses on the architecture of networks, its key components, the industrial performance metrics, and both simulation and mathematical modelling techniques used to design and optimise networks. The knowledge will provide you with an advanced understanding of wireless communication systems, covering the emerging challenges related to capacity growth in urban areas, cost and energy efficiency, large-scale modelling, and network integration, all crucial areas in the development of telecommunications.

**Information Theory and Coding**

This module provides the understanding and analytical tools necessary to apply information theory to a range of modern problems in communication engineering. In particular, you will gain knowledge of information and entropy, of the principles of coding for both error correction and coding, of the concept of channel capacity, and emerging information theory topics. You will develop the skills to apply these techniques to modern communication and signal processing systems used within the ICT industry.
**Wireless Communications**

This module focuses on fundamental wireless theory and its application in the physical layer of a wireless communication system. This includes antennas, propagation, receiver and equaliser methods, shadowing and diversity, and the operation of cellular communication systems. These will you with the essential elements to embark on a career in wireless communications, whether this is in equipment design, or in more general system specification and engineering roles.

**Optical Communication Systems**

This module presents the key elements in optical communication systems including optical device principles, optoelectronic systems integration and optical networking. The focus is on specialist knowledge of the detailed strategies and techniques involved in the design and analysis of optical communication systems. These will include both optical fibre and free space optical transmission and include coverage of the relevant general communication principles and their application to optical communication systems.

**Signal and Image Processing**

This module equips students with the theoretical background and software skills for 1-dimensional digital signal processing and 2-dimensional image processing. You will develop an extensive knowledge of specific skills, such as the principles of digital filters coupled with transferrable high-level programming skills.

**Optional Modules**

- ASICs, MEMS and Smart Devices
- Optical Engineering
- Data Mining (from Computer Science)
- Foundations of Data Analytics (from Computer Science)
- Multimedia Processing, Communications and Storage (from Computer Science)
MSc Energy and Power Engineering

Our MSc in Energy and Power Engineering is designed for graduates wishing to acquire the additional knowledge and skills required by a power engineer, including the latest developments in renewable energy and smart grids, making use of modern sensing, communication and signal processing technologies.

The course is delivered by a team of world-class research-active academics in energy and power engineering, most of whom have had a career in industry. This guarantees that the course material is always up-to-date and reflects the reality of both industry and society.

This course is suitable for graduates in electrical/electronic engineering, general engineering, mechanical engineering or physics, or closely related disciplines.

**Individual project**

You will carry out an individual research project that may be of industrial significance. The projects undertaken often come directly from the strategic partners of the School such as GE, Siemens Wind Power, Mott Macdonald, National Grid and Western Power Distribution, giving you valuable experience of working within industrial partners on problems of practical significance.

Recent project titles include:
- Condition based maintenance strategy in power systems
- Energy footprint of power device fabrication
- HVDC connection study for offshore wind
- Intelligent management of distributed generation
- Motor drive simulation for hybrid electric vehicles
- Power electronics system modelling using wavelet transforms
- Reliability of offshore wind turbines

**Core Modules**

**Power Electronic Converters and Devices**

This module introduces the concept of power electronics as power processing and control, and presents the whole range of applications of power electronics in today’s society. You will become familiar with power semiconductor devices as basic switching elements used in power electronic converters, their operation and their applications. You will develop an understanding of the issues present in converter and device design, including the impact of physical layout and heat dissipation.

**Electrical Machines and Power Systems**

This module will introduce the design and characteristics of electrical machines and to explain the principles of their control. You will establish analytical and simulation models of the main components in modern electrical power systems (generators and network components including HVDC), develop skills for power system analysis (load flow, short circuit and stability) and gain in-depth knowledge of the concept of smart grids.
Operation and Control of Power Systems

This module establishes a comprehensive understanding of the factors driving the development of modern power systems. You will achieve a sound understanding of the challenges posed in operating advanced systems, in order to achieve the technical, environmental as well as social-economical objectives. The module will introduce advanced operational (including protection) and control solutions based on current and future generations of communication, future communication and power electronics technologies. You will develop analytical skills for power system planning and design studies.

Fuel Cells and Energy Storage

This module introduces the principles of modern energy storage and fuel cell systems and their applications (grid scale storage, vehicle propulsion and portable electronics). You will develop a firm grounding in the thermodynamic principles of electrochemical, electrical and mechanical energy conversion, focusing on modern fuel cells and energy storage methods.

Renewable Energy

This module will provide in-depth knowledge of renewable energy technologies, including their design and development. You will learn about existing and proposed renewable energy systems, assess these technologies against economic, engineering and other criteria in an active solution-seeking approach. Two of the most promising technologies, wind power and solar energy, will be covered in-depth as examples of optimisation in mechanical and electrical engineering designs. You will also study other technologies such as geothermal, biomass, ocean and hydro power.

Optional Modules

- ASICs, MEMS and Smart Devices
- Heat Transfer Theory and Design
- Optical Communication Systems
- Signal and Image Processing
- Systems Modelling and Simulation
- Wireless Communications

KEY FACTS

MSc Energy and Power Engineering

Entry requirements
British Second Class Honours degree or overseas equivalent in Engineering

Language requirement
(apply to non-native English speakers only)

IELTS: 8.5
TOEFL iBT: 92
PTE: 62
CAE: 60+

Course duration
12 months full-time

Study programme
5 core modules 75 credits
3 from 6 optional modules 45 credits
Individual research project 60 credits

Assessment
Exams, plus individual assignments, some group work and a research project.

Chartered Engineer status
This course meets the academic requirement for Chartered Engineer (CEng) status when combined with an accredited first degree.

Fees and funding
Fees information is available on our website.

warwick.ac.uk/pgfees

Further information
W: warwick.ac.uk/kepe
T: (0)24 7652 2046
E: eng-pgadmissions@warwick.ac.uk
The MSc in Tunnelling and Underground Space is a specialist course developed with the British Tunnelling Society (BTS) and is suited primarily to civil engineering graduates working, or wishing to work, in the tunnelling industry.

During the course you will integrate and apply knowledge and skills to the solution of complex civil engineering and tunnelling problems, apply understanding to novel and challenging situations and become aware of the limitations of the situation.

Approximately 20% of teaching is delivered by guest lecturers from industry who give up their time freely to support the course, ensuring the content remains relevant. Specialist subjects and case studies are presented by experts with first-hand experience.

Tunnelling is a rapidly expanding sector on a global scale where suitably trained engineers are in high demand. For graduates of this degree, the career opportunities are extensive.

**Project**

To complement the taught modules, a group design project is undertaken. This provides the opportunity to put your knowledge, understanding and skills into practice in a real situation.

Part-time students undertake an individual research project.

**Core Modules**

**Underground Construction Methods**

This module establishes a framework for the MSc course giving you the ability to recognise the diversity and complexity of underground excavations and associated works. During this module you will learn how to calculate stability, to familiarise yourself with ground improvement methods, to predict ground movements and to perform damage assessments for buildings. Visiting industry experts will cover subjects such as open and closed-face tunnel boring machines, sprayed concrete linings, pipejacking and microtunnelling, boxjacking, shaft and cofferdam construction methods.

**Tunnel Design**

This module provides an understanding of soil-structure interaction through the use of empirical, analytical and numerical methods. You will learn how to design tunnels and shafts using timber, reinforced concrete and steel fibre reinforced concrete. The module also covers architectural aspects, the design stage process, alignment and spaceproofing, concrete fixings, effect of tunnelling on other subsurface structures, design for fire and design for water ingress.

**Geological Investigation and Ground Characterisation**

The excavation and support of underground space is primarily dependent upon the ground conditions. The geological and hydrological properties of the ground must be determined (site investigation) and the geotechnical properties evaluated (in situ and laboratory testing). This module will equip you with the necessary knowledge to collect, evaluate and interpret site investigation data. This will include conceptualising the 3D ground structure and determining the environmental impact of underground works due to the nature of the ground.
Health, Safety and Environmental Considerations

Practicing engineers have a legal and moral responsibility to ensure the health and safety of their colleagues, workforce and the general public as well as observing environmental laws and best practice. This module outlines the legal framework, strategies for managing risk and key hazards in tunnelling and underground works. You will learn how to evaluate potential hazards and apply sound management strategies to their mitigation. This module will also cover legislation relating to H&S and the environment.

Construction Management

This module is entirely taught by industry experts in the planning and construction management of tunnelling projects. You will develop the skills to identify and evaluate forms of contract and documents associated with a typical tunnelling/construction project, and evaluate and use appropriate techniques to schedule, control and manage a construction project and associated risks.

Professional Skills

This module equips you to identify and critically evaluate information, presenting the output in a well-structured and appropriately referenced literature survey or report. You will be able to evaluate and communicate complex information via an oral presentation, to evaluate a complex issue and provide a sound, systematic and accessible presentation of that issue to a public audience, appraising and effectively responding to team and cultural issues.

Optional Modules

- Finite Element Methods for Tunnelling
- Rock Mechanics
- Advanced Structural Engineering*
- Supply Chain Management*
- Design for Sustainability*
- River Mixing*

*Modules marked are only available to full-time students
Applying to us

We encourage all applications to postgraduate courses to be made online. If you require a printed application form, please e-mail pg.prospectus@warwick.ac.uk with your postal address, or telephone us on +44 (0) 24 7652 3648.

The application process does not include consideration for a scholarship (unless otherwise stated in the scholarship advert). In most cases you will need to hold an offer of admission before making a scholarship application.

There is a non-refundable online application fee for taught postgraduate courses of £35. Unpaid applications remain on the system for 20 days, before being automatically withdrawn.

🔗 warwick.ac.uk/study/postgraduate

Entry requirements

For admission to the majority of our MSc courses, you should normally have obtained at least a British lower second class honours (2:2) bachelor degree in an engineering discipline.

Applicants for MSc Biomedical Engineering are also expected to demonstrate appropriate mathematical ability. See our website for further details.

🔗 warwick.ac.uk/bioe

Work experience, although welcomed, is not a prerequisite.

Overseas qualifications

We welcome applications from candidates with a range of overseas qualifications. Achieving the appropriate grades in your examinations is only one aspect of the application process and does not guarantee admission. For information on qualifications from your home country, visit the International Office’s website.

🔗 warwick.ac.uk/services/international/admissions/entry-requirements

English language requirements

If your first language is not English, you will be expected to obtain one of the following recognised English language qualifications:

- IELTS of at least 6.5 (Minimum component: none below 6.0)
- TOEFL iBT of at least 92 (Minimum component: L21, R22, W21, S23)
- PTE of at least 62 (Minimum component: 51+)
- CAE of at least 60+

🔗 elts.org | ets.org | pearsonpte.com
🔗 cambridgeesol.org

Course duration

The majority of our MSc courses are full-time and have a 12 months duration. The start date for 2014-15 academic year is 29 September 2014. The MSc Tunnelling and Underground Space can also be taken part-time with a 24 month duration, or as separate CPD short courses.

🔗 warwick.ac.uk/engineering/pg
Frequently asked questions

What is the deadline for applications?
Applications are accepted all year round. The start date that you select should allow time for the processing of your application and take into consideration any accommodation or travel requirements. Please note that international students must submit and pay for their application by 31 July 2014.

How much will it cost?
For up-to-date information on tuition fees and living costs, please refer to the University’s website. Information on short courses in Tunnelling and Underground Space is available on the School of Engineering’s website.

Is there any funding available?
The university offers a small number of partial scholarships. For more details see the Graduate School website. Companies associated with the MSc Tunnelling and Underground Space also offer bursaries or scholarships.

How do I apply for a visa?
It is important that if you wish to study in the UK, you hold an appropriate visa to do so. The University’s Immigration Service website provides you with information on the student visas and how to apply.

What supporting documents are required?
- Statement of purpose
- Academic transcripts and certificates
- Two academic references
- English language qualification (where required)

Where can I find you in the league tables?
The School of Engineering can be found under ‘General Engineering’ in The Guardian postgraduate tables, which can be ranked to suit your own criteria.
We believe this brochure is accurate, but accept no liability for errors or later changes. Course and module content is continually reviewed and updated to reflect the latest research expertise at Warwick and is therefore subject to change. See our website for the latest information.