




2012-13

ENGINEERING  
UNDERGRADUATE BROCHURE

THE UNIVERSITY OF  
WARWICK

A photograph of two young men sitting at a desk in a classroom or computer lab. They are looking at a laptop screen. The man on the left is wearing glasses and a grey t-shirt, and is writing in a notebook. The man on the right is wearing a white t-shirt. In the background, there is a large screen and a green chalkboard. A grey vertical pole is in the foreground on the left.

“BECAUSE ENGINEERING IS INEXTRICABLY TIED TO PEOPLE, IT CANNOT BE JUST AN APPLIED PHYSICAL SCIENCE; IT IS ALSO AN APPLIED SOCIAL SCIENCE. ... (THE ENGINEER’S)... RAISON D’ÊTRE IS TO SERVE THE PUBLIC”

P. Aarne Vesilind and Alastair S. Gunn, 1998, “Engineering Ethics and the Environment”, Cambridge, p.35)

# WELCOME

## ...to Engineering at Warwick

Warwick offers a range of exciting engineering courses that will open up a world of opportunities to you. Our international reputation for excellence in teaching and research means that your Warwick degree will be known and respected throughout the world. This combined with our attractive and friendly campus makes Warwick an ideal choice as a place to study.



Any student will tell you that your time at University is much more than just academic study, however important that may be. It is an opportunity to broaden your horizons and to develop a fully rounded personality through a wide range of social and cultural activities.

This introduction to Engineering courses at the University of Warwick supplements the more general information on the University and its facilities provided in our Undergraduate Prospectus.

I hope that you find it both helpful and informative.

**Karen Bradbury**

Director of Undergraduate Admissions  
for Engineering

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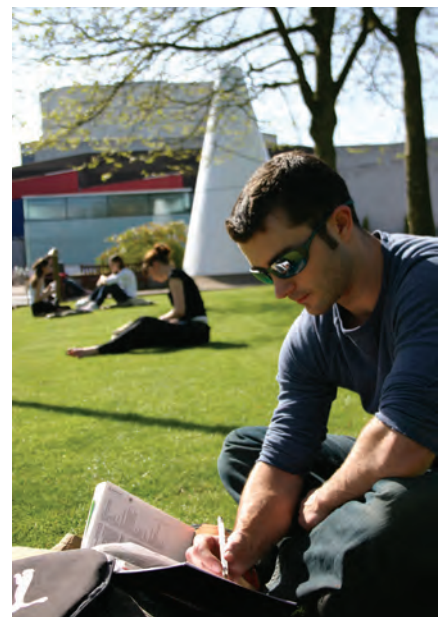
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## WHY CHOOSE THE UNIVERSITY OF WARWICK?

As a leading university Warwick is consistently highly ranked in the top 10, with the Guardian ranking us 6th in the UK for 2012. In the last UK Research Assessment Exercise the University as a whole was ranked 7th in the UK. This combined with our reputation for innovative and flexible courses, has made the University one of the most popular destinations for students. This year Warwick has approximately 13,000 undergraduate students, with 2,500 from overseas and 10,500 from the UK/EU. According to a 2011 High Fliers Research survey, Warwick is the "second most targeted university in the UK by top employers."

In addition to Warwick's undoubted academic excellence, the University also offers a modern, lively campus with first class facilities for study, living and recreation. The Warwick campus is set in nearly 300 hectares of natural countryside, twenty miles south of Birmingham and three miles from Coventry. It

provides easy access to the historic towns of Stratford-upon-Avon (home to the Royal Shakespeare Company), Kenilworth, Royal Leamington Spa, and Warwick, with its famous castle. Social and recreational facilities are varied and excellent, and the university offers a wide range of on-campus and off-campus accommodation. Finding accommodation as a new student can be stressful. It is reassuring to know that in 2011 we were able to satisfy all requests for on-campus accommodation from 1st year undergraduate students who held Warwick as their firm or insurance choice (and applied within the normal deadlines).

Social activities are supported through one of the largest Student Unions in the UK; with its own building rebuilt with £11million investment in 2010. The Union offers over 250 social clubs and 70 sports clubs. The campus also hosts the Warwick Arts Centre, one of the largest performance and visual arts complex of its kind in the UK outside London with around 300,000 visitors a year to over 3,000 individual events embracing contemporary and classical music, drama, dance, comedy, films and visual art.

**“WARWICK HAS OFFERED ME A WELL BALANCED, ENJOYABLE AND INTERESTING DEGREE THAT I FEEL HAS PUT ME IN GOOD STEAD FOR AN ENGINEERING CAREER, WHICH WILL START AT ROLLS-ROYCE AEROSPACE”**

James Wickens, MEng Graduate.

**“I HAD A BRILLIANT TIME; I LOVED MY DEGREE, MY FRIENDS AND SOCIAL LIFE. I WOULD SUGGEST TO EVERYONE THEY TRY IT”**

Lucy Milns, MEng Graduate.

**“CIVIL ENGINEERING GRADUATES FROM WARWICK UNIVERSITY HAVE DEMONSTRATED A TECHNICAL AND COMMERCIAL AWARENESS THAT ENABLES THEM TO CONTRIBUTE VERY QUICKLY TO OUR DESIGN AND CONSULTANCY WORK. I AM PLEASED TO CONTINUE TO RECRUIT FROM WARWICK’S CIVIL ENGINEERING COURSES”**

Sam Luke, Rail South Division, Mouchel Parkman.

**“PRESTIGIOUS AND CHALLENGING WITH OPPORTUNITIES TO STUDY A VARIETY OF SUBJECTS WITHIN ENGINEERING AND BUSINESS. THE LECTURERS ARE WILLING TO SPEND A LARGE AMOUNT OF TIME WITH YOU”**

Ibrar Alyas, Graduate  
(and former international student).

# WHY CHOOSE AN ENGINEERING COURSE AT WARWICK?

If you choose to study Engineering at Warwick you will be joining a course ranked 4th in 2012 in the general engineering league tables and in the last Research Assessment Exercise, in 2008, Engineering was ranked 5th. You will be joining around 1,100 engineering students, making up over 8% of the undergraduate student population at Warwick.

What makes Engineering at Warwick unusual is our unified approach to the teaching of our courses, which are delivered through a strategic partnership between the School of Engineering and WMG. This means that you will benefit from the expertise and facilities of two departments.

We believe that Engineering is inherently inter-disciplinary. Just take a careful look at the products around you; your games console or smart phone and the buildings you live and study in. You will find they are all complex systems made up of electronic and mechanical components. Designing and delivering these products to meet the customers' needs whilst also making a profit means bringing together an interdisciplinary team of experts. These team members must not only be experts in their own field but must also understand the needs and language of other experts in technical, managerial and business fields. To prepare our graduates for this challenge we have designed our engineering courses around a common first year that develops this interdisciplinary approach. This common first year also enables you to delay your final choice of engineering degree course and equips you to make a more informed choice about your final career path. This course structure means that you will only find Warwick ranked in the engineering league tables against general engineering.

Across the two departments staff take a multi-disciplinary approach to teaching providing you with the opportunity to become involved in applying your skills and knowledge to global challenges. To enable you to do this there are state-of-the-art facilities including two large engineering halls giving you access to staff and resources to enable you to carry out your studies. In 2011 the School of Engineering invested £2.3million in refurbishing their buildings; providing new flexible study area and a new design studio. This supplements the three computer rooms already available uniquely to engineering students for both formal teaching and self study. WMG continually invest in their facilities, with a fifth building, situated next to the International Digital Laboratory, is due to be completed in summer 2012. WMG has well-established links with industry, having worked with a wide range of companies, both nationally and internationally, for over 30 years. These relationships have led to Jaguar Land Rover's Advanced Research Group and Tata Motors' European Technical Centre to be based at WMG.



# INTERNATIONAL STUDENTS IN ENGINEERING

Warwick has an international student population of around 6,400 students, 2,500 of whom are undergraduate students. We have more than 120 different nationalities studying at the University. In 2011 there are 250 international undergraduate students studying for Engineering degrees and Engineering staff members also represent a wide spectrum of nationalities and ethnic groups. Many of the student nationality groups run their own cultural societies, which organise social events, sports meets and parties,

and give international students the chance to keep in touch with matters back home.

Warwick's International Office is also here to support all our international students before they arrive, during their time at Warwick, and even after they leave. Many countries offer a pre-departure party for you to meet current students and all new international students can take our Orientation Programme just prior to starting their first year at Warwick. The International Office also runs its own scholarship programme to assist students

applying from overseas. Please contact the International Office or check their website for further details.

## Contact details:

International Office,  
University house,  
University of Warwick,  
Coventry, CV4 8UW

**Tel:** +44 (0) 24 7652 3706

**Fax:** +44 (0) 24 7652 4337

**Email:** [Int.Office@warwick.ac.uk](mailto:Int.Office@warwick.ac.uk)

**Website:** [www.warwick.ac.uk/  
services/international](http://www.warwick.ac.uk/services/international)



## Social Life at Warwick for an International Student

### Jaber Hussain Bappi, 4th Year MEng Automotive Engineering

After I had received offers from different universities in the UK, being an international student from Saudi Arabia, I looked for the university that was the most diverse and appealing amongst all. Warwick's One World Week, the biggest student festival of international culture in Europe, could not have been more attractive for an international student like me. Being brought up in a very cultural and religious background and having a keen interest in sports, I was interested in the cultural and religious societies and their activities, and the sports facilities provided, and again Warwick topped the list with over

200 active societies of every category and sports facilities of almost any kind thinkable.

After I arrived at Warwick, a little nervous due to the whole new environment that I was placed into, I had no problems settling here. Help starting from, the Freshers helpers, the International office, resident tutor, the Students Union, to my personal tutor, resolved every problem that I faced and made the start of my university life very exhilarating. The past three years at university have been the most eventful and the best learning experience of my life. I have been an active member of various societies and an executive member of four societies, including president of Bangladeshi Society. I have been involved in various volunteering works arranged by Warwick. Warwick has helped me discover my strengths and skills, has moulded me into a more confident and appealing individual, while making university life a very exciting experience.



# CAREER OPPORTUNITIES

Engineering is one of the most exciting and rewarding professions, and influences all aspects of our everyday life. Worldwide engineering is recognised as a vital sector in global economic recovery. The engineering sector generated 24.9% of the turnover of all businesses in the UK in 2010, the UK is still the world's 7th largest manufacturing nation and engineering graduates in the UK commanded the 4th highest mean average starting salary. (Source: "Engineering UK 2012" by Engineering UK).

Most ambitious engineering students will aspire to achieve the status of Chartered Engineer (CEng), which is the internationally recognised badge of professional achievement and competence. The preferred route to chartered status is to start by reading a 4-year Masters of Engineering (MEng) degree, which is accredited as fully satisfying the educational base for a Chartered Engineer (CEng). An alternative route is to start by reading a 3-year Bachelor of Engineering (BEng) degree, which is accredited as partially satisfying the educational base for a Chartered Engineering. A programme of accredited Further Learning will be required to complete the education base for CEng. All our specialist MEng and BEng degrees are accredited by the relevant professional institutions, for progression to CEng status. Our accrediting bodies include the IET, IMechE, IStructE, IHE, CIHT, ICE and InstMC.

Only our BSc Engineering and Business Studies and our BEng Engineering Business Management have not been submitted to the engineering institutions

for accreditation because of their greater business content. Career opportunities for graduates from both these degrees, and those not wishing to pursue a career as a Chartered Engineer, vary from business, finance and management roles within the engineering industry to professions as varied as teaching and journalism.

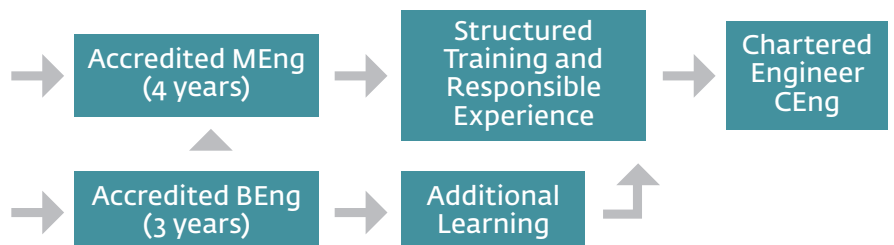
## Careers support

Engineering, WMG and our Student Careers and Skills service will provide a wealth of opportunities for you to develop skills and experiences to help you make the most of your time here and to prepare effectively for your life after Warwick. Our close contacts with over 1,500 local, national and international employers ensure our services reflect their priorities when recruiting high potential graduates. Events such as 'Options in Engineering' bring students and engineering employers together and in November 2011 the following firms came to promote employment opportunities: Rolls-Royce, Jaguar Land Rover, Unilever, Balfour Beatty, Atos, Centrica, Nestle, Thales, Alstom, Brose, Cooper Industries, Detica, Eaton Corporation, Jane Street, Renishaw and Johnson Matthey Plc.

Typically around 70% of both BEng and MEng graduates find employment in engineering or IT sectors, with well-known firms such

as Amey, BAE Systems, Jaguar Land Rover, Rolls Royce (Aerospace) and Ericsson. Around 10% of our graduates are employed by accountancy firms, consultancies and investment banks because of their strong numeracy, inter-personal and team-working skills. The remaining 20% of graduates find employment in a variety of different sectors such as retail, the armed forces and teaching.

Engineering has its own careers representative, who hosts weekly careers clinics in Engineering so that students can drop in to seek advice on career opportunities, job applications, CVs etc. Our vacancy service covers opportunities for work experience, graduate jobs, internships and sponsorship for further study and we also advertise these on the Engineering news web page. The Warwick Student Careers and Skills service offers a comprehensive and popular range of career planning workshops, assessment centre experience, mock interview practice and e learning skills courses. Industrial placements are an excellent way to enhance your cv, as demonstrated by the following 2 case studies. A year out in industry can be taken before you start a degree or by temporarily withdrawing for a year at any point in your degree. MEng students can also choose to take a year out formally between study year three and four and have this experience formally reflected in their degree title; MEng with an intercalated year (for industry) or with a year in research.





After my 2nd year during the summer vacation I undertook a feasibility study on hydro-power in Uganda. I became interested in hydro-power after a fascinating lecture. Following further discussions with the lecturer, Dr Colin Oram, who is himself involved in development work, we began planning a

## Case study – Vacation Placement

**Stephanie Hirmer, BEng Civil Engineer**

project for the summer. Three other students and I received a grant from EPSRC through the Undergraduate Research Scholarship Scheme (URSS) and this enabled us to undertake the feasibility study. This was also supported by a travel scholarship from the Arthur Shercliff Memorial Trust. With the funding received we were able to not only complete a feasibility study but go onto implement a 1.5kW hydro-power scheme in the Rwenzori Mountains of Uganda. This project has given me a fantastic knowledge of how to conduct field research, how to use the appropriate equipment and also enabled me to understand river flow, soil structures and project management.

My experience has greatly enhanced my understanding of engineering materials and technologies. It has shown me how important it is to be able to work in a team and thus be able to draw on everyone's strength to gain the best possible result. Furthermore this trip has allowed me to improve my communication skills and network with many people, one of whom has offered me an internship at his firm GTZ. I now feel sure that I want to pursue a career in Civil Engineering, ideally in development.



## Case study – Industrial placement

**David Watkins, 4th year MEng Mechanical Engineer**

in 2010, this initial prototype showed a reduction in the overall distance that swimmers cover in open water.

A meeting with a major sportswear company highlighted various aspects that must be improved and incorporated into a secondary prototype. The size of the electronics had to be reduced, the cost should be kept to an absolute minimum and finally the device should be simple to operate. The possibility of increasing the functionality was also discussed; the inclusion of a lap counter and timer would make the gadget more appealing.

The selection of optics played an important part in the design rationale. TFEL, LCD and LED technologies were all considered as options with LEDs being deemed most appropriate. Significant effort went into selecting smaller electronic components and in the design of the printed circuit board.

With regards to mechanical design, a casing and attachment mechanism was produced using Solidworks. A CT scan of the goggles to be used supplied reference points, this allowed the attachment mechanism to be designed in a more robust manner.



I decided to undertake my internship at WMG to boost my employability by gaining industrial experience.

The internship aimed to build on the success of a prototype device created to assist open water swimmers. Manufactured

Whilst difficulty with programming meant the device was never fully operational, the experience gained and the skills developed made the internship truly beneficial. Being able to approach employers and discuss my time at WMG has provided me with a significant advantage over my fellow students.



# DEGREE CONTENT AND STRUCTURE

## Introduction

Our degree structure recognises that whilst many students are confident in their choice of engineering they are far less certain what type of specialist engineering course they wish to study. Our structure was based on feedback from students who wanted more choice and flexibility and feedback from employers who wanted graduates with strong technical knowledge but who also recognised the role of engineering within a broader economic, social and political context.

## Year One for all engineering courses

Core modules	Optional module (one of the following)
Technological Science	<b>Engineering related modules;</b> Biomedical Engineering, Multimedia Technology, Technology in International Development
Design for function	<b>Broadening modules;</b> The Aesthetics of Design, History of the British Car Industry, Rights and Wrongs: The Engineering Profession and Society
Economics and the structure of industry	<b>Foreign language module;</b> a wide range from beginner to post A level  <b>Foundation Mathematics module;</b> for those offering higher level Physics but no higher level Mathematics

The technological science module introduces you to the fundamental technical and mathematical techniques within the context in which they can be used to solve engineering problems. In the Design module project work begins almost from day one of your course and you will have some choice in your project work. For example, if you are interested in Electronic Engineering you can design a printed circuit board in the design module. As chartered engineers will be the future leaders of engineering industry all accredited engineering courses require some business teaching. Warwick is unusual in delivering this material in years one and two. The optional module provides you with an opportunity to further tailor your degree. Our engineering related modules draw on our research themes and enable you to study topics that are often only available at postgraduate level. The broadening options help you to place engineering in its widest context and a foreign language could prepare you for an international career.

## Year Two

In year two whilst there are two different 'pathways' to choose from all students continue to study the fundamental technical and mathematical techniques with a second Technological Science module and further develop their understanding of

business with the Starting and Running a Business module. We work in partnership with Warwick Business School and part of the module involves working in small groups of students on the same specialist degree course, such as Mechanical Engineering, to develop a proposal for a new small engineering or technology business. Part of the assessment involves making a group presentation in the style of the BBC programme 'The Dragon's Den' to an audience of 'dragons' from the University and from local industry. The remaining 50% of the year differs depending on the pathway chosen.

**Pathway 1** is designed for BEng/MEng Electronic Engineering and can also be taken by students taking BEng/MEng Engineering, BEng/MEng Systems Engineering, BEng Engineering Business Management and BSc Engineering and Business Studies. The design module focuses on electronics and all students are involved in the design and testing of the instrumentation for a proprietary rocket. The fourth module is Computer Systems.

### Pathway 1 – Core modules

Technological Science

Electronic Design

Starting and Running a business

Computer Systems

**Pathway 2** is designed for BEng/MEng Automotive, Civil, Manufacturing and Mechanical and Mechanical Engineering. It can also be taken by students taking BEng/MEng Engineering, BEng/MEng Systems Engineering, BEng Engineering Business Management and BSc Engineering and Business Studies. In the design module students can choose from two design projects; one for civil engineers to design and test a model roof structure and the second to design and test a model of a vehicle suspension system.

### Pathway 2

Core modules	Optional module (one of the following)
Technological Science	<b>Engineering related modules;</b> Biomedical Materials, Computer Systems, Forensic Engineering
Design and Durability	<b>Business/teaching related modules;</b> Rights and Wrongs: The Engineering Profession and Society, Introduction to Secondary Teaching
Starting and Running a business	<b>Foreign language module;</b> a wide range from beginner to post A level

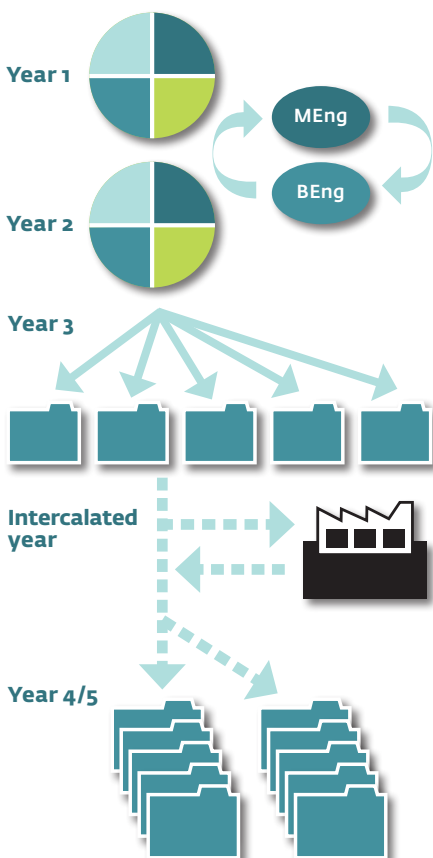
At the end of year two you make your final decision as to which type of engineering course you wish to take and whether to continue for a BSc, BEng or MEng degree. MEng students need to achieve a 2:1 classification, 60% or higher average, in their second year to remain on the MEng.

## Year Three

In your third year the course concentrates on providing the specialist engineering knowledge unique to each course and on developing your research skills via an individual project, further detail is provided on the later pages for each degree course. If you still want to take a broad approach that will lead to chartered engineer status you can do this via the general BEng or MEng Engineering degree. Opportunities exist for some MEng students to spend their third year studying abroad. If you decide you do not wish to become a chartered engineer you can study more business on our Engineering Business Management or Engineering and Business Studies degrees.

## Year Four (MEng only)

If you follow a MEng course you will stay on for a fourth year of academic study and add some more specialist material relevant to your chosen degree course. All MEng students join an interdisciplinary Group Project, which will integrate taught material as well as helping you practice your research skills in a team environment. You can focus on a particular area of interest via your elective choice or simply choose three optional modules. It is also possible to take a yearlong placement in an industrial or research environment before returning for your fourth year of academic study and have this reflected in your MEng degree title.



# TEACHING AND LEARNING STYLES IN ENGINEERING

Engineering provides an ideal opportunity for the use of a wide range of teaching and learning styles and techniques. Warwick courses include:

**Lectures** – large group teaching

**Seminars** – small groups for the development of communication skills and interactive design

**Tutorials** – highly personalised instruction

**Examples classes and surgeries** – problem solving

**Computer-aided learning** – online tutorials and support material

**Practical work** – laboratory, workshop and field work

**Research and design projects** – in-depth study, on both individual and team-based projects

**Private study** – an important part of any University course and an essential skill for your career!

The academic year is made up of three 10-week terms with a single period of examinations in the summer term. This structure allows students to synthesise their knowledge across modules without the constant interruption of revision and examination associated with a semester-based scheme.

Group work, so important in any future engineering career, is embedded in the design of our courses from the first year. All students at Warwick are allocated a personal tutor whose primary role is to assist students with the process of induction and orientation into University life and to retain an interest in their personal and academic development. In your first year you will meet with your personal tutor each week for an hour in a small group of five to eight engineering students to review academic work from the core modules. These weekly meetings not only help ease the transition to University patterns of independent study but also enable you to get to know your tutor and your fellow tutees. Many students continue to work

informally in these 'study groups' and may rent houses off-campus together in later years. Throughout your degree your personal tutor is there to support your development, and is an ideal person to act as a referee when applying for your first graduate position.

Both departments have rigorous quality monitoring procedures with frequent student staff liaison committee meetings, and course reviews informed by online student questionnaires. Our degrees are regularly monitored internally by university reviews, and externally by Accrediting Institutions – all of which include student comment. We welcome student ideas on how to improve life at Warwick. In Summer 2011 we employed a team of three Warwick students lead by Oliver Newth, an engineering student, to develop his proposal for a new cloud based storage system to provide one source, rather than multiple web-pages, for all engineering lecture, seminar and laboratory resources.

You can read more about this application at <https://lecturesapp.warwick.ac.uk/>

# FIRST YEAR TIMETABLE

SAMPLE TIMETABLE											
	08:00	09:00	10:00	11:00	12:00	13:00	14:00	15:00	16:00	17:00	18:00
MON		Lecture		Lecture			Laboratory				
		Technological Science	Personal Study	Economics and the Structure of Industry			The Aesthetics of Design		Personal Study		
TUE			Lecture		Lecture		Industrial Visit				
			Technological Science	Personal Study	Design for Function		Economics and the Structure of Industry		Personal Study		
WED		Meeting with Personal Tutor		Lecture		Sports Clubs Activities and Competitions, Social Activities or just FREE TIME!					
THU			Seminar		Examples Class						Lecture
			Design for Function	Personal Study	Technological Science			A swim at the Sports Centre?	Personal Study	The Aesthetics of Design	
FRI			Lecture		Lecture						
			Design for Function	Personal Study	Technological Science			Some sport activity	Personal Study		

KEY TO TIMETABLE	
Core	← Teaching Method
Engineering Option	→
Tutorial	
Other	
	Module Title

## Notes to Timetable Further information online

In theory, the university timetable starts from 08:00 to 19:00, though 08:00 lectures are not usually scheduled evening lectures should be expected on some modules.

Core Modules will usually be in the morning and options in the afternoon.

Laboratories will normally take place from 14:00 to 17:00.

Wednesday afternoons are free for students to get involved in sports or other social activities.

A typical week would consist of 37 hours of academic work consisting of about 20 hours of lectures, seminars, tutorials or laboratories; and 17 hours of recommended private study time.

**Module information page:**  
[www2.warwick.ac.uk/fac/sci/eng/euo/modules/year1/](http://www2.warwick.ac.uk/fac/sci/eng/euo/modules/year1/)

**Language Centre:**  
[www2.warwick.ac.uk/fac/arts/languagecentre](http://www2.warwick.ac.uk/fac/arts/languagecentre)

**Warwick Arts Centre:**  
[www.warwickartscentre.co.uk/](http://www.warwickartscentre.co.uk/)

**Library:**  
[www2.warwick.ac.uk/services/library](http://www2.warwick.ac.uk/services/library)

**Sports Centre:**  
[www2.warwick.ac.uk/services/sportscentre](http://www2.warwick.ac.uk/services/sportscentre)

**Music Centre:**  
[www2.warwick.ac.uk/services/musiccentre](http://www2.warwick.ac.uk/services/musiccentre)

**Learning Grid:**  
[www2.warwick.ac.uk/services/library/grid](http://www2.warwick.ac.uk/services/library/grid)

**Students' Union:**  
[www.warwicksu.com](http://www.warwicksu.com)  
 Unitemps: [www.unitemps.co.uk](http://www.unitemps.co.uk)

# LIFE AS A FIRST YEAR STUDENT



## Richard Coulton, 2nd year MEng Engineering

**Warwick University is not only constantly ranked within the top 10 university's in the country, making it a great place to study, but also has a very lively social side with over 200 clubs and societies.**

As a first year student I was in Heronbank which is situated on campus, making it easy to make new friends and explore the campus. There is a wide range of sports, teams and clubs available catering for beginners to professional levels, so everyone has the chance to try out something new or carry on with their existing passion.

Engineering degrees at Warwick are structured in a different way to most other places. With Warwick all disciplines study a common first year, allowing you to delay your decision on specialisation until you have tried modules from each. This not only gives you the benefit of a more informed decision but also helps you build inter-discipline relationships as real technical situations would require. This flexibility in the course also gives you the option to switch from BEng to MEng degree pathways like I have since joining the University, and there is the option to take a sandwich year placement between years if students wish to take a year out.

The Students Union has been revamped over the last two years and proves to be a central point for most students' nights out on campus. The SU has a large pub style bar as well as a multiple room club, which attracts some large name artists. The Union runs a number of events every week catering from chart topping tunes at "Top Banana" on a Monday to midweek cheese with "Pop" on a Wednesday.

Everyone will find something to their liking and if not, Coventry and Leamington provide yet more options for a great night out.

I took a gap year between sixth-form and University, and for anyone considering this I highly recommend it to you. It allowed me to gain valuable work experience, which I have been able to relate with my course material. However, I would recommend keeping up to speed on things like maths, as it's amazing how much you lose in a year, and the course gets straight back into the subject as term starts. (Editor's note: Loughborough University offers the LUMEN mathematics course designed to help students on a gap year in industry in conjunction with the Engineering Development Trust, refer to <http://lumen.lboro.ac.uk/>)

For my second year I am living in Leamington Spa, which whilst being about 15 minutes bus/drive from campus, provides a great selection of pubs, clubs and restaurants, all with student nights and promotions. Most students will live in either Coventry or Leamington from their second year onwards and it is down to personal preference which people go for.

It is definitely worth noting that Warwick is very much a campus university, surrounded partly by countryside. It is often said that the campus atmosphere creates a "bubble" for the students, separate from the rest of the world and for people that are looking for a city university you may want to visit Warwick to check its right for you. That said however most students love the campus atmosphere, and I personally think it's great and would recommend it to anyone.

# STUDENT PROJECTS

## Electronic Engineers Really do Rocket Science!

Electronic engineering at the University of Warwick is now involved in a number of space related initiatives designed to maximise student interest and involvement in various high-profile space technology projects. These opportunities for electronics engineers occur at various levels of the undergraduate programme, and through to postgraduate research projects.

### ESMO – A European Moon Orbiting Satellite Project

A multi-disciplinary team of 4th year undergraduate students, including not just electronic engineers but also systems, mechanical and manufacturing engineers, is designing and building the electrical power supply system for an ESA (European Space Agency) satellite that is planned for launch in 2015.

Working with other subsystem teams from 25 of Europe's top universities, the team are developing the solar panel arrays, power control and distribution circuitry, battery control systems, and protection of the electrical supply to all satellite subsystems and payloads. The students work closely with the project co-ordinators, Surrey Satellite Technology Ltd, and with a large body of major sponsoring companies who offer the students finance, training, equipment, technical expertise, and – very often – a job when they graduate!

This will be the first satellite using student designed technology that will leave an earth orbit and carry a scientific instrumentation payload to the moon. Each graduating team hands over to a new 4th year team, so a large number of students have experience with this project, and they all eventually graduate with a CV that would be the envy of any student looking for top class employment!

### 3rd Year Projects

A number of 3rd year individual projects related to the main ESMO project are offered each year. This allows electronic engineering students who wish to

progress onto the main ESMO team to work in a related area during their 3rd year.

Recent projects involved the design and build of a demonstrator model of the actual satellite. This model will be used in various promotional events to demonstrate the functions of the ESMO satellite that are being developed by the main satellite team.

### 2nd Year Laboratory – Rocket Instrumentation System

The influence of 'Rocket Science' has also reached 2nd year laboratory work where students design instrumentation that is placed in the nose cone of a proprietary rocket. The aim is to measure pressure, acceleration, and rocket orientation as the rocket is fired from its launch site. The students are able to attend the launch event, launch their own rocket, and evaluate the data that is recorded by their on-board instruments.

### Related Academic Research: Satellite Battery Development

Dr Bill Crofts and PhD student Claire Parfitt are carrying out research into improved battery systems for satellite applications. Working in collaboration with ABSL Space Products (UK) the aim of the research is to investigate alternative Lithium-based battery technologies and to develop appropriate battery management systems necessary to obtain optimum performance in space applications.

The charge/discharge characteristics of batteries under test are carried out in an environmental chamber. This allows the batteries to be charged and discharged at variable current rates and at different temperatures, hence emulating satellite mission conditions.

Other related PhD opportunities are planned to allow more students to progress from the ESMO project into post-graduate research.



Image courtesy of NASA

# STUDENT PROJECTS



## WorldFirst Racing Car Project

The WorldFirst F3 racing car project was created as a demonstration of the sustainable materials research conducted in WMG. This project came about directly as a result of the School of Engineering's participation in the IMechE's Formula Student competition. The project was run by WMG academics Dr Kerry Kirwan and Dr Steve Maggs along with Research Fellow Dr James Meredith and postgraduate research student Ben Wood.

### Formula Student

At Warwick the Formula Student project is currently run as a 4th year multi-disciplinary group project for MEng students. The group typically has between 12 to 15 students taking part drawn from all the engineering degrees except Civil Engineering.

Formula Student also supports 3rd year individual projects. In recent years Automotive, Electronic, Manufacturing and Mechanical engineering students have undertaken projects on engineering topics such as engine management systems, impact attenuation, monocoque chassis design and the transmission system as well as management topics such as a system to manage the design process.



### Eco One

This was WMG's first project to demonstrate how an environmentally friendly racing car could be developed and transformed one of our previous Formula Student entries. Eco One uses tyres, bodywork,

brake pads and lubricants and fuel made from natural, renewable materials and has a power-to-weight ratio of 540bhp/tonne. It does 0-62mph in less than four seconds, and will go on to a top speed in excess of 140 mph. The car certainly captured the Media's attention in 2007 and 2008 and you may have seen the car at exhibitions in the Science Museum or Eden Project or on television shows such as 'Richard and Judy'! Ben Wood, a MEng Mechanical Engineering graduate initially worked on this car as part of his engineering doctorate and you can read more about him in the Graduate Profiles section.

### WorldFirst

Eco One demonstrated that using a racing car was a very powerful way to disseminate information on the use of more environmentally friendly materials in product design. WorldFirst also explores further the use of biodiesel in a high performance application. The project brings together a large number of companies and other universities who were also able to use the racing car as a platform to demonstrate their work. For example, Lola has provided the chassis, Scott Racing the engine and Yazaki the wiring loom. It also allowed us to engage with the motorsport industry to examine the issue of green motorsport. This is an area of current interest that has many questions yet to be solved.

The project has links to undergraduate teaching in a number of ways. David Cooper, a MEng Mechanical Engineer used his individual project supervised by Dr Kerry Kirwan to work with Stuart Jackson of EOS UK to apply EOS's direct metal laser sintering process and its Ti64 material to the production of hydraulic manifolds for the Red Bull Racing Formula One team. David's work was so successful it was described in an article in the September/October 2009 edition of Race Engine Technology and he is currently engaged in postgraduate research with WMG. This year we will be conducting a third year project that conducts an ecoaudit of the car and compares it to a conventional F3 car in order to examine its environmental credentials. The 2010/11 Formula Student team examined the construction of the F3 car and what they learned has influenced the design of our new car for the 2012 competition. We hope to recruit more doctorate students to examine further aspects of sustainable motorsport and whether it has a future.

You can read more about WorldFirst at [www.worldfirstracing.co.uk](http://www.worldfirstracing.co.uk)

# DEGREE COURSES

As we explained in the section on degree structure the first year of our engineering courses is common to all students and in the second year there are two pathways so many students can delay their final choice degree course until the end of their second year, giving them plenty of time to confirm their career path. Having build the essential foundations for any engineering course the third year of our BEng and MEng courses is dedicated to providing you with the core specialist knowledge that you will need to become an Automotive, Civil, Electronic, Manufacturing and Mechanical, Mechanical or Systems Engineer. All students will take part in some individual project work and this may provide an opportunity for you to focus on a specific topic of interest. In the 4th year all MEng students take part in a multi-disciplinary group project designed to replicate the way engineers work in industry. All MEng students can choose at least 3 of their 6 modules in their final year and may decide to take these 3 modules as part of one of our five electives, refer to page 25.

In the next few pages you can learn a little more about each degree course and the current third and fourth year modules on offer. Naturally we are constantly updating our modules to reflect industry's evolving needs and new areas of research expertise.

**BEng, MEng Automotive Engineering**

**BEng, MEng Civil Engineering**

**BEng, MEng Electronic Engineering**

**BEng, MEng Engineering**

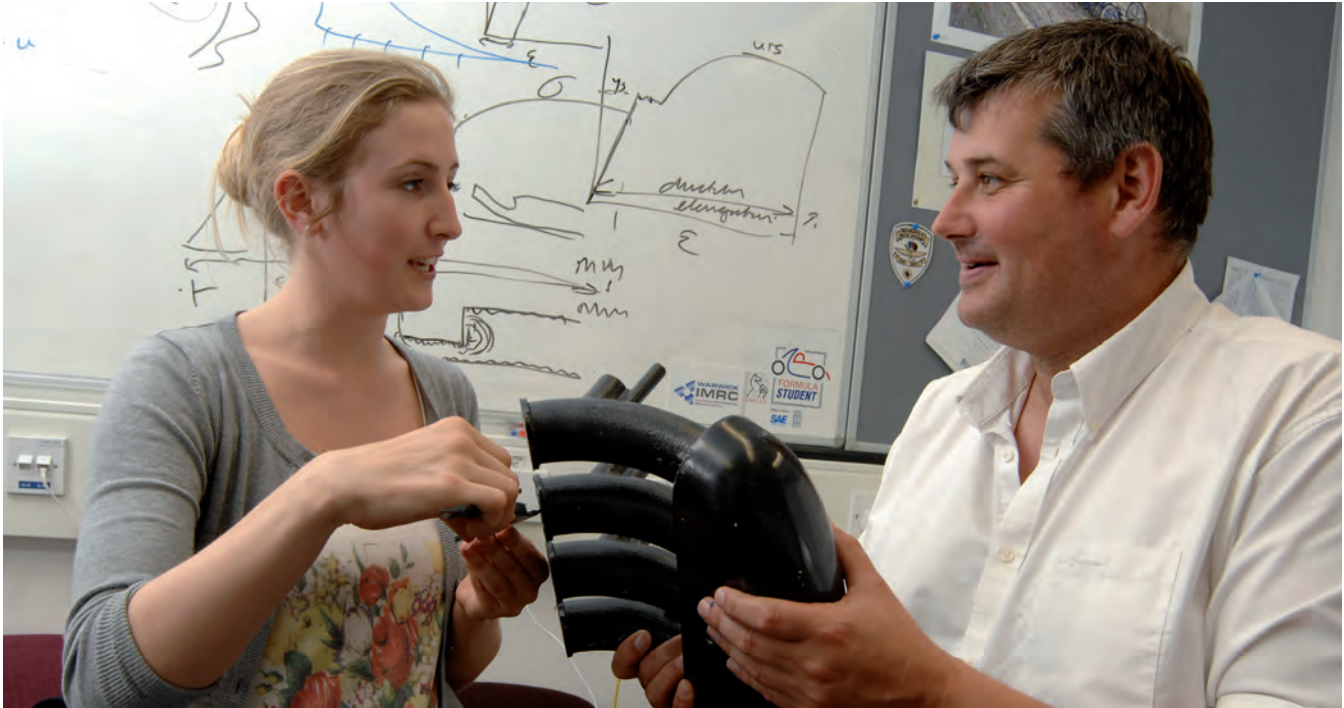
**BSc Engineering and Business Studies**

**BEng Engineering Business Management**

**BEng, MEng Manufacturing and Mechanical Engineering**

**BEng, MEng Mechanical Engineering**

**BEng, MEng Systems Engineering**



# AUTOMOTIVE ENGINEERING

## BEng/MEng Automotive Engineering

Accrediting institutions: IMechE, IET

The automotive industries are central to the manufacturing sectors of many countries. This includes the UK where companies like BMW, Jaguar Land Rover, Nissan and Toyota continue to fly the flag of automotive innovation and quality production. Furthermore, these brands are supported by a huge network of manufacturers who constitute an elaborate and wide-ranging set of suppliers to the industry both in the UK and internationally.

Automotive Engineering is increasingly global in its outlook and multidisciplinary in its operation, for example approximately 30% of the value of a modern car lies in its electronic systems. With skills ranging from mechanical design, electronic systems, manufacturing techniques, management, ergonomics and human perception of things such as noise, vibration and performance, the well-rounded automotive engineer will be equipped for a broad range of career options.

Typical destinations range from research and development positions within industrial or academic establishments, to design and manufacturing posts in car companies or the supply industries. Eco One saw WMG develop an environmentally friendly racing car based on a previous Formula Student entry and work on renewable racing car designs continues via the WorldFirst F3 racing car project. Details of third and fourth year modules are shown below. Details on the first and second years can be seen on pages 9 and 10.

BEng Automotive Engineering Year Three	MEng Automotive Engineering Year Three	MEng Automotive Engineering Year Four
<b>Core Modules</b>	<b>Core Modules</b>	<b>Core Modules</b>
Project Automation and Robotics CAD/CAM and Simulation Design for Manufacture Design for Safety and Comfort Part 1 Quality Techniques Systems Modelling and Control	Individual Project Automation and Robotics CAD/CAM and Simulation Design for Manufacture Design for Safety and Comfort Part 1 Quality Techniques Systems Modelling and Control	Group Project Automobile Systems, Dynamics and Control Design for Safety and Comfort Part 2
<b>Optional Modules: one of the following</b>		<b>Optional Modules - four of the following;</b>
Dynamics of Vibrating Systems or Electrical Machines and Power Systems		Advanced Robotics, Design for Sustainability, Dynamic Analysis of Mechanical Systems, Energy Conservation, IC Engines, Quality Systems, Renewable Energy Systems, Simulation of Operations or Supply Chain Management
		<b>Electives - available by taking three specified optional modules</b>
		MEng Automotive Engineering with Business Management MEng Automotive Engineering with Robotics MEng Automotive Engineering with Sustainability



# CIVIL ENGINEERING

## H200 BEng Civil Engineering H202 MEng Civil Engineering

Accrediting institutions: ICE, IStructE

From the world's tallest structure in 2010, the 829.84 m tall Burj Khalifa in Dubai, United Arab Emirates, to the latest bare-knuckles roller-coaster ride (or even the more sedate London Eye) civil engineering structures are all around us. Civil Engineers plan, design, construct and maintain the infrastructure or "built" environment, including buildings, airports, railways, roads, tunnels, bridges and dams. Like all engineers, the Civil Engineer must master the key principles of design, analysis and management. At Warwick design forms a unifying theme throughout the three, four or five years of the course. The first two years establish a sound approach to the principles of design, which are then applied in the subsequent years to the core disciplines of structures, fluids and geotechnical engineering. Analytical techniques form an essential part of good design and students

develop these skills throughout the course. Management skills are vital to the realisation of civil engineering design, and the course covers such diverse areas as accounting, planning, marketing, human resource management, law, safety, and organisation of the industry.

Modules are supported by practical work in modern, well equipped laboratories, and by residential field-courses in geotechnical engineering in Wales and the Isle of Wight. A further field course in Uganda is offered within the year four module "African Field Course". Projects throughout the course draw on the School's major strengths, which are its interdisciplinary structure and the internationally recognised expertise of its staff. Details of third and fourth year modules are shown below, details on the first and second years can be seen on page 9.



BEng Civil Engineering Year Three	
<b>Core Modules</b>	
Project, Civil Engineering Materials and Structural Analysis, Concrete Structures, Construction Management in Practice, Geotechnical Engineering, Steel Structures, Water Engineering for Civil Engineers	
MEng Civil Engineering Year Three	MEng Civil Engineering Year Four
<b>Core Modules</b>	<b>Core Modules</b>
Individual Project, Civil Engineering Materials and Structural Analysis, Concrete Structures, Geotechnical Engineering, Steel Structures, Water Engineering for Civil Engineers	Group Project, Construction Management in Practice
	<b>Optional Modules - four of the following;</b>
	Advanced Geotechnical Engineering, Advanced Structural Engineering, African Field Course, Design for Sustainability, Energy Conservation, Finite Element Methods, Global Water and Sanitation Technologies, Health and Wellbeing and the Built Environment, River Mixing, Quality Systems, Renewable Energy Systems, Simulation of Operations, Supply Chain Management
	<b>Electives - available by taking three specified optional modules</b>
	MEng Civil Engineering with Business Management MEng Civil Engineering with Sustainability

# ELECTRONIC ENGINEERING

## H610 BEng Electronic Engineering H612 MEng Electronic Engineering

Accrediting institutions: IET, InstMC

Electronic systems play a vital role in almost all aspects of our everyday life and are the power behind the "information revolution" that is increasingly impacting on all our lives. Electronic Engineers play a pivotal role in the design and manufacture of a vast range of products and systems from smart phones to communications satellites and from personal computers to medical diagnostic systems. These have been made possible by a remarkable combination of scientific and technical innovations that encompass both the

design and development of physical systems (hardware) and in many cases the programs that define their operation (software). All Electronic Engineers need skills in the areas of design, analysis, information engineering and management. Our courses develop these by the use of a range of modern learning and teaching techniques that are used throughout all years of the course. Project work plays a unifying role in all years, bringing together technical and analytical material, developing design skills and

encouraging innovation. An example of the project work is the instrumentation and launch of a rocket in the second year 'Electronic Design' module. At Warwick teaching and project work build on the considerable research strengths within the school in areas such as communications, media technology, microcomputer systems, signal processing, smart sensors and novel semiconductor devices. This research expertise, together with our considerable industrial collaboration, keeps our courses at the leading edge of electronics. Details of third and fourth year modules are shown below, details on the first and second years can be seen on page 9. For details on the electives see pages 26 to 27.

<b>BEng Electronic Engineering Year Three</b>
<b>Core Modules</b>
Project Analogue Systems Design Communications Systems Digital Systems Design Fundamentals of Modern VLSI Design Signal Processing
<b>Optional Modules : one of the following</b>
Automation and Robotics, Electrical Machines and Power Systems, Systems Modelling and Control or Software Engineering

<b>MEng Electronic Engineering Year Three</b>	<b>MEng Electronic Engineering Year Four</b>
<b>Core Modules</b>	<b>Core Modules</b>
Individual Project Analogue Systems Design Communications Systems Digital Systems Design Fundamentals of Modern VLSI Design Signal Processing	Group Project ASICs, MEMS and Smart Devices Intelligent Systems Engineering Power Electronic Converters and Devices
	<b>Optional Modules - three of the following;</b>
	Internet Enabled Engineering Instrumentation and Measurement, Optical Communication Systems, Quality Systems, Simulation of Operations, Supply Chain Management, Wireless Communications,
	<b>Electives - available by taking three specified optional modules</b>
	MEng Electronic Engineering with Business Management MEng Electronic Engineering with Communications





# ENGINEERING

## H100 BEng Engineering H102 MEng Engineering

Accrediting institutions: ICE, IET, IMechE, InstMC, IStructE

The Engineering degrees offer an ideal entry route if you intend to specialise but want to delay your decision as to which specialist course to follow until later in your studies. They also offer a route if you are one of those students who wish to design their own engineering degree course in their final year. BEng students may choose options from across the range of modules offered to other engineering degree courses. As well as providing an opportunity for you to continue

with a broad education in engineering this degree also enables MEng students to create a unique degree course tailored to suit their fourth year elective choice. This is the only degree available with any of our five electives.

A broad engineering education provides for a range of career opportunities such as project or contract management within engineering companies or it could enable you to exploit your engineering knowledge

in careers such as teaching or journalism. Subject to the selection of modules in the 3rd and 4th years this can lead to a BEng degree accredited as partially satisfying the educational base for CEng status or a MEng degree accredited as fully with one of the following satisfying the educational base for CEng status with; the Institution Engineering and Technology, the Institute of Measurement and Control or the Institution of Mechanical Engineers.

BEng Engineering Year Three
<b>Core Modules</b>
Project
<b>Optional Modules; seven modules</b>
Students can choose from any of the engineering modules available on the other courses. Refer to pages 16 to 23.

MEng Engineering Year Three
<b>Core Modules</b>
Individual Project
<b>Optional modules</b>
Students may choose seven modules from those available on the specialist engineering degree courses. Students wishing to graduate with an accredited degree should follow the third year of the relevant specialist degree course, i.e. Mechanical Engineering for the IMechE.

MEng Engineering Year Four
<b>Core Modules</b>
Group Project
<b>Optional Modules: six modules</b>
Students can choose from any of the year four modules available, subject to any pre-requisites and timetable constraints.
<b>Electives - available by taking three specified optional modules</b>
MEng Engineering with Business Management MEng Engineering with Communications MEng Engineering with Fluid Dynamics MEng Engineering with Robotics MEng Engineering with Sustainability

## HN1 BSc Engineering and Business Studies

Engineering for many years has been regarded as an ideal background for a career in management, business or commerce. The accountancy profession, for example, recruit many engineering graduates because they have strong numerical and quantitative skills combined with a sound understanding of industry.

In the first two years of this degree you will take modules with all the BEng and MEng engineering students within the School of Engineering, providing a broad study of engineering and technology. In year three you will transfer to the internationally renowned Warwick Business School and study with their business students, as well as other science students taking degrees such as Physics and Business Studies, selecting modules to gain a wide introduction to the world of commerce, business and management. The choice of business modules available in the third year is in excess of 40 and too many to list here, refer to this web page for more details <http://www2.warwick.ac.uk/fac/sci/eng/eso/modules/year3/ebs3>

The skills acquired will open up a wide range of graduate career opportunities for management or administrative positions within industry or commerce. The degree is ideally suited to those candidates who have an interest in science and technology as well as business but who do not wish to become a chartered engineer. You may enter the University by applying directly for this degree on your UCAS form, or you may transfer from another engineering course at the end of year two. Continuation or transfer into the third year of this course is subject to performance overall and in the business module in year 2.

## HN12 BEng Engineering Business Management

The way customers purchase products is changing. Customers no longer want to own equipment such as aeroplane engines, which entails them having to undertake their own maintenance and service. Airlines want to lease aircraft engines from the manufacturer and pay for 'power by the hour'. Some manufacturers are no longer simply selling a new product: they are selling a complete service package. They must take responsibility for the product from 'cradle to grave'. To meet these evolving business challenges industry needs individuals who understand both the technical and business requirements for this new generation of products and services. Led by WMG the Engineering Business Management degree is designed to provide these individuals who wish to work within an engineering industry but who do not wish to become a chartered engineer. The first two years are common as for the other BEng and MEng engineering students. In the third year of the degree you choose half of your modules from engineering disciplines and half your modules from business disciplines, see below for details. The skills acquired will open up a wide range of career opportunities where an in functions such as marketing, contract management, procurement, supply chain management, servicing and maintenance. You may enter the University by applying directly for this degree on your UCAS form, or you may transfer from another engineering course at the end of year two.



### BEng Engineering Year Three

#### Core Modules

Individual Project  
Quality Techniques  
Supply Chain Management

#### Engineering Optional Modules; two of the following modules

Automation and Robotics  
Design for Manufacture  
Productionising Design

#### Business Optional Modules; two of the following

e-Business and Value Chains  
Corporate Strategy  
International Business Strategy  
Marketing Management

# MANUFACTURING AND MECHANICAL ENGINEERING

## HH73 BEng Manufacturing and Mechanical Engineering HH37 MEng Manufacturing and Mechanical Engineering

Accrediting institutions: IET, IMechE, InstMC

Manufacturing and Mechanical engineers are creative problem solvers and require vision to work with a range of other engineers in the development of innovative and cost-effective products. They find employment with in advanced industries as diverse as aerospace, consumer goods, electronics and pharmaceuticals, as well as the more traditional light-and heavy engineering sectors. Manufacturing globally is a key provider of wealth and employment. The United Kingdom is the world's sixth largest manufacturer by Gross Value Added.

Students of Manufacturing and Mechanical Engineering must master modern technologies and skills such as, robotics, computer aided design and simulation. Students will also gain a significant understanding of management techniques and skills alongside these technical subjects. Warwick offers you an unrivalled curriculum and resource to achieve this. A sound underpinning of the basics in science and management is developed in years one and two, whilst years three and four develop state of the art techniques and methodologies that graduates will find directly applicable in industry.

WMG is world renowned and is the largest group of its kind in Europe. Its teaching is truly global with centres in the Far East, South Africa and other European Countries. You will benefit from having staff who teach a wide range of subjects and who have industrial experience. WMG have large well equipped laboratories and engineering halls that enables students to experience industrial scale equipment. Close interaction with industry ensures that at all levels, from undergraduate to doctoral, our modules reflect and exploit the latest technologies.

### BEng or MEng Manufacturing and Mechanical Engineering Year Three

#### Core Modules

Individual Project  
Automation and Robotics  
CAD/CAM and Simulation  
Design and Management of Lean Operations  
Design for Manufacture  
Productionising Designs  
Quality Techniques

### MEng Manufacturing and Mechanical Engineering Year four

#### Core Modules

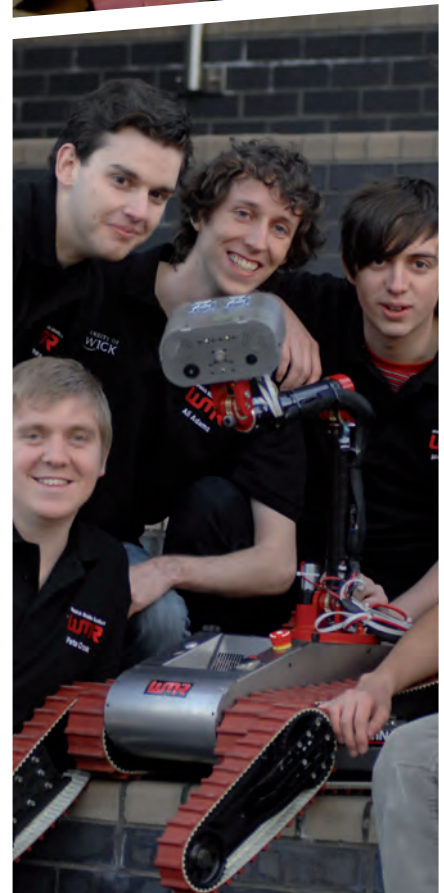
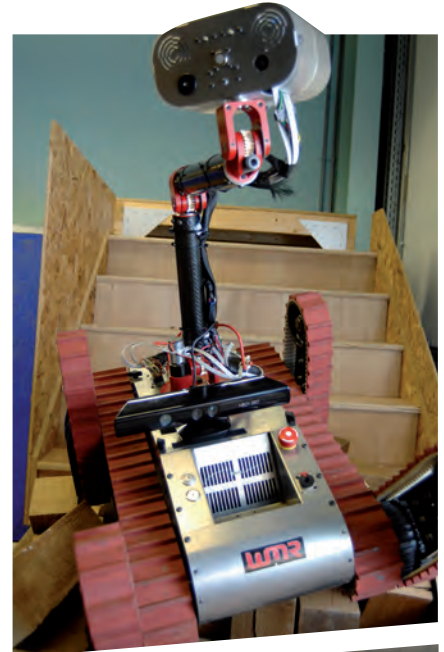
Group Project  
Innovative Process Development

#### Optional Modules - four of the following:

Advanced Robotics, Design for Sustainability, Dynamic Analysis of Mechanical Systems, Energy Conservation, Quality Systems, Renewable Energy Systems, Simulation of Operations, Supply Chain Management

#### Electives - available by taking three specified optional modules

MEng Manufacturing and Mechanical Engineering with Business Management  
MEng Manufacturing and Mechanical Engineering with Robotics  
MEng Manufacturing and Mechanical Engineering with Sustainability



# MECHANICAL ENGINEERING

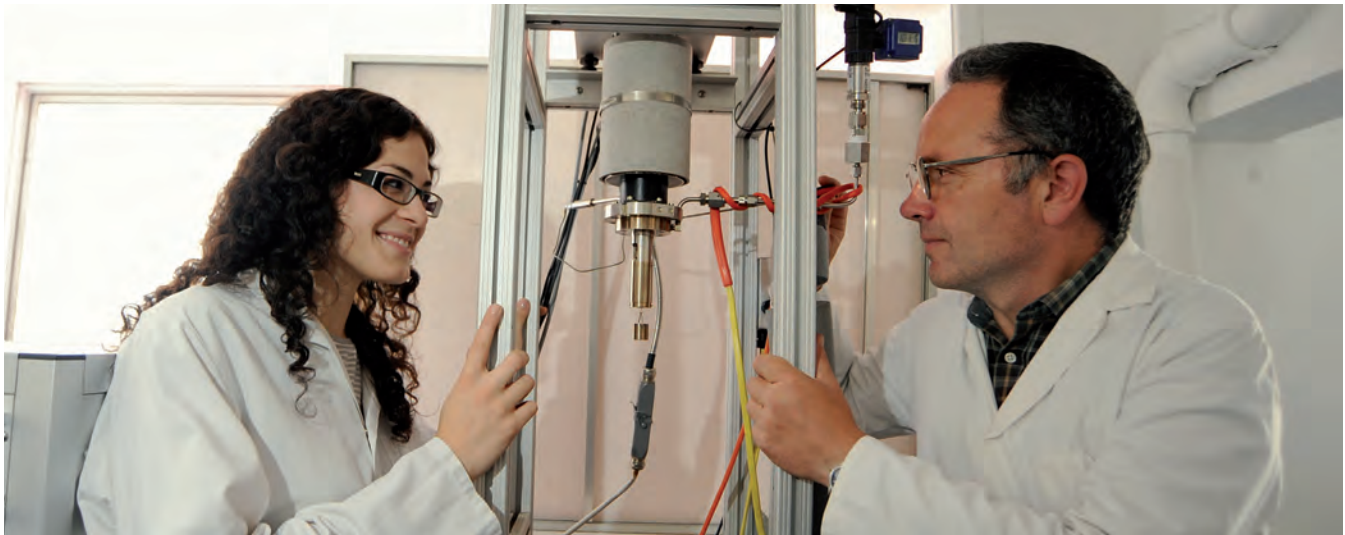
## H300 BEng Mechanical Engineering H302 Mechanical Engineering

Accrediting institution: IMechE

From cars to robots; from aircraft to DVD players; and from power stations to medical implants, almost all man-made systems involve Mechanical Engineering in one form or another. Mechanical systems, mechanisms and machines lie at the heart of our traditional engineering industries, and the skill and techniques associated with them continue to be essential knowledge, although often used very differently to even 20 years ago. In recent years these basic skills have been extended to the areas of precision engineering,

nano-technology and mechatronics. At Warwick, Mechanical Engineers follow a programme in years 1 and 2 that introduces basic design and analysis techniques, and develops technical, business and personal skills. Subsequent years build on these elements, presenting material within the key areas of technology, design, materials, analysis and management. Core Mechanical Engineering topics are supplemented by a range of optional modules and electives enabling students to steer their courses to suit their interests

and career needs. Modules cover topics as diverse as: the design of an aircraft wing; the computer modelling of car suspension systems; the optical gauging of a moving turbine blade; and the design of micro-electromechanical systems. Situated close to the UK's industrial heartland, Warwick works with many of the country's leading companies. This collaboration fuels our research and informs our teaching, helping us to keep our courses at, or beyond, the forefront of industrial best practice.



BEng Mechanical Engineering Year Three	MEng Mechanical Engineering Year Three	MEng Mechanical Engineering Year Four
<b>Core Modules</b>	<b>Core Modules</b>	<b>Core Modules</b>
Project Dynamics of Vibrating Systems Electromechanical Systems Engines and Heat Pumps Fluid Mechanics for Mechanical Engineers Mechanical Design Planar Structures and Mechanisms Techniques for Mechanical Detail Design	Individual Project Dynamics of Vibrating Systems Electromechanical Systems Engines and Heat Pumps Fluid Mechanics for Mechanical Engineers Mechanical Design Planar Structures and Mechanisms	Group Project
		<b>Optional Modules: six of the following</b>
		<b>A minimum of three modules from:</b> Advanced Fluid Dynamics, Computational Fluid Dynamics, Design for Sustainability, Dynamic Analysis of Mechanical Systems, Energy Conservation, Finite Element Methods, Heat Transfer, Mathematical and Computer Modelling, Precision Engineering and Microsystems, Renewable Energy Systems. <b>No more than three from:</b> African Field Course, Optical Engineering, Quality Systems, Simulation of Operations, Supply Chain Management
		<b>Electives - available by taking three specified optional modules</b>
		MEng Mechanical Engineering with Business Management MEng Mechanical Engineering with Fluid Dynamics MEng Mechanical Engineering with Sustainability

# SYSTEMS ENGINEERING

## HH36 BEng Systems Engineering HH63 Systems Engineering

Accrediting institutions: IET, IMechE, InstMC

An autonomous mobile robot, the hybrid electric propulsion system in an automobile, the flight control system in a fly-by-wire aircraft and human metabolic processes are all examples of a system. These, and all systems, are an amalgamation of elements or components that interact, or are interdependent. In many cases, real-world systems are a complex combination of elements and, often, their behaviour is time varying, or dynamic. Systems Engineers are employed in the analysis, design, development and

operation of systems. In contrast to experts in the traditional engineering disciplines, they take a holistic view of complex problems and proposed technological solutions, including relevant factors in the surrounding environment and/or the whole product life cycle. Many Systems Engineers will be engaged in applying modelling and analytical techniques, supported by computational tools, to decision making and problem solving, and to refining and testing new design concepts. Others will act as technical consultants to senior management in support of strategic

planning. At Warwick our size and scope allows us to offer a Systems Engineering degree that includes electronics, mechanical and manufacturing systems; and which includes an appreciation of business systems within engineering. This variety is reflected in the range of electives offered with this degree. Similarly the unified nature of the School is reflected in interdisciplinary research, often linked with other Warwick departments, with a systems bias, for example in medical, automotive, manufacturing or electronic systems applications.

### BEng/MEng Systems Engineering Year Three

#### Core Modules

Project  
Electrical Machines and Power Systems  
Measurement and Instrumentation  
Quality Techniques  
Signal Processing  
Systems Modelling and Control

#### Optional Modules: two for BEng, one for MEng of the following

Automation and Robotics  
Dynamics of Vibrating Systems  
Software Engineering

### MEng Systems Engineering Year Four

#### Core Modules

Group Project

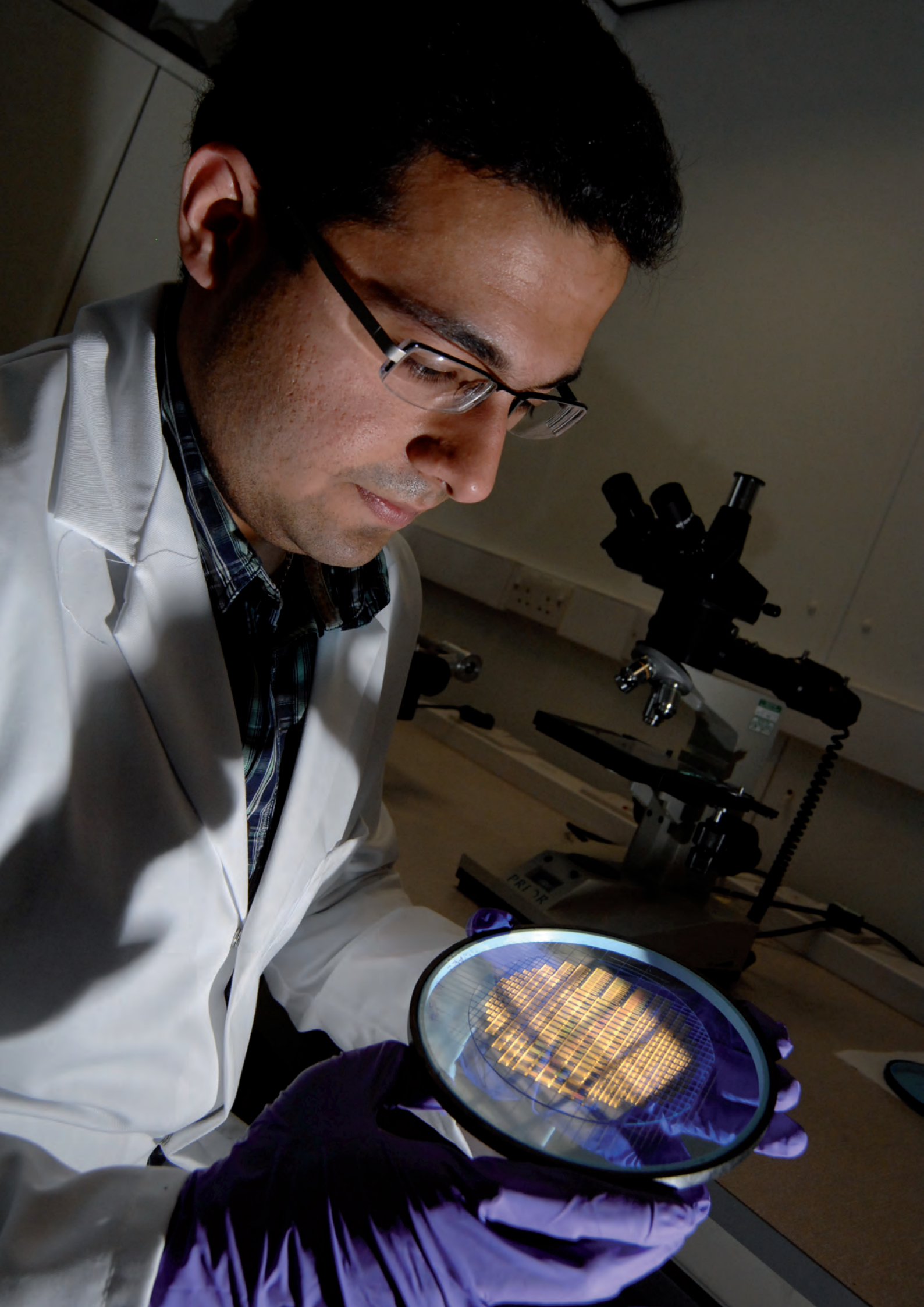
#### Optional Modules: six of the following

**A minimum of three modules from:**  
Automobile Systems, Dynamics and Control, Biomedical Systems, Dynamic Analysis of Mechanical Systems, Power Electronic Converters and Devices, Renewable Energy Systems, Mathematical and Computer Modelling  
**No more than three from:**  
Design for Sustainability, Energy Conservation, Quality Systems, Simulation of Operations, Supply Chain Management,

#### Electives - available by taking three specified optional modules;

MEng Systems Engineering with Business Management  
MEng Systems Engineering with Sustainability





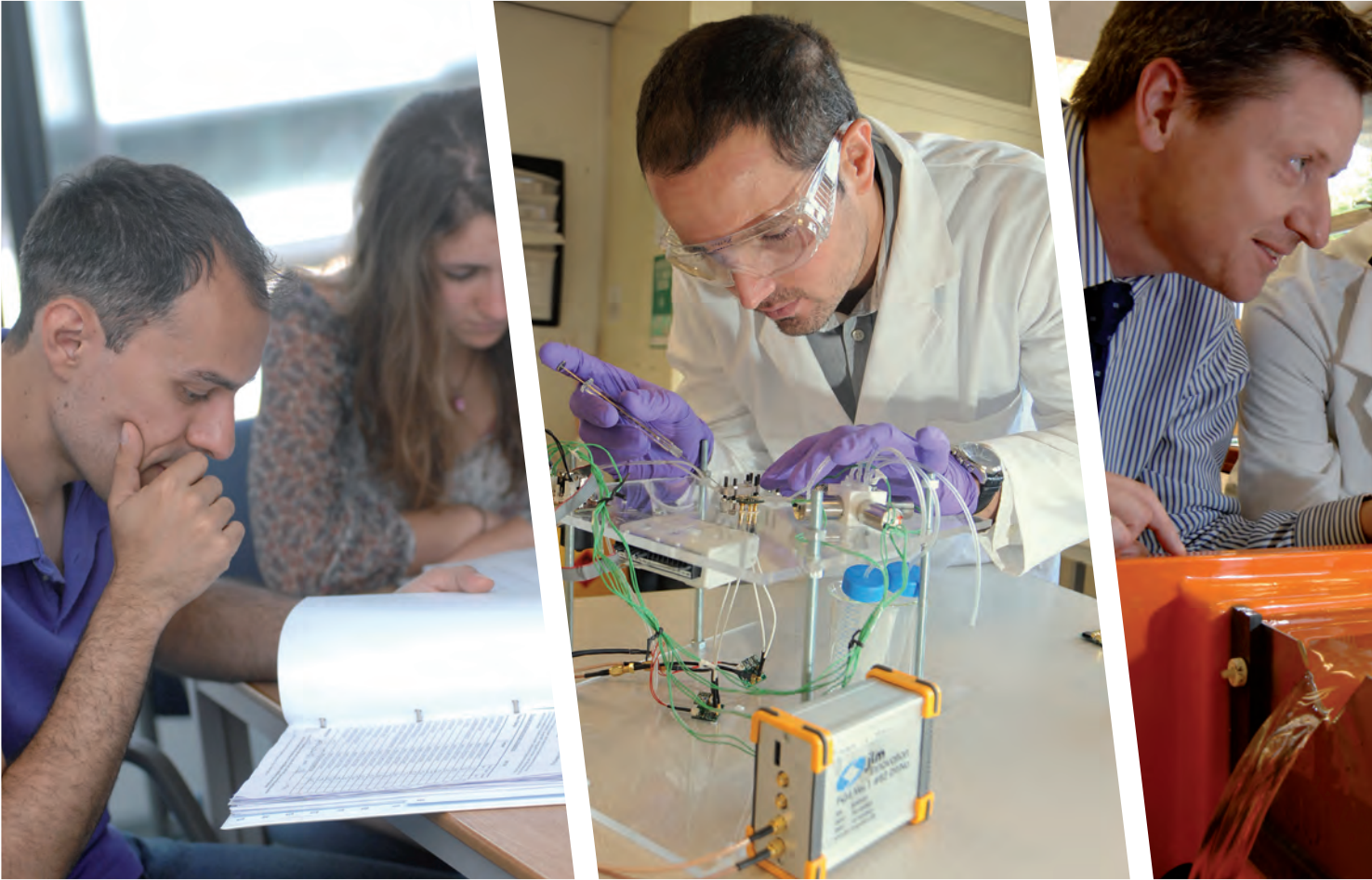


# MEng ELECTIVES IN YEAR FOUR

An elective is made up of the three specific modules. Our five electives are linked to areas of teaching and research expertise at Warwick. The elective can be added to your final degree title to help differentiate yourself from other graduates. So for example the degree title 'MEng Civil Engineering with Sustainability' will highlight your expertise to future employers. You do not need to decide whether you wish to take an elective until your third year of study at Warwick so you have plenty of time to decide and students can take the modules within a specified elective but choose not to add this to their degree title. If you have taken 'an intercalated year', in industry, or 'a year in research' and extended your degree to 5 years you could add this to your degree title instead.

**The diagram below explains which electives are available with which degree courses.**

	BUSINESS MANAGEMENT	COMMUNICATIONS	FLUID DYNAMICS	ROBOTICS	SUSTAINABILITY	AN INTERCALATED YEAR (5 YEAR DEGREE)	A YEAR IN RESEARCH (5 YEAR DEGREE)
ENGINEERING	•	•	•	•	•	•	•
AUTOMOTIVE ENGINEERING	•			•	•	•	•
CIVIL ENGINEERING	•				•	•	•
ELECTRONIC ENGINEERING	•	•				•	•
MANUFACTURING AND MECHANICAL ENGINEERING	•			•	•	•	•
MECHANICAL ENGINEERING	•		•		•	•	•
SYSTEMS ENGINEERING	•				•	•	•



## Business Management

Available with all MEng Engineering courses.

All professional engineers need to understand the business environment in which they operate. Career progression within the engineering profession typically requires engineers to become more involved in planning and coordinating with other business functions such as purchasing, quality, marketing and finance. This planning and co-ordination is vital to ensure that the engineers design and make products that meet the ever more stringent customer requirements for low cost, high quality and delivery on time. This elective is therefore suited to students from any of the engineering disciplines. The business management modules will be delivered by WMG. WMG is the largest group of its kind in Europe and its teaching is truly global with centres in India, Hong Kong, Malaysia, Thailand, and Singapore. The business management modules will draw on the material developed for the WMG MSc courses in Electronic Business Management, Engineering Business Management and Supply Chain and Logistics.

**The modules forming this elective are: Quality Systems, Simulation of Operations and Supply Chain Management.**

## Communications

Available with MEng Electronic Engineering and MEng Engineering.

In recent years, arguably the most dramatic improvements in our everyday life have come about as a result of developments in various forms of communication. The most significant of these

have been within the Electronics field, which has seen rapid growth in areas such as mobile phones, e-mail, the Internet, ATM (cash) machines, digital television and GPS (satellite) navigation. Communications is now the fastest growing sector of the electronics industry and offers tremendous opportunities and employment prospects. The Information and Communications Technologies research group at Warwick has worked on improving protocols for ad hoc wireless systems, analysis of the security of these systems and on improving the design of optical antenna to capture infrared energy more efficiently than lenses.

**The modules forming this elective are: Internet Enabled Engineering Instrumentation and Measurement, Optical Communications Systems and Wireless Communications**

## Fluid Dynamics

Available with the MEng Mechanical Engineering and MEng Engineering courses.

Aerodynamics and computational fluid dynamics (CFD) have applications throughout engineering. Examples include: the design of car bodies and aircraft wings; modelling air flow within and around buildings or the effectiveness of fans cooling electronic components; investigating the flow of dog food through pipes during production or the cooling system in a car engine; and modelling atmospheric flows. The list is endless. At Warwick we even have models of how dolphins swim! The elective draws upon the research and teaching of Warwick's Fluid Dynamics Research Centre - one of the largest groups of its kind in the UK. The Centre promotes interdisciplinary research through the collaboration of engineers, mathematicians and physicists.



Not all modelling is computer based. The centre has studied the influence of background rotation on the dynamics and stability of vortex rings and built an octagonal water-filled tank, 2.5 metres high and 1 metre in 'diameter' to do this. Our ongoing work in this area will help to improve understanding of problems in geophysical fluid dynamics and flows in rotating machinery. Knowing about the ideas behind such work gives a head-start for a career in many important industry sectors.

**The modules available for this elective: Advanced Fluid Dynamics, Computational Fluid Dynamics and Optical Engineering.**

## Robotics

Available with the MEng Automotive Engineering, MEng Manufacturing and Mechanical Engineering and MEng Engineering courses.

Robots are starting to migrate from the factory to the home. One of our 4th year MEng group projects is currently working on a robot rescue vehicle designed to find victims trapped after disasters such as earthquakes. Robots will become far more sophisticated than the ones we have today and will no longer be confined to industry but will also become mass produced consumer goods. Robotics needs many different types of engineer. All robots will need electrical power, electronics for control, mechanical mechanisms to move, and software for "intelligence". Systems engineers are needed to ensure all these areas work together successfully. Manufacturing engineers may either concentrate on the application of robots to make products or on manufacturing the actual robots. The modules in the Robotics elective equip you

with the necessary skills and know-how to pursue a career working towards creating new and better robots.

**The modules in this elective are: Advanced Robotics, Dynamic Analysis of Mechanical Systems and Simulation of Operations.**

## Sustainability

Available with the MEng Civil Engineering, MEng Manufacturing and Mechanical Engineering, MEng Mechanical Engineering, MEng Systems Engineering and MEng Engineering courses.

Modern industrial activities consume an enormous amount of natural resources and create large volumes of waste material, a situation that is no longer sustainable. All engineering disciplines are now concerned with minimising this wastage and in assessing the true cost of a project for the planet as well as for current and future generations. Many civil and mechanical engineering companies, for example, have created large departments solely for this purpose. If you are looking for a career the future is sustainability! Sustainable development is a key national and international policy that requires that the environmental impact and costs of a project are minimised and used to inform the initial design process. It seeks to generate higher levels of sustainable growth and productivity within a modern economy. In order to achieve some of the aims of sustainable development, research activities in the School of Engineering focus on three interacting areas: pollutant control, whole life cycle design and resource and energy optimisation.

**The modules forming this elective are: African Field Course, Design for Sustainability, Energy Conservation, Renewable Energy Systems, River Mixing**



# STUDENT SOCIETY – ENGINEERING WITHOUT BORDERS

Engineers Without Borders (EWB) is a charitable organisation which is geared towards developing skills and knowledge in the areas of appropriate technology and international development. There are many branches at different universities across the UK and around the world. EWB-UK organises nationwide training events and conferences, which anyone is welcome to, and usually include a strong social aspect to encourage networking. EWB-UK also organizes and funds international placements, during which students will employ the skills we teach as part of a defined project, such as hydro turbine construction or biofuel implementation.

At Warwick, we hold regular open meetings which are for all our members to attend and aim to provide a wide range of engineering

skills and knowledge from all of our activities. Our main recent project has been to build a 3.6 metre diameter Hugh Piggott wind turbine from scratch, manually carving blades, laying foundations, tensioning steel cables, winding generator coils, and casting and welding metal components. We are in the final stages of installation and connection, after which the turbine will supply electrical energy to the campus grid. We plan to involve as many members as possible in its erection and maintenance.

**Come and find us at the Fresher's fair as well as on the SU website. We also have our own website <http://www.ewb.uwcs.co.uk/news.php> which you can visit and ask us any questions.**

# RESEARCH AND GRADUATE PROFILES

Our undergraduate engineering courses benefit from the research activities of two departments; the School of Engineering and WMG.

The School of Engineering is one of the few unified Schools in the UK to undertake internationally leading research in all the main fields of Engineering; civil, electrical and electronics, mechanical, manufacturing and chemical engineering. Particular areas of research in which Warwick is leading are; fluid dynamics, sensors (chemical, gas and ultrasonic), power electronics, heat transfer (heat pumps and refrigeration), systems modelling (neural and pharmacokinetic), biomedical engineering, wireless communications, intelligent systems, image processing, precision engineering, structures, geotechnics and water engineering. Additionally, the School works in collaboration with a large number of companies from all the main sectors of engineering, examples, include; Arup in construction, AstraZeneca in pharmaceuticals, Converteam in renewable energy, Thales and Airbus from aerospace to name a few.

WMG is an international model for how universities and businesses can work together. They are at the forefront of innovative technology, leading major multi-partner projects to create and develop exciting new processes and products that can lead to major breakthroughs and be of huge benefit to organisations providing them with the opportunity to gain a competitive edge. They are developing applied research in fields such as materials, manufacturing technologies, digital technologies, operations, business management and healthcare. These multi-partner projects have seen WMG working across a wide range of sectors including automotive, aerospace and defence, digital, energy and utilities, finance, food and drink, healthcare and pharmaceuticals. Within these sectors they have collaborated with government sponsored bodies and the NHS, innovative SMEs and global corporations such as Airbus, Arup, AstraZeneca, BAE Systems, GlaxoSmithKline, Jaguar Land Rover (JLR), Network Rail, Rolls-Royce, Siemens, TATA Motors, TATA Steel and TVS to name but a few. As advocates of manufacturing, innovation and technology, WMG has provided expert advice to many overseas governments, who have visited the Group to study they operate, in order to develop similar initiatives in their own countries.

The two departments collaborate on a number of joint research programmes such as the £19million Low Carbon Vehicle Technology programme funded by Advantage West Midlands. The School of Engineering and WMG recently collaborated on a conference with IMAPS-UK and NMI. The two-day event brought together more than 150 representatives from across the UK in the field of Power Electronics Technology, for networking between end-users, researchers, supply chains and technology providers. Integrating cutting edge research into the engineering undergraduate programmes is a priority for both departments. Research led teaching brings the subject alive and makes it up-to-date and relevant as well as preparing graduate for the demands of an engineering career.



# RESEARCH CASE STUDIES

**In 2010-11 the School of Engineering was awarded £8 million of research income. In 2010-11 WMG was awarded £17.3 million of research income.**

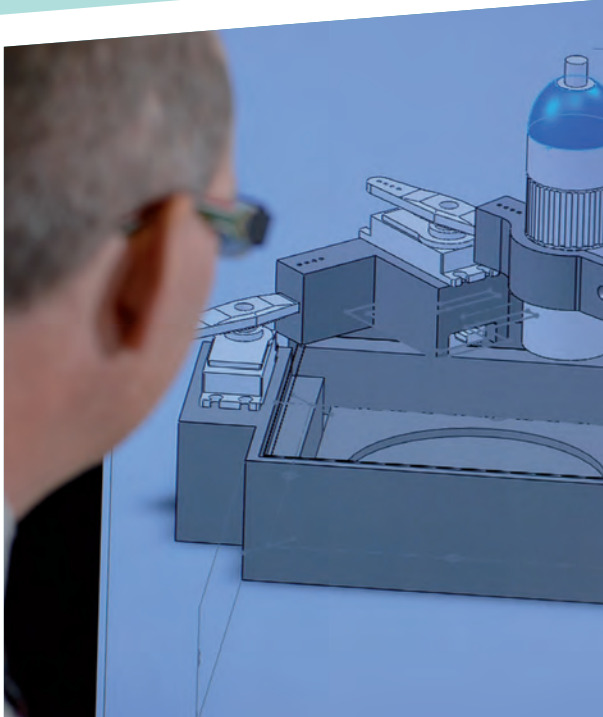


## 'Engineering in the fight against cancer'

Dr James Covington leads a team in the School who are developing and trialing the electronic nose to detect colon cancer (one of the largest cancer groups for non-smokers), by sniffing the odours that emanate from urine samples. The electronic nose was invented at Warwick University in the 1980's as an instrument to replicate the human sense of smell, and has been

in continuous development ever since. Over the years many undergraduates have been involved in the research via individual projects and MEng group projects. In this new research 'electronic noses' will 'sniff' out unique biomarkers, which are given off by colon cancer. If successful, the procedure would lead to the development of non-invasive techniques, which would change the face of colon cancer diagnosis, and ultimately lead to improved recovery

rates. This work is part of the FAMISHED (Food and Fermentation using Metagenomics in Health and Disease) project, and is supported by NIHR and CLRN. The long-term vision is to develop a new generation of non-invasive, rapid, portable instruments that will detect a broad spectrum of ailments. For more information about the work, visit [go.warwick.ac.uk/famished](http://go.warwick.ac.uk/famished).

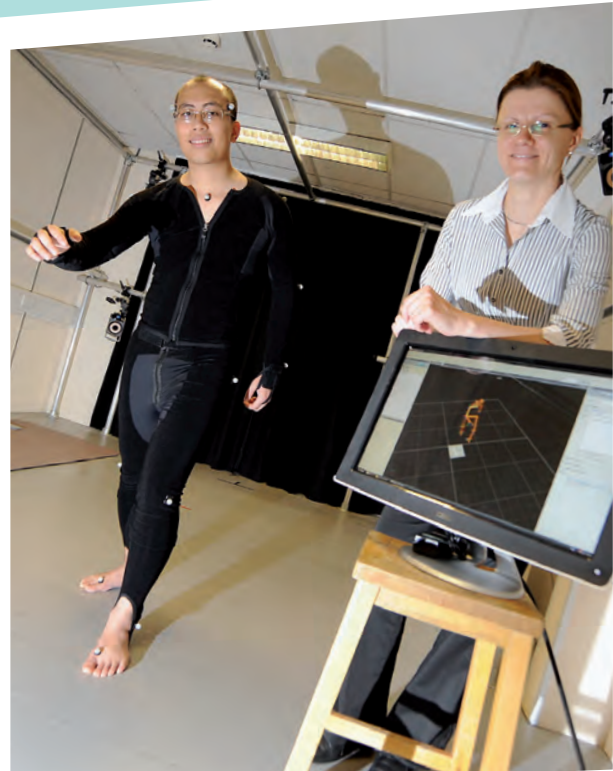


## 'WMG working with worms'

Professor Christopher James leads the healthcare technologies team in the Institute of Digital Healthcare within WMG and has been working on a research project that tracks the meanderings of one nematode worm at a time after they were exposed to alcohol. The nematode worm is a very simple animal that shares many genes and molecular pathways with humans. Gene researchers can learn a great deal from these worms by observing their behaviour under particular conditions; however the equipment to do this is very expensive ranging from £10,000 to £15,000.

Professor James was certain he could devise a far cheaper and more efficient way of worm watching. So over the summer working with a Warwick civil engineering intern student they applied manufacturing and digital technology knowledge and some lateral thinking, to bring together part of a model aeroplane, an off the shelf USB microscope, and some rapid prototyped plastic parts to create a worm tracker that cost a hundredth of the price to manufacture and is already being developed further to follow more than one worm at a time.

For more information on Professor James's work visit [www.idh.warwick.ac.uk](http://www.idh.warwick.ac.uk)



## 'Bridging the future'

Dr Stana Zivanovic received her EPSRC First Grant in September 2011. Her project is entitled 'Pedestrian Interaction with Lively Low-Frequency Structures', and it is due to run for two years. The aim of the research is to provide fundamental understanding of the interaction between pedestrians and lively structures, such as footbridges and low-frequency floors.

This will be achieved by monitoring human kinematics and kinetics while walking on a 20m long model bridge, being constructed on the Strong Floor in School of Engineering's Structures Laboratory. The bridge will be completed in May 2012. Recently, the concrete deck has been cast with contribution from undergraduate and postgraduate students. Human walking on the bridge will be monitored using the motion capture system VICON available in Warwick's Gait Lab. This state-of-the-art equipment has been used by many engineering students in preliminary studies of human motion.

This research will allow us to understand when people act as amplifiers and when as attenuators of structural vibrations and it will bring us a step closer to providing high quality infrastructure fit for intended purpose.

The outcomes will help prevent vibration serviceability failures, such as the one of the Millennium Bridge in London 12 years ago. For more information see <http://gow.epsrc.ac.uk>.

# GRADUATE PROFILES

## Alumni of the School of Engineering



### Divya Surana, BEng Engineering Business Management 2009

Coming to the University of Warwick has been one of the best decisions of my life and I have thoroughly enjoyed each minute spent here. Not only did I fulfil all my dreams but I achieved a lot more than I could have possibly imagined.

Engineering at Warwick is highly under rated; I was taken aback by how rigorous the course was with the right mix of lab work, theory and sums. I have had some interesting projects like designing an automatic house for the elderly, making a robot car and developing an idea for an attack alarm cum watch! Engineering at Warwick gives you great flexibility to select modules according to your preference.

I chose Engineering and Business Management because it's an interesting degree and also very sought after by the employers. In my last year I studied Management Accounting, Principles of Finance, Economics for Business and Markets, Marketing and Strategy. The whole financial crisis/recession suddenly became so much more relevant because all that we learnt could be applied so well.

Warwick places a great emphasis on extra-curricular activities and this is where its students differentiate themselves from others. Amongst other activities I hosted a Bollywood music show on Radio Warwick which was thrilling! In my final year I received the Warwick Advantage Gold Award for my exceptional involvement with the University.



Images supplied courtesy of Armfield Ltd.

### Tom Morton, BEng Civil Engineering 2010

I graduated from the University of Warwick in 2010 with a 1st Class BEng Honours Degree in Civil Engineering. After graduating I started to ask myself which career path I would like to take. Being an engineer from Warwick I had many options and received a number of offers from different industry sectors.

I was fortunate enough to be offered employment by a company called Armfield, who are the industry leaders in the design of Engineering Teaching Equipment. Armfield supplies equipment, in civil engineering, mechanical engineering, chemical engineering and food technology, to universities in over 100 countries around the world. The University of Warwick is one of those universities and during my degree I worked with some of the Armfield equipment.

It is very exciting to work for a company who are innovators in their field and Warwick's well rounded course has given me the best possible tools for the job. With Warwick's emphasis on general engineering I gained an understanding of mechanical and electrical engineering as well as my more thorough understanding of civil engineering. These skills have proved invaluable whilst working at Armfield, where all disciplines of engineering are covered. The business modules of the course at Warwick have provided me with the knowledge required to have a better understanding of both the industry sector and commercial aspects of the company as a whole.





## Nick Ellison, MEng Systems Engineering 2009

The main incentive that studying at Warwick held for me, was the ability to continue learning a broad spectrum of subjects for two years before the question of specialising arose. As my strengths have always laid in being able to holistically analyse projects, and view complex scenarios in a top-down approach, it was perhaps natural that I should end up pursuing Systems Engineering when the time came. This gave me the benefit of retaining interdisciplinary knowledge, whilst still providing a sound education in the aspects I found most appealing. Having this structure within the university system has undoubtedly aided my progression outside of academia, and has refined the way I approach any task.

Being able to join the European Student Moon Orbiter team at Warwick, and working in conjunction with the European Space Agency in my final two years is something simply unique to Warwick in the UK. It gave me an unparalleled opportunity to apply my skills to a group endeavour, and also the chance to work with very talented engineers on an international level. Additionally, due to the early introduction of cross-discipline group work, my skill set desirable to industry rose dramatically. This resulted in an internship as a Technology Risk Consultant with Deloitte by the Summer of my second year, and I went on to secure a graduate position, often relating in-situ events from Engineering projects in the interviews.

During my time at Warwick, I spent two very successful years running the Skydiving Club (rated as the Most Improved Club or Society in the UK 2008), and created the university's largest ever charity event as part of its activities.



## Ben Wood, MEng Mechanical Engineering 2006

I studied for a MEng in Mechanical Engineering between 2002 and 2006. As part of my degree I took part in the Formula Student group project, which was a fantastic opportunity to work closely with industry and develop my engineering skills. Project work and research were the areas of my degree that I enjoyed the most, so I applied to do an Engineering Doctorate with WMG at Warwick. The EngD requires the research to be industrially relevant which was a challenge, but also meant that I had the option to work outside of academia. The subject of my research was sustainable motorsport, which allowed me to be involved in projects such as Eco One and Worldfirst; green racing cars. The Worldfirst F3 was particularly enjoyable to be involved with, and really captured people's interest with its carrot fibre steering wheel and chocolate-based biodiesel fuel.

Working on industrially-focused research brought me into contact with a range of companies and organisations, and I drew on this experience of working with industry when I was looking for jobs after my EngD. I now work at WMG in the SME team working with small to medium enterprises (SMEs) in the West Midlands giving them access to cutting edge academic research to help them develop new products and services to make their businesses more successful.

# APPLICATION DETAILS

## How to apply

Applications to all UK Universities are made through the Universities and Colleges Admissions Service (UCAS) via their online system at <http://www.ucas.ac.uk>. If you have enquiries regarding the UCAS system you can make enquiries from the UK on telephone +44 (0)871 468 0 468.

## Entry requirements for 2012 entry

All applicants are given individual consideration. For those offering A-levels our typical offers in recent years have been:

### All Engineering degrees; AAB

Candidates are expected to offer three A-level, or equivalent, subjects, excluding General Studies and these subjects should normally include both mathematics and physics. In the interests of widening participation, the School will consider strong, motivated candidates for entry into year one who have either mathematics or physics at A-level and who have demonstrated their aptitude for both these subjects at a lower level, such as GCSE or AS-level. Candidates with A-level physics but not A-level mathematics, if admitted, replace their first year optional module with the module 'Foundation Mathematics'. This route is designed for strong candidates who chose their initial higher level subjects before realising that they wanted a career in engineering. These students need to be highly motivated to cope with the foundation mathematics taught just one week prior to the more advanced mathematics delivered within the Technological Science core module. The benefit of this route is that the start of your degree course is not delayed and you will be taught Foundation Mathematics in a small group, typically of 10 students.

Candidates with A-level mathematics but not A-level physics, if admitted, will be given any additional support they require via our personal tutor system and some extra physics classes. We are always happy to receive applications from those offering equivalent qualifications, and our typical entrance requirements can be found on our admissions website. We are pleased to give advice in advance of an application to those who are uncertain as to whether they satisfy our entry criteria. If we can be of any help, please contact our admissions secretary (contact details below).

## Open days

Applicants who live in the UK are encouraged to attend a School of Engineering Open Day, during which they will meet students and staff, and learn more about life at Warwick, our facilities and the course content.

The University also offers two General Open Days, normally in May and September, for those considering an application. Bookings are made online and details can be obtained by telephoning our Student Recruitment Office on +44 (0)24 7652 3723 or by visiting their website at <http://www2.warwick.ac.uk/study/undergraduate/visits/>

## Further information

If you would like any further information, or have any questions, please contact our admissions secretary by phone, fax or email. Alternatively, visit our admissions website.



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