MANCHESTER 1824

The University of Manchester

Electrical, Electronic and Mechatronic Engineering

UNDERGRADUATE BROCHURE

Switch on your career in electrical, electronic and mechatronic engineering at The University of Manchester, a university with a prestigious engineering history and a bright focus on the future. We're home to one of the largest departments dedicated to the subject in the UK, have fantastic links with industry, and have taught Electrical Engineering here since 1905.

More than 100 years later, we continue to help solve today's biggest energy problems, develop new electronics components for agriculture and other industries, design advanced robotic solutions for nuclear decommissioning and much more. We offer three distinct degree streams: electrical and electronic engineering, electronic engineering, and mechatronic engineering. We break down the difference on page 5.

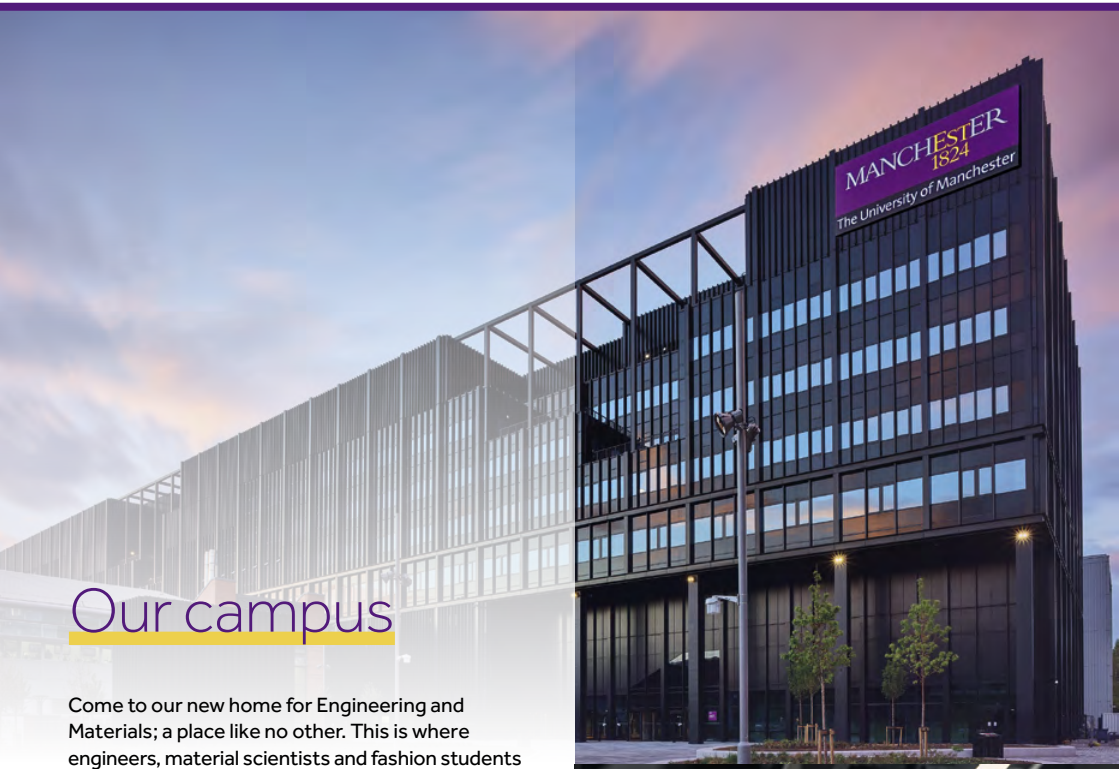
Why Manchester

We are ranked 4th in the UK for Electrical, Electronic and Mechatronic Engineering with over 90% of our academic staff research active, meaning you will be lectured by experts in the field. (QS World University Rankings 2022)

Since 1905 electrical engineering at Manchester has produced a series of firsts, including the world's first stored-program computer: the Manchester Small-Scale Experimental Machine (SSEM).

We are ranked 3rd in the UK for research impact (REF). We make a global impact; our research into ester liquids means that eco-friendlier and safer transformers are being used by utility companies and our extensive research in renewable power generation systems contributes to a greener future.

Read more about why Manchester should be your first choice: uom.link/ug-eee-why-mcr



Our campus

Come to our new home for Engineering and Materials; a place like no other. This is where engineers, material scientists and fashion students collaborate, innovate and make their mark on the world.

Unleash your potential in our creative, academic playground that signals the evolution of a proud history of innovation spanning almost 200 years. In this very special place, we're ripping up the rule book, offering you a truly innovative teaching and learning experience. As well as our creative classrooms, you'll also have access to world-leading sustainable research facilities.

There are a world of possibilities, whether you are interested in aerospace, robotics, or sustainable fashion, there's a home for you here. Manchester is synonymous with the Worker Bee and our Makerspace will be the hive of activity. It's led by students, for students, as the place to connect and tackle real-life challenges together with support from across our disciplines. Our new home for Engineering and Materials is equipped and ready for students to unleash their potential.

uom.link/ug-eee-campus

ELECTRICAL AND ELECTRONIC ENGINEERING

The use of electricity is an everyday part of our lives. It has to be generated as efficiently and cleanly as possible and distributed safely to homes and industry. Our homes require electrical power for lighting, cooking, household appliances and many other electronic gadgets. The domestic mains voltage needs to be converted to a much lower voltage in other household equipment, such as music and video streaming systems, televisions, DVD, PCs etc. all of which contain sophisticated electronic circuitry. Industry needs power at a higher level for use in heavy machinery, which must be controlled and monitored by sophisticated electronic systems. Increasingly in transport, electrical systems are being used in electric vehicles (road and rail), hybrid drives (part electric motor, part internal combustion), engine management electronics, climate control, on-board entertainment and navigation systems.

ELECTRONIC ENGINEERING

In the 21st century, we look to electronics to provide answers for more and more complicated problems. Take the mobile phone: a very sophisticated computer and communications system that links to a worldwide network of antennas to allow it to connect to any other mobile or landline. Or the digital camera, at the heart of which is a sophisticated electronic device containing millions of individual light-level detectors. Modern electronics requires an understanding of basic analogue and digital circuits to enable the design of simple elements, which can be connected together to make small systems, which can be connected together to make bigger systems. When the systems become complicated, we require techniques to allow us to design and use them, such as digital signal processing – for images and audio signals, concurrent processing – to allow the manipulation of the massive amounts of data, data networking and digital communication systems - for local distribution and across the internet.

MECHATRONICS ENGINEERING

Mechatronics is the marriage of mechanical engineering with smart electronics and is vital to industrial automation and robotics. To interact with an object, a system must know where it is, be able to move the object and place it in the required new position. The electronics therefore require information from sensors that can detect position, orientation and visual or audio signals. The electrical inputs from the sensors have to be interpreted and the appropriate signals sent out to the actuators to perform the required operation. This process relies on sophisticated software and hardware capable of translating low-voltage, low-current signals into power signals of sufficient current to drive the actuators. A good understanding of feedback control is also required in order to make changes in the system from one steady position to another, without oscillations or unpredictable movements.

Our courses

Electrical and Electronic Engineering BEng

Electrical and Electronic Engineering MEng

Electrical and Electronic Engineering with Industrial Experience MEng

Electronic Engineering BEng

Electronic Engineering MEng

Electronic Engineering with Industrial Experience BEng

Electronic Engineering with Industrial Experience MEng

Mechatronic Engineering BEng

Mechatronic Engineering MEng

Mechatronic Engineering with Industrial Experience BEng

Mechatronic Engineering with Industrial Experience MEng

Electrical, Electronic and Mechatronic Engineering with an Integrated Foundation Year

FLEXIBLE OPTIONS

The first three semesters of our undergraduate courses share the same content. This gives you the opportunity to transfer between electrical and electronic, electronic, and mechatronic engineering up until halfway through your second year.

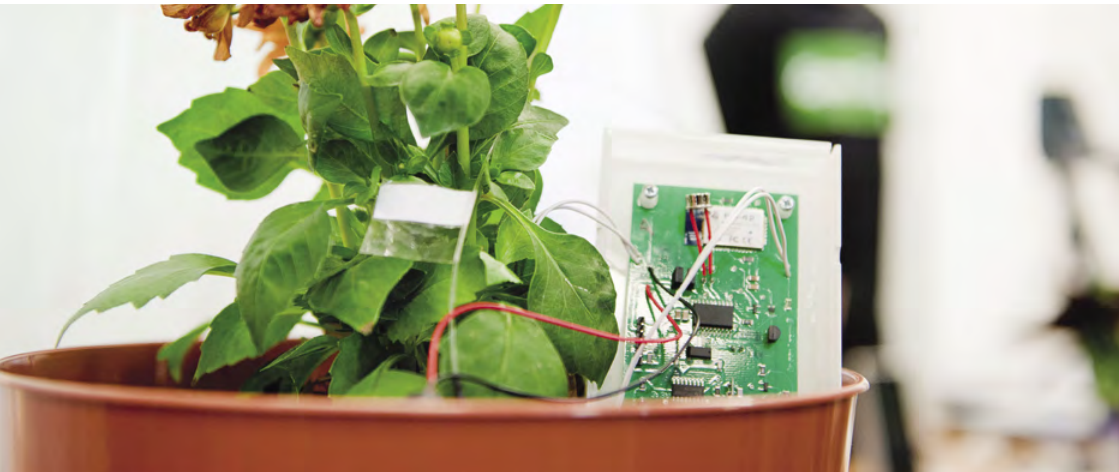
BEng VS MEng

As well as choosing your area of interest, you can also select a three-year BEng or a four-year MEng. This is a choice that can be made anytime up to end of your second year. If you are aiming to be a Chartered Engineer, the accredited MEng degree provides the educational base required to achieve this. Accredited BEng degree courses require further study to achieve the same status.

FOUNDATION YEAR AVAILABLE

You can prepare for the full degree course if you do not have the appropriate qualifications for direct entry by undertaking our foundation course first.

Find out more about the different courses and options on offer on our department website: uom.link/ug-eee



What you'll learn

If you choose to study electrical and electronic engineering you'll learn to:

- combine your maths knowledge with creativity to solve energy challenges
- develop electronics, sensors and communication systems for homes and industry
- design, control and operation of power conversion systems and large-scale power systems
- develop real-time microcontroller-based embedded systems and robotics.

As part of our electronic engineering courses you'll learn to:

- design analogue and digital circuits to create smart devices
- develop real-time microcontroller-based embedded systems and robotics
- design control systems for various industrial processes
- design nanoscale devices exploiting quantum mechanical effects due to low dimensionality.

When studying mechatronic engineering you'll learn to:

- develop real-time microcontroller-based embedded systems and robotics
- design, operation and modelling of actuator systems
- design control techniques for unmanned intelligent underwater, ground and aerial vehicles
- develop localization and mapping techniques for robotics applications.

PROJECT WORK

Across all courses you'll carry out interesting project work in each year of study.

In Year 1, you'll complete an electronics project. This project introduces the practical issues associated with the design, electronic assembly, mechanical fabrication, and testing of electronic systems.

In Year 2, you will design, build and test an autonomous buggy which can use sensors to navigate its way around a track - whilst avoiding a few obstacles on the way! This is our year-long problem-based, Embedded Systems, project.

In Year 3, the individual project usually involves development of software and/or hardware systems and you'll be allocated a project aligned with your preferences from a selection proposed by lecturers. The projects are run over two semesters and will give you the opportunity to explore topics outside the curriculum or master some of the techniques that you've learnt. Examples of recent individual projects:

- 5G communications networks
- Agri Internet of Things (IoT) – next generation platform from Sony
- Modelling and simulation of thin-film transistors (TFTs) and circuits.

In the final year of our MEng courses, you'll undertake a team project that is either directly funded by industry or inspired by industrial needs. Examples of fourth year projects in previous years include:

- Haptic glove for bilateral teleoperation with virtual/augmented reality tools
- An autonomous farm robot crop inspection and care without human intervention
- Instrumented training wheelchair for para-athletes.

Watch our video showcasing past projects: uom.link/ug-eee-projects-video

Special features

INDUSTRIAL EXPERIENCE

All our courses can be combined with an accredited, year-long industrial placement. Students on these extended courses spend a year in industry after their second year. We encourage you to spend time in industry during your course as it develops your business, team-working and transferable skills, all of which are sought after by graduate employers. It will also increase your awareness of the broad range of careers on offer and guide your choice of optional subjects. We have strong links with industry and our students find industrial placements with high-profile companies, such as Red Bull Racing, Jaguar Land Rover, National Grid, BP, National Instruments, AstraZeneca, Texas Instruments and many others. During an industrial placement year, you are paid a salary by the company you are working for. Placements can be accredited by the IET towards the training required for attaining Chartered Engineer status.

To find out more information about industrial placements visit: **uom.link/ug-eee-ind-exp**

EXCELLENT FACILITIES

- State-of-the-art dry lab blended lecture theatre including LabVIEW and Multisim
- National Grid High Voltage facility, including the National Grid Power Systems Research Centre
- Rolls-Royce University Technology Centre (Electrical Systems for Extreme Environments).

To find out more about our facilities visit: **uom.link/ug-eee-facilities**

STUDENT SUPPORT

We pride ourselves on the range of support we offer students, from our dedicated wellbeing hub to our award-winning PASS (Peer Assisted Student Study) scheme. PASS allows you to utilise the experience and expertise of higher year volunteer students (PASS Leaders). You'll be assigned a dedicated academic advisor who can help you with academic issues and guide you through your transition from school or college to university.

Read more about our PASS scheme: **uom.link/ug-eee-pass**

"Manchester is a great place to be a student as it's a multicultural city wherever you look. People in Manchester always surprise me. You would never feel alone or lost here because you'll always find someone you can identify with."

Kevin Haro Garces / BEng Electrical and Electronic Engineering

OUR STUDENT COMMUNITY

You can boost your career prospects and enhance your student experience through any of the different extracurricular opportunities available at the University, including societies (including The E4C Electronics Club, The Electrical and Electronic Engineering Society, and The Robotics Society), volunteering and work placements. The Manchester Leadership Programme allows you to develop the skills that graduate employers seek while also giving back to the community.

uom.link/ug-eee-student-union

Read more about our students' experiences, our alumni and where they are now, and our department in our blog: **uom.link/ug-eee-blog**

See what life is like in the department of Electrical, Electronic and Mechatronic Engineering: **uom.link/ug-eee-youtube**

MANCHESTER DISTANCE ACCESS SCHEME

The Manchester Distance Access Scheme is the University's national widening access programme which gives eligible students the opportunity to develop key skills in preparation for university.

For more information on MDAS visit: **uom.link/ug-eee-mdas**

Open days

The University holds undergraduate open days regularly where you have the opportunity to find out more about our courses, the support we offer and see our facilities. Attending an open day is a great way to find out what studying at Manchester is like.

For information about our open days visit: **uom.link/ug-eee-open-days**

"The best part of Electrical and Electronic Engineering is that there are countless domains in which you can apply it. From medicine, to phones and computers, all the way to renewable energy systems, it's amazing to see how the same principles apply. Technology is a big part of the present and it'll be an even bigger part of the future, so I have no doubt that this field of study and work will continue to grow in the most unexpected ways."

Flavia Dumitrica / MEng Electrical and Electronic Engineering

Employability and careers

As a student here you'll acquire a firm grounding in engineering and an appreciation of the exciting challenges faced by the wider industry. You'll also benefit from the strong links we've forged with leading organisations, such as:

- National Grid
- National Instruments
- Rolls-Royce
- Siemens.

WHAT OUR GRADUATES DO:

- Design automotive electronics
- Design communication systems
- Develop robotics
- High voltage engineering
- Integrate renewable energy sources
- Oil and gas exploration
- Systems for unmanned vehicles.

WHERE OUR GRADUATES WORK:

- Arup
- National Grid
- Scottish Power
- ABB
- Rolls-Royce
- BAE Systems.

Find out more about the careers opportunities the University and our department offer, so that you graduate with a range of skills and experience: uom.link/ug-eee-careers

Graduate with a degree from us and you'll be in demand among the top graduate employers by attending the most targeted university according to The Graduate Market in 2022 - High Fliers Research. uom.link/ug-eee-highfliers

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DISCLAIMER

This brochure was produced in 2022. It has therefore been produced in advance of course starting dates. For this reason, course information, including course content, may be amended prior to your applying for a place on a course of study. There are a number of reasons why changes to course information and/or published term dates may need to be made prior to your applying for a place on a course. These may include, but are not limited to: the need to make reasonable changes to the content and teaching offered in relation to any course for operational and/or academic reasons; the withdrawal of courses due to insufficient numbers; a course not receiving the required accreditation; and/or interruption or loss of key services due to circumstances beyond our control, including fire, flood or other operational issues.

Prospective students are therefore reminded that they are responsible for ensuring, prior to applying to study at The University of Manchester, that they review up-to-date information by searching for the relevant course at uom.link/fse-ug-courses

INDUSTRIAL EXPERIENCE DISCLAIMER

Some aspects of the industrial experience programmes may continue to be impacted by the COVID-19 pandemic. The situation is fast-moving and dynamic and may require adjustments at short notice.