



Newcastle University

Undergraduate Study

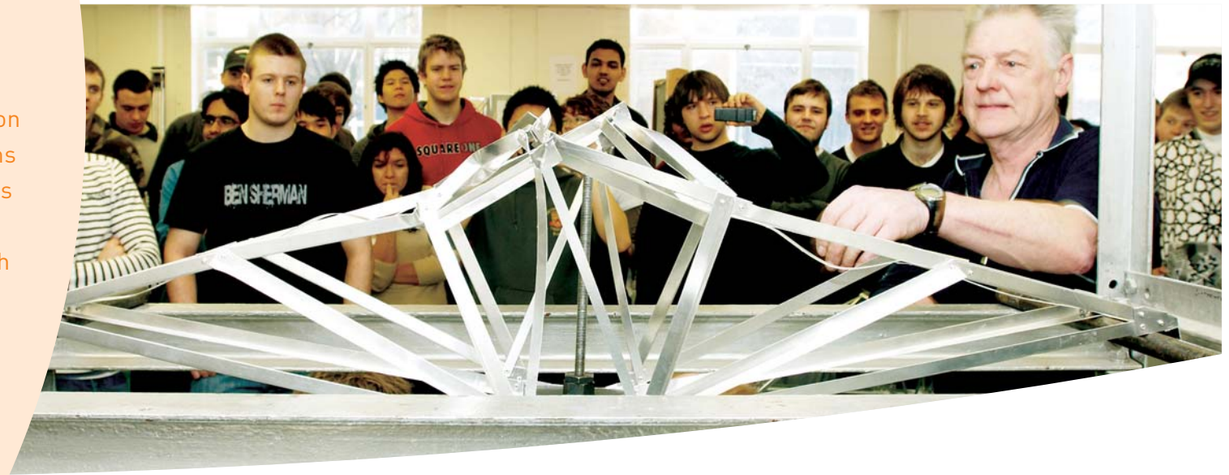
Mechanical and Systems Engineering

Mechanical and Systems Engineering

Engineers play a leading role in providing energy, transport, communication and the structures and products we use every day. Mechanical and Systems Engineering is one of the broadest engineering disciplines. It encompasses everything from structures (such as car bodies) through mechanisms (such as human joint replacements), to micro-electro-mechanical devices (such as miniature piezoelectric gyroscopes for aircraft guidance systems), and even systems for controlling complex processes (such as road, rail or air traffic).

Newcastle University is a major engineering university with one of the largest engineering teaching and research groups in the UK. Our research feeds directly into our undergraduate programmes, so that our students benefit from being taught by experts in their field. We are also able to offer specialist options not available at most universities, for example, in bioengineering and mechanical power transmissions. Our students develop an awareness of design principles, an understanding of technical issues, knowledge of manufacturing processes and an ability to interact with business.

Mechanical engineering at Newcastle has been ranked 8th in the UK by the *Guardian University Guide 2009*



Professional accreditation

Our degrees are CEng (Chartered Engineer) accredited by both of the appropriate bodies: the Institution of Mechanical Engineers and the Institute of Electrical Engineers. If you want to become a Chartered Engineer, the Engineering Council currently recommends that you apply for a four-year MEng degree as this is seen as the most direct route to becoming professionally qualified. If you wish to gain Chartered Engineer status at a later stage in your career, or if you are an international student who does not need British Chartered Engineer status, then the three-year BEng degree may be more appropriate.

Why study Mechanical and Systems Engineering at Newcastle?

First-class facilities

As well as lecture and seminar rooms we have a number of specialist facilities including dedicated computer clusters, fluid and aerosol flow measurement, nanotechnology facilities, and the UK national gear metrology laboratory.

Excellent student support

Each student is allocated a personal tutor, who is a member of academic staff in the School. Throughout your first year, you have regular weekly meetings with your tutor to discuss your progress. We are an active promoter of the national Engineering Education Scheme, as well as the Insight and Headstart engineering courses.

Contact with industry

We have close contacts with industry on a local, national and international level. This enables us to organise visits to local companies such as Nissan and Flymo, as well as welcoming industrialists into the University to give specialist lectures. Our contacts with industry can lead to vacation work-placements or an industrial placement year, and a significant proportion of the student final year projects are based on our industrial links.

We also provide services to industry; for example, the Design Unit and the New Rail unit are consultancies which make the School's specialist skills available to industry, local and national government and the armed services.

Links with the armed services

Newcastle University is involved in the Defence Technical Undergraduate Scheme (DTUS) for students interested in joining one of the three armed services or the Ministry of Defence (MOD) as technical officers after graduation.



Degree structure

Each academic year corresponds to one Stage of the degree programmes. Stages 1 and 2 are common to students on all the programmes. The modules that you will take in Stages 1 and 2 consist of the core engineering subject areas and provide a basis in Mechanical Engineering. The approximate percentage of time spent on each subject is given in brackets in the following table.

Stages 1 and 2

Manufacturing and management (12%) You will cover the basic principles of project financial management, as well as the structure of engineering companies and the key issues in manufacturing systems design. You also develop a basic understanding of important manufacturing processes, and the relationship between design, materials and manufacturing process selection.

Engineering design (15%) You will learn to prepare, read and understand drawings and CAD (Computer-Aided Design). In addition, you examine the specification of dimensions, tolerances and finishes of components, taking into account the limitations of manufacturing processes. As part of your studies, you will design assemblies and power transmissions and also design, make and test a specific structure.

Mechanical sciences (35%) In your study of related mechanical sciences, you will cover: mechanics (statics, kinematics, dynamics of rigid bodies in pure translation and pure rotation, vibration, control theory); strength of materials (stress and strain, shear and bending stresses, structural loading and failure mechanisms, 2D stress analysis, finite element method); thermodynamics (perfect gases and real substances, energy equations, work and heat transfer, cyclic processes, power and refrigeration cycles and efficiency); and fluid mechanics (stress in a fluid, fluid statics, continuity, momentum and Bernoulli equations applied to real incompressible flows). You will also be introduced to software for analysing stress, control and cycle design problems.

Electrical engineering (8%) You will study basic electrical principles and circuits (DC, AC), electrical power (machines, transformers) and analogue and digital electronics.

Materials engineering (8%) You study the key engineering properties of materials, and the relationship between microstructure and properties for metals, ceramics, polymers and composites, as well as material selection parameters, failure modes and material lifetime issues.

Engineering mathematics (18%) Engineering is about size, shape, performance, cost, modelling and predicting behaviour and optimisation. Mathematics, therefore, is the 'language' of engineering and is an important element of all the subjects taught. You study calculus (including partial differentiation and numerical integration), ordinary differential equations, matrix and vector algebra, systems of linear equations and eigenvalue problems, statistical analysis and series used for vibration analysis.

Computing (4%) You will be shown how to use spreadsheets and mathematical software to help your engineering work and be introduced to simple programming.

Stage 3

MEng and BEng Honours

Project (25%) Individual project. Students have the option to participate in *Formula Student*, to design and produce a single-seater racing car.

Core management subjects (8%)

Specialist programme modules (67%)

Stage 4

MEng Honours only

Project (42%) Team project with project management.

Specialist programme modules (58%) Giving Master's-level depth in specialist modules.

Please note:
modules are subject to additions and changes on an annual basis.



Degrees available

The main emphasis of our degree programmes is on the technical core of engineering. You will therefore need to have an enthusiastic attitude towards subjects such as mathematics and science. Degrees available include:

Mechanical Engineering BEng Honours

Mechanical Engineering MEng Honours

Mechanical Engineering with Foundation Year BEng Honours

Mechanical Engineering with Foundation Year MEng Honours

Mechanical and Automotive Engineering MEng Honours

Mechanical and Design Engineering MEng Honours

Mechanical and Manufacturing Engineering MEng Honours

Mechanical and Materials Engineering MEng Honours

Mechanical Engineering and Mechatronics MEng Honours

Mechanical Engineering with Management MEng Honours

Mechanical Engineering with Mathematical Modelling MEng Honours

Mechanical Engineering BEng Honours

UCAS code H300

The three-year BEng programme in Mechanical Engineering shares many common elements with the four-year MEng Mechanical Engineering Honours Option, and provides a broad grounding in mechanical engineering. The programme allows you to specialise in one of the fields of mechanical engineering represented by the various MEng Honours Options in your final year. Projects undertaken support your optional stream selection, and recent titles include: design of a stair climbing hoist (Newcastle Social Services); maintenance systems direction (Dupont); failure systems for composite tubes (Ameron DV); energy recovery from continuously cast steel (Corus); and wear mechanisms in diamond and CBN drills (NSK Bearings). It is possible to transfer between the MEng and BEng programmes up to the end of Stage 2, depending on whether you have reached an appropriate standard of achievement.

Mechanical Engineering MEng Honours Option

UCAS code H301

This Honours Option continues to provide a broad-based grounding in mechanical engineering throughout Stages 3 and 4, allowing you maximum career flexibility. In order to ensure breadth, the programme includes manufacturing, design and materials behaviour as well as covering subjects relating to stress and fluid flow modelling, bioengineering, automatic control and power systems and power transmission. Examples of project topics include: repair of eroded steel pipelines (Vosper Thorneycroft); performance of 'liquid ring' vacuum pumps (Thomlinson Hall Ltd); design of loading arms for transferring liquid chemical products to and from road and rail tankers (GT Engineering Group); and developing the concept of a torque balanced camshaft (Ford).

Mechanical and Automotive Engineering MEng Honours Option

UCAS code H390

This Honours Option is designed to meet the needs of the automotive consultancy industry and specialist vehicle designers and manufacturers. Recent graduates have gone on to work for Alfa Romeo, Jordan Formula 1, Jaguar, Ford and Cosworth Racing. The emphasis is on the fundamental principles from which the automotive technologies of the future will develop, rather than on present-day processes. In Stages 3 and 4 specialised topics include Computational Fluid Dynamics, internal combustion engines, sensors and actuators, design of power transmissions, manufacturing technology and thermal power and propulsion systems. Examples of recent project topics include: cellular manufacturing of Ford Fiesta sub-assemblies (Talent Engineering); engine management systems (Jaguar); fuel injection systems (Sagen); self-levelling suspension system (Porsche); design of an overhead cam drive (Karman); exhaust systems (Calsonic).

'I'm really pleased with facilities in my School. We have a large, new computer cluster, and a wide range of high-tech engineering machinery. Because our School is used by industries in the North of England everything is of top quality.'

Matt, Mechanical Engineering BEng Honours



Mechanical and Design Engineering MEng Honours Option

UCAS code HH31

Design is the creative core of engineering and this Honours Option is concerned with the interaction between design and the manufacturing process. In Stages 3 and 4 you will concentrate on areas which are important in relation to mechanical design, such as optimisation of behaviour and selection of materials, the impact of electronics and instrumentation and manufacturing technology. You will also gain knowledge of the financial and business systems within which new products are developed. The University has specific research strengths in design with the world-class Engineering Design Centre, the Resource Centre for Innovative Design and the Design Unit. These activities provide many opportunities for related final-year projects. Examples of recent project titles include: humanitarian landmine removal (Pearson Engineering); timber transport trailer (Farrell); vibration powered generator (AEA Technology); forging die control (Dana Precision Forge); crane hung load manipulator (Morris Materials Handling).

Mechanical and Manufacturing Engineering MEng Honours Option

UCAS code HH37

Manufacturing is concerned with making products profitably so that they meet customers' requirements on quality, price, delivery and functionality. In Stages 3 and 4 you will concentrate on management, manufacturing systems and technology, emphasising the latest computer developments and applications. You will cover subjects such as robotics, manufacturing system design and material behaviour. In Stage 4 time is spent working in collaboration with industry on manufacturing problems, through final-year projects. Examples of recent project topics include: wear of micro drills for the PCB industry (Via Systems); analysis of supplier relationships (VA Tech-Reyrolle); detection and performance of new coatings on glass (Pilkington Technology Centre); scheduling manufacturing with long quality/inspection times (Glaxo-Wellcome).

Mechanical and Materials Engineering MEng Honours Option

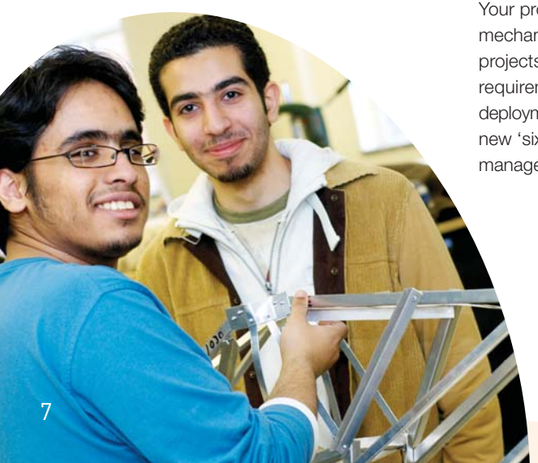
UCAS code HJ3M

Materials engineering is closely related to mechanical and manufacturing engineering. It ensures that devices and components can fulfil the duties required of them, over a lifetime subject to creep, fatigue, wear, corrosion, chemical or environmental attack, not only in high-technology applications (for example aircraft or information storage devices) but also in more everyday applications such as cars and domestic appliances. Innovation in materials and processing routes is essential to developments in mechanical and manufacturing engineering. In Stages 3 and 4, this Honours Option provides a specialist understanding of the behaviour, design and development of materials to meet specific product requirements, along with the opportunity to undertake project work in materials science and engineering. It is operated in conjunction with our associated School of Chemical Engineering and Advanced Materials, to ensure specialist materials modules are included, and was developed in consultation with leading companies such as BP, Courtaulds, GKN, RTZ, Dunlop and Unilever. Specialised modules cover a range of topics such as manufacturing technology, reliability and lifetime prediction, tribology, corrosion, stress analysis and environmental, energy and sustainability issues. Recent Stage 4 final-year projects have covered materials as diverse as the fire resistance of composite materials for offshore structures, steels for automotive gearboxes and the mechanical behaviour of biological materials such as bone.

Mechanical Engineering and Mechatronics MEng Honours Option

UCAS code HH36

This Honours Option has been designed to provide you with the technical skills that will enable you to work effectively in an interdisciplinary engineering environment, embracing precision mechanical engineering, electronic engineering, control systems and real time computing. In Stages 3 and 4 specialised modules cover areas such as computer engineering, robotics, automatics control, electronics, and sensors and actuators. The Option is taught in conjunction with the School of Electrical, Electronic and Computer Engineering. Previous projects have included: tension measuring and setting in IC engine camshaft belts (IDS Ltd); robotic deburring of gears; design of a two-axis probe for gear measurement (industrial consultancies through the Design Unit); endoscope actuator (Sunderland Royal Infirmary).



Mechanical Engineering with Management MEng Honours Option

UCAS code H3N2

This Honours Option is designed for those who are interested in the principles and practices involved in business studies, but want to study these in a numerate, technological and industry based context, which includes exposure to software applications. Management is a natural complement to the discipline of engineering and while all engineering degrees contain management elements, many students want to study it in greater depth, either through a subsequent postgraduate course, or in an engineering degree such as this that allows specialisation in management topics and project work. In Stages 3 and 4 you will focus on manufacturing systems, human resource management, new product introduction, statistical techniques, quality assurance and product liability, marketing and environmental management issues. Your projects will combine management and mechanical engineering concepts. Previous projects have included: quantifying customer requirements through ‘quality function deployment’ (Draeger Ltd) and integrating the new ‘six sigma’ approach into a company management system (Johnson Controls).

Mechanical Engineering with Mathematical Modelling MEng Honours Option

UCAS code H3G1

This Honours Option is designed for students who are interested in applications of mathematics and computers for modelling of physical and business processes. The programme allows you to pursue these topics in an engineering context in order to develop a broader understanding and to maximise future career prospects. In Stages 3 and 4 you will focus on the understanding and application of mathematical tools. Specialised modules cover a range of mathematical modelling topics, providing a balance between advanced mathematics and high-level programming. There will also be the opportunity to apply these principles to mechanical engineering concepts such as continuum and systems dynamics. Recent projects applying mathematical techniques to industrial problems have included: computational fluid dynamics modelling of absorption filtration devices (Domnick Hunter) and genetic algorithms for optimising IC engine management (Ricardo).

Foundation Year

Mechanical Engineering with Foundation Year MEng Honours

UCAS code H305

Mechanical Engineering with Foundation Year BEng Honours

UCAS code H304

We also have two Foundation Year programmes that are designed to allow students to study for an engineering degree, without the appropriate level of qualification in mathematics and science for normal first-year entry. During the Foundation Year you will study elements of mathematics, mechanical science and applied mechanics. You also undertake project and laboratory work relating to mechanical engineering. After successful completion of the Foundation Year, you then progress onto Stage 1 of the MEng or BEng programme of your choice.

Teaching and assessment

Engineering degrees involve intensive study and move at a rapid pace. You should expect your class contact time to be approximately 20 hours a week throughout Stages 1 and 2, with half your time spent in lectures and the remaining time split between tutorials, seminars and laboratory, drawing office and computing practicals. In addition you will be expected to spend an equal amount of time on private study to supplement this work.

At Stages 1 and 2 assessment is mainly through written examination, which counts for approximately 70 per cent of your marks in each Stage. The remainder is assessed through in-course assessment and submitted work. In Stages 3 and 4, assessment methods will depend on the modules that you take, but will usually consist of a mix of examination and in-course assessment. All students undertake an individual project in Stage 3 supervised by a member of academic staff.



Sponsorship and funding

We strongly encourage our students to seek sponsorship or to take a Year in Industry, either before or during their degree, and we are happy to defer entry if necessary. Companies who have sponsored our students in the past have included British Aerospace, the Cookson Group, GEC, Lucas Girling and VSEL. Sponsorship by a company may include a financial allowance, as well as paid vacation work which can be counted towards your Chartered Engineer (CEng) industrial training.

Whenever possible, we try to collaborate with the sponsoring company on your final-year project. For successful students, the School offers prizes at all Stages, which are sponsored by organisations such as Vickers, Ford, APV Baker and the Institution of Mechanical Engineers. We also have five AN Whitton Bequest Scholarships (currently worth up to £1,200), which are awarded to selected students who firmly accept our offer of a place during the UCAS application process.

The Sector Skills Council of the Science, Engineering and Manufacturing Technologies offers careers advice and produces information on companies willing to offer sponsorship.

Freephone: 0800 100 3682
www.semta.org.uk

To find out more about sponsorship you should contact one or more of the institutions listed below:

The Institution of Engineering and Technology
Telephone: 020 7240 1871
www.theiet.org

The Institution of Mechanical Engineers
Telephone: 020 7222 7899
www.imeche.org.uk

The Royal Academy of Engineering
Telephone: 020 7227 0500
www.raeng.org.uk/education



Student finance (UK/EU)

For more information on tuition fees, bursaries and scholarships, please see **www.ncl.ac.uk/undergraduate/finance** or contact the Enquiries Service for a copy of our *Guide to Student Finance*.

International students

Your choice of university is an important step towards your future. You are not only choosing a programme to study, you are also choosing a place to live. Newcastle has everything you need for successful studies and enjoyable experiences. We welcome students from all over the world and are already home to around 2,500 international students from more than 100 different nations. Find out more at:
www.ncl.ac.uk/international

Disabled students

We welcome applications from students with disabilities and this brochure is available in alternative formats from the Enquiries Service. Disability Support provides help and advice whilst you are at the University, and make every effort to provide a suitable learning environment for you. To discuss the facilities on campus and any specific requirements you may have, contact:

Disability Support
Telephone: (UK) 0191 222 7623
(International) +44 191 222 7623
Textphone: (UK) 0191 222 5545
(International) +44 191 222 5545
Fax: (UK) 0191 222 5539
(International) +44 191 5539
E-mail: disability.support@ncl.ac.uk
www.ncl.ac.uk/disability-support

Careers

As well as the technical and practical expertise that you gain from studying mechanical engineering, all of our degrees provide you with skills such as problem solving, communication, team work, planning and organising and computer literacy, which are essential for the employment market. As a result, mechanical engineers are highly sought after by a wide range of employers.

We have good links with employers and many companies visit the campus to give presentations, attend job fairs and carry out interviews. Some employers are also actively involved in work-related course projects and modules. In recent years our graduates have found employment with well-known companies such as Aston Martin, Exxon Mobil, Royal Air Force, British Energy, ABB, BNFL, as well as many smaller businesses. Engineering graduates who choose an alternative career path might decide to enter jobs in management consultancy, marketing, finance, logistics, computing or teaching.

At Newcastle, we provide an extensive range of opportunities to all students through ncl+ to enable you to develop personal, employability and enterprise skills and to give you the edge in the employment market after you graduate. For more information about employment opportunities available see
www.ncl.ac.uk/undergraduate/careers

Entrance requirements

We recognise that students will apply to our degree programmes with a range of qualifications. We consider each applicant on an individual basis, taking into account the information on your UCAS application including past academic performance and potential. The following information gives an indication of the type and level of entrance requirements, but we encourage you to contact us if you require any further details or clarification. We are happy to accept deferred entry.

Foundation Year entry

A levels
MEng: ABB/BBB in any subjects.
BEng: BBB/BBC in any subjects.

GCSE Mathematics and Physics (or Dual Award Science) both at grade B or above are required if not offered at A or AS level.

Scottish qualifications
MEng: AABBB at Higher Grade.
BEng: ABBB/BBBBB at Higher Grade.

Preferably including Mathematics and Physics. Mathematics and Physics are required at Standard Grade (or Intermediate 2) if not offered at Higher Grade.

International Baccalaureate
MEng: 34 points.
BEng: 30 points.

Mathematics and Physics are required at Standard Level minimum grade 5.

Stage 1 entry

A levels
MEng: AAB/ABB
BEng: BBB/BBC

To include Mathematics, and excluding General Studies. Physics or Chemistry is preferred at A or AS level.

Scottish qualifications
MEng: AB at Advanced Higher
BEng: BB/BC at Advanced Higher

To include Mathematics and preferably Physics. Physics or Chemistry is required at Higher Grade B if not offered at Advanced Higher.

International Baccalaureate
MEng: 34 points
BEng: 30 points

Mathematics and Physics are required at Higher Level minimum grade 5.

We welcome applications from students with qualifications other than the ones described above, including Access to HE Diplomas, BTEC Higher National Diploma or Certificate, and a full range of European and international qualifications. We are pleased to advise anyone interested with regard to choosing an appropriate preparatory course of study.

Entrance requirements can vary from year to year, so you should check the University's website for up-to-date details.
www.ncl.ac.uk/undergraduate/mecheng

> I enjoyed my open day visit and felt like the University wanted me rather than the grades.
>
> Martin, Mechanical Engineering

Further information

If you have any further questions about these degree programmes or your own qualifications, please contact:

Admissions Selector
School of Mechanical and Systems Engineering
Newcastle University
Newcastle upon Tyne NE1 7RU
United Kingdom

Telephone: (UK) 0191 222 6216
(International) +44 191 222 6216
E-mail: mse.admissions@ncl.ac.uk
www.ncl.ac.uk/mech

To find out more about the University and its facilities, including accommodation, sports and social activities, or the city and surrounding area, you should consult the University's website or request an Undergraduate Prospectus from:
www.ncl.ac.uk/undergraduate

Enquiries Service
Newcastle University
Newcastle upon Tyne NE1 7RU
United Kingdom
Telephone: (UK) 0191 222 5594
(International) +44 191 222 5594
Enquire online at: **www.ncl.ac.uk/enquiries**

Visiting the University

If you would like to visit the University before you apply, our Visit Days offer subject talks, an information fair and tours of the campus and accommodation. If we make you an offer, open days for your subject area give you the opportunity to talk to current students and members of staff. You can discuss the degree programmes as well as see the University and its facilities.
www.ncl.ac.uk/undergraduate/visit

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Details are correct at the time of printing (November 2008) but should be checked against the current edition of the *Undergraduate Prospectus* or on the University's website. Details contained in this brochure are for information and guidance purposes only.

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The University of Newcastle upon Tyne trading as Newcastle University.