FACULTY OF ENGINEERING · LTH
LUND UNIVERSITY | SWEDEN
A cross-boundary faculty of engineering within a world-class university that works to understand, explain and improve our world and the human condition.
LTH and Lund University

Knowledge lights up our lives. Those who gain new insights and skills have the world at their feet. LTH, the Faculty of Engineering at Lund University, opens many doors to opportunities. A degree from LTH paves the way for a meaningful and vital career. Bright research ideas lead to innovations that improve our society.
FACULTIES AT LUND UNIVERSITY:
Economics and Management, Engineering (LTH), Fine and Performing Arts, Humanities and Theology, Law, Medicine, Science, Social Science. LU is also home to the International Institute for Industrial Environmental Economics (IIIEE), MAX-lab and the Raoul Wallenberg Institute for Human Rights.

LTH IN FIGURES:
9 600 students, 1 660 employees (500 doctoral students, 700 teachers and researchers, and 400 technical/administrative staff). Turnover SEK 1.6bn, of which SEK 1bn goes to research.
The Faculty of Engineering is one of the largest faculties at Lund University. We are also one of the newest additions in almost 350 years of university history, being founded in 1961 and incorporated into Lund University in 1969.

Nowadays, we are Sweden’s third largest school of engineering for higher education and research. We have several of the country’s most attractive degree programmes and broad research. Our research is world-leading in a number of fields, including nanotechnology, mobile communications and biomedical engineering.

Being part of Lund University, which is usually ranked as one of the world’s top 100 universities, encourages collaboration and active exchange across disciplinary boundaries. Within a radius of just one kilometre, roughly 7,000 staff and 47,000 students work and study. We also have a number of programmes that are taught in Helsingborg.

Lund and Helsingborg are located in the Öresund region, which has been ranked as one of the most innovative regions in the world. The region has

LTH’s campus, created in the 1960s and surrounded by greenery, is only five minutes by bike from Lund city centre.
a population of 3.7 million and a quarter of Denmark and Sweden’s combined GDP is produced here. From Lund, it takes 33 minutes by direct train to Copenhagen International Airport Kastrup.

In Lund, huge investments are being made in the future research facilities MAX IV and ESS. When MAX IV enters operation in 2016, it will be the leading synchrotron radiation facility in the world. ESS, a European research facility, is under construction adjacent to MAX IV and will house the world’s most powerful neutron source when it becomes operational in 2020. A number of LTH researchers are involved in the construction and design of the facilities. □
Student life in Lund is part of the attraction of the University. In this small yet dynamic city with medieval roots, knowledge-thirsty individuals from near and far meet and gain experiences and contacts for life.

Lund is international in many ways. There is collaboration with many universities abroad both within education and research. At LTH alone, there are student exchange agreements with some 100 universities.
Education

For many people, studying at LTH is both hard work and great fun. Days filled with lectures, group work, lab sessions, exercises, and exam revision. Coursemates who become like an extra family that you meet at student societies, student unions and other student events. Experience from these years forms a good foundation for a future career – and for life.
EDUCATION IN FIGURES:

Approx. 9 600 students, (of which 6 700 study full-time)
16 MSc Engineering programmes
Architecture programme
Industrial Design programme
Aviation programme (Ljungbyhed)
5 BSc Engineering programmes (Helsingborg)
11 international Master’s programmes

> See page 28 for all programmes
Each year, over 1,000 students graduate from LTH. The majority study one of the MSc Engineering programmes, while others study BSc Engineering, Fire Safety Engineering, Architecture or Industrial Design.

Most gain a professional qualification; others also gain an academic Bachelor’s or Master’s degree.

A degree from LTH is a good basis for a career working with important issues and influencing the development of society. Many graduates go on to work in areas that improve our environment, health, communications, homes and cities. A large number end up in senior managerial positions, both in Sweden and abroad.

LTH students are attractive to employers. Our programmes are designed in close collaboration between programme directors, researchers and representatives of wider society. This makes the programmes relevant to employers in business, the public sector and academia.

The programmes are largely based on current research and the lecturers are usually also active researchers. At LTH, major emphasis is placed on professional development in teaching. Experienced students also help new students through a scientifically proven method called SI, Supplementary Instruction, which has been refined at LTH.

LTH is located on a green and lively campus with many natural meeting places.
During their studies, students have the opportunity of work experience and careers advice. Degree projects are often carried out in collaboration with industry and often form a gateway to a job.

At LTH, there are unusually good opportunities to study abroad. One in four LTH students chooses to undertake part of his or her studies at one of our partner universities in another country. Several of these are among the top 10–20 institutions in the world. Through the T.I.M.E. network, students are also offered double degrees from LTH and a university in Europe or Japan. It is also possible to undertake a work placement abroad.

Some 600 international students come to LTH every year. In the past decade, an increasing number of international Master’s programmes have attracted students from around the world. All teaching on these programmes is in English and the students study with both exchange students and students on the MSc programmes.

In recent years, interest in engineering and science has increased, and several programmes at LTH are among the most popular in Sweden.

TLTH Students’ Union looks after the students’ interests and works in close collaboration with the management of LTH. The union’s other activities include organising an annual careers fair that is well attended by both students and employers.

A number of LTH’s characteristic red brick buildings have recently been refurbished to meet the demands of a modern university, with modern teaching rooms and more areas for private study.
10 REASONS TO CHOOSE LTH:

- Comprehensive Faculty of Engineering
- High-quality education
- Investment in teaching
- The student city of Lund
- Part of a large university
- Successful research that influences teaching
- Peer-assisted learning with SI, Supplemental Instruction
- Good opportunities to study abroad
- Unique China and Risk Management specialisations
- Located in the dynamic Öresund region
Research

Clean water flows from the tap. Fresh food can be stored in the fridge and freezer and heated in the microwave or on the hob. Our refuse is converted into electricity, fuel or heat. We can travel into town or out to the country by bike, bus, car or train. We can fly to other continents or stay at home and communicate with people around the world online. Decades of technical advances have made our lives easier, and the journey continues on. The planet must become cleaner, while managing to feed a rapidly growing population.
RESEARCH IN FIGURES:
Every year at LTH, around 100 doctoral theses, 1300 articles in scientific journals and 500 conference papers are published.

The research is 70% financed by external grants and commissions.

LTH’s broad research creates the conditions for research links in education. Inversely, the strong education creates a good recruitment base for our research.
Social responsibility is a phrase you often hear when you ask researchers what motivates them.

Dirty exhausts, pharmaceutical residues in watercourses and inadequate diagnostic technology in health care require solutions. Engineering students are taught to solve problems like these.

At LTH there are around 700 researchers and 500 doctoral students working in both classic engineering subjects and in newer fields branching off towards medicine, science, environmental science and design. They are spread across some 75 disciplines linked to one of LTH’s 19 departments. LTH’s research comprises 15–20 per cent of all engineering research at Swedish higher education institutions.

Strong research areas include nanotechnology, laser physics, energy, IT and mobile communications, food technology, biotechnology, biomedical engineering, logistics and transport. A number of these are world-leading.

Being part of a large university promotes interdisciplinary collaboration. Laser physicists and cancer researchers develop methods that track tumours, researchers in electrical engineering study electricity in the body with heart and brain researchers, traffic researchers receive help from mathematicians to automate traffic surveys and nuclear physicists study dirty air particles with researchers on the work environment.
Engagement

Just outside the city of Moatize on the Zambezi River in Mozambique, the coalfields are expanding. Here, as in various other African countries, coal and natural gas are a growing source of energy and income. A group of LTH researchers are working by the Zambezi River to analyse the environmental impact of the coal mining and, above all, to give practical advice on how to make the water cleaner for the residents of Moatize and others in Mozambique.

All the knowledge held at a school of engineering springs into life and develops when it interacts with wider society. In the case above, the studies are being carried out together with doctoral students from Eduardo Mondlane University in Maputo.
SCHOOL ENGAGEMENT, A SELECTION:

Flickor på teknis: Female researchers from LTH inspire girls to study engineering
Teknikättan: A national engineering competition for pupils in year 8
Gemstone: Upper secondary school pupils with an interest in engineering spend the autumn half-term at LTH
NMT-dagarna: Thousands of upper secondary school pupils visit the university
LTH advent calendar: YouTube clips of students performing experiments
At LTH, public engagement activities are often interwoven with research and education. Research is based on problems in society and is often carried out in collaboration with businesses or other research institutions in Sweden or abroad. Studies equip students to meet the needs of society. We have continuous consultation with employers, trade associations and other public agencies so that the education we provide meets real needs.

During their studies, students have opportunities for work experience and careers planning. Degree projects and other projects are often carried out in collaboration with industry.

A stone’s throw from LTH lies Ideon Science Park, one of the top science parks in Europe and the oldest in Scandinavia. Of over 900 companies that have operated there since it opened in 1983, a large number have their origins at LTH. Close to Ideon, the life science centre Medicon Village is developing – one of a number of examples of collaboration between academia, business and politics. Lund is also the headquarters of major companies with close connections to LTH, including Alfa Laval, Ericsson, Sony, Gambro, Axis, Intel, Qliktech, Tetra Pak, Huawei and Flatfrog.

Many research findings are commercialised to become innovations and businesses. In order to facilitate the process, the University offers researchers and students help with business development, intellectual property rights, legal issues and financing of commercialisation projects. □

Vattenhallen Science Centre LTH attracts 40 000 visitors a year of all ages to learn about and interact with engineering and science phenomena.
BEST FOR CONSTRUCTION MOISTURE?

Many homeowners know how difficult it is to predict the way moisture will be transported, accumulate and affect a building. LTH has a ‘Moisture Centre’ comprising some 40 experts from around Sweden who all advocate for moisture-proofing of new builds and renovated properties and taking correct measures to deal with moisture problems. Information, recommendations and discussions with the construction industry are key. In the early years of the 21st century, the Moisture Research Centre warned against construction with an exterior insulation and finishing system. Unfortunately, they were proved right.

SOUNDING BOARD BOOSTS MATHS TALK

Twelve upper secondary schools in Skåne County receive regular visits from an LTH student to complement teaching in maths, physics and chemistry. The student helps explain difficult subjects by asking questions, acting as a sounding board, initiating work in small groups and coordinating conclusions. The students receive training in the Supplemental Instruction (SI) method, which provides them with tools to use while working as an SI leader.
A few innovations with their roots in LTH research:

- Diagnostic ultrasound
- Oatly – oat drink for milk allergy sufferers
- Bluetooth technology for wireless communication over short distances
- Proviva – a drink with oat flour for sensitive stomachs
- Precise Biometrics – fingerprint readers
- Decuma – handwriting recognition
- Blood purification with ultrasound
- Polar Rose – advanced image analysis and facial recognition
- Hövding – invisible cycling helmet
- Sol Voltaics – solar cells made of nanowires
- Glo – low-energy LEDs
- Gasporox – gas analysis in food packaging
- Pharmaceutical companies Camurus, Bioinvent, Respitarious and Alligator Bioscience
- Qlucore – analysis of bioinformation
- Cognimatics – automatic video analysis
Programmes and organisation
MSc Engineering programmes (5 years / 300 credits)

**Biotechnology** concerns how new advances in biochemistry can be used, as well as old knowledge about processes such as fermentation. Students study chemistry with biology, mainly on cell or micro level, and complement it with knowledge of processes. There are four specialisations: Bioprocess Technology, Molecular Biotechnology, Food, and Pharmaceuticals.

**Computer Science** is a programme for those who want to create the technical systems and applications of the future with a focus on computers and programming. During the third year, there is the opportunity to specialise in applied areas such as Software, Images and Graphics, or Communications Systems.

**Environmental Engineering** was established to train students who can help to solve major environmental issues, through knowledge and the ability to communicate both with scientists about engineering and with engineers about science. In the final part of the programme, students specialise in one area, such as Energy Systems or Water Resources.

**Electrical Engineering** makes use of the parts of physics that deal with electricity, i.e. everything from the conduction pattern in your processor to the generation and consumption of electrical power. Some of the areas that are currently developing at a rapid pace are nanocomponents, communication systems, computer science, environmental engineering and biomedical technology. Students of this programme help to shape the society of the future.

**Information and Communication Technology** places strong emphasis on the processing, storage, presentation and communication of data. These aspects are essential to the development of the advanced products and services of today and tomorrow. The subjects covered in the programme include internet technology, human–machine interaction, network programming, computer security, and mobile systems with related applications.

**Industrial Engineering and Management** integrates mathematics, engineering, economics and management. Students choose to focus on different areas of engineering in the third year: Production and product development, Energy and environmental engineering, Mathematical modelling, System and software development, Industrial systems engineering. The two final years comprise specialisation in one of the following areas: Business and Innovation, Finance and Risk, Logistics and Production Management, Software-Intensive Systems, Production, Supply Chain Management.

**Chemical Engineering** addresses how we use chemistry in a sustainable society. Courses include organic, physical and analytical chemistry, as well as many courses focusing on chemical engineering and processes. There are three specialisations: Process Design, Pharmaceuticals and Materials.

**Surveying and Land Management** is an interdisciplinary MSc programme. Property law and economics are combined with engineering subjects such as surveying and mapping technology, geographic information systems, spatial planning, construction and environmental subjects, and general engineering subjects such as mathematics, statistics and programming. The specialisations within the programme are Property Development, Real Estate Law and Geographic Information Science.

**Mechanical Engineering** is a classic engineering programme with components of environmental engineering and industrial engineering which supplies the industry with qualified engineers. As well as construction of mechanical devices and machinery, it addresses general problem solving necessary for successful and competitive production.

**Mechanical Engineering with Industrial Design** is an MSc Engineering programme that combines science and engineering with a wide range of design-related courses.

**Biomedical Engineering** is a programme for students who want to develop advanced technology for diagnosis and treatment of disease and technology that can contribute to better health. The first three years provide basic knowledge of biology, physics, maths and medicine, maintaining a continual biomedical perspective. The two final years provide a choice of specialisations in Biomedical Physics, Biomechanics & Rehabilitation, and Signals, Images & E-health.

**Engineering Physics** combines advanced mathematics and physics with engineering applications. Programming and quantum physics are included along with subjects such as sustainable development and measurement technology. Engineering physics graduates are general problem solvers with a very broad field of employment in both industry and academic research. Students can specialise in many different areas, including financial modelling, biomedical technology, environmental and energy systems or nanophysics.
Engineering Mathematics provides good knowledge of applied mathematics and various areas of application in engineering and science. The programme offers specialisations in Computation & Simulation, Biological Modelling, Finance, Software Systems, Environment, Risk & Climate, or Signals & Systems.

Engineering Nanoscience is a programme with an interdisciplinary perspective that is unique in Sweden. It involves studying and manipulating matter at atomic level, where physics, chemistry and biology meet. At that level, the laws of quantum physics take over, which can give material on the nanoscale special properties. Nanoparticles and nanostructured surfaces can be used for durable car tyres, stain-repelling fabrics and as a UV filter in suncream. In the field of new energy sources, for example solar cells, LEDs and thermoelectric materials, nanostructures can also be used. Nanotools are needed in biology and medicine, in chemical catalysis and in the electronics industry.

Civil Engineering is a classic field of engineering, yet is always highly relevant in a society that needs well-functioning and low-energy buildings and infrastructure. It is a varied programme with specialisations in Industrial Construction, Building Technology, Property Development, Structural Analysis, Traffic Planning and Water Resources Management.

Risk Management and Safety Engineering is a unique engineering supplementary programme, open to those who have completed three years of the Fire Protection Engineering programme at LTH, or any comparable Nordic engineering programme. A technical foundation is supplemented with economics and statistical safety analysis, law, health and environment studies, “man, technology & organisation” and insurance issues.

China Specialisation – this is a specialisation on the MSc Engineering programmes where students take Chinese and China studies alongside their engineering courses. Students spend one semester at a top Chinese university and then have the option to apply for further exchange studies and a degree project in China. The China specialisation is open to students of Computer Science, Electrical Engineering, and Information and Communication Technologies.

Architecture / Fire Protection Engineering / Industrial Design:

Architecture (300 credits) has been offered at LTH since its foundation. The programme is artistic and academic and provides all-round training in processing and shaping spatial and theoretical issues. A lot of the work on the programme is practical and hands-on, with drawing and model construction. Alongside this are theoretical studies with lectures, seminars and written exams; students read, calculate, write, discuss and reflect.

Fire Protection Engineering (210 credits) is unique and world-leading. It is the only academic programme in Sweden that trains students in both fire protection and rescue services. Basic engineering is combined with combustion chemistry, risk assessment and the work environment. During a work placement in the first summer vacation, students really find themselves ‘in the heat of it’. The programme gives students the opportunity to progress to the programme in Risk Management and/or a one-year supplementary programme in fire and rescue at Räddningsskolan in Revinge, just outside Lund.

Industrial Design (180 + 120 credits) means being involved in the entire product development process, from idea to final product. The external design is a consequence of the product’s function and context. This calls for new understanding and awareness in many different areas. Industrial designers should also have the ability to rapidly reflect on cultural and technical shifts in society. A stronger link between aesthetic, technical, industrial and financial aspects has become a necessity. The School of Industrial Design has two programmes: a BFA (180 credits) and an international Master’s programme (120 credits).
BSc Engineering (180 credits):

Civil Engineering – Architecture teaches structural engineering, environmental awareness and a deeper understanding of the link between architecture and structural engineering. The programme provides opportunities for close contact with the business sector through study visits, seminars and individual meetings.

Civil Engineering – Railway Construction is delivered in collaboration with Järnvägsskolan (the Railway College) in Ängelholm, where part of the studies are based. Besides a foundation in engineering (mathematics, physics, technology, etc.), students read special courses in railway construction. The programme is the only one of its kind in Northern Europe.

Civil Engineering – Road and Traffic Technology is a programme given in collaboration with the MSc in Civil Engineering. The programme provides broad knowledge of road construction (planning, design and construction) as well as knowledge and understanding of the function of the transport sector in society.

Computer Science Computer scientists work across the field of human–technology interaction. The programme in Computer Science provides a broad theoretical foundation in both software and hardware. In professional contexts, the development of computer-based systems is often a task for project teams of different sizes. Project work is therefore a central aspect of the programme. In the second and third years, projects are carried out in large groups, often in close collaboration with business.

Electrical Engineering with Automation Technology deals with how to plan, develop and install both electrical and automation systems. An electrical/automation engineer works on the planning, construction, maintenance and operation of automation and electrical facilities. The programme provides knowledge of both electrical power systems and building service systems, and automation technology with sensors, automatic control systems and computer-based control and automation systems.

Foundation programmes and university diplomas:

Engineering foundation year
A foundation programme for those who do not meet the admission requirements for the BSc or MSc programmes.

Food Technology diploma (120 credits)
A two-year programme for those with professional experience in the food sector who want to expand and deepen their knowledge.
International Master’s Programmes (2 years)

Over the past decade, an increasing number of international Master’s programmes have attracted students from around the world. All teaching on these programmes is in English.

**Architecture** aims to give students a broad education and the opportunity to specialise in one of 4 main fields: Advanced Architectural Design, Spatial Experiment, Architectural Conservation Design, and Human Shelter / Urban Space. The programme combines best practice with advanced research to help students develop into highly skilled professionals who are competitive at an international level.

**Biotechnology** offers international students courses focused on modern methods in biotechnology, an area in which LTH has world-leading researchers. The programme covers many different aspects of using biocatalysts to convert raw materials into products (including the development of the biocatalyst and the conversion process), as well as the role of biotechnology in a sustainable society.

**Energy-Efficient and Environmental Building Design** students will graduate with advanced knowledge, skills and competencies within the area of energy-efficient and environmental building design in cold climates. The programme covers the design, building and renovation of energy-efficient buildings, taking into consideration the architecture and environment, the inhabitants’ needs, their health and comfort, as well as the overall economy.

**Fire Safety Engineering** is a joint programme between Ghent University, the University of Edinburgh and Lund University, with the main objective of offering an educational programme that defines the required knowledge for a professional fire safety engineer. Ghent focuses on general FSE, Lund on enclosure fire dynamics, CFD modelling, and human behaviour during fires and evacuation, and Edinburgh on structural fire safety engineering.

**Food Innovation and Product Design** is a two-year programme in the field of food science and product development, operated by Lund University together with AgroParisTech (France), UNINA University (Italy), and DIT (Ireland). The programme aims to provide a European dimension to the knowledge-intensive area of food research and development.

**Food Technology & Nutrition** aims to meet the needs of graduate students intending to work as professionals in government authorities, the agro-industrial sector at an advanced level, or prepare for a career in research. The programme covers a broad range of subjects, including food chemistry, food processing, surface and colloid chemistry, microbiology, production systems, green chemistry, and quality and safety.

**Industrial Design** students focus on three areas: living and behaviour, form and technology, or man and nature. The curriculum consists of individual industrial design projects, workshops and theoretical core subjects, and students participate in, and contribute to, the creation of knowledge within the field of design.

**Sustainable Urban Design** deals with the design of the urban environment on various levels, from the detailed design of townscapes to strategic planning on a regional scale. The programme has a well-established reputation for developing humanistic modern design that promotes liveability, community building and social sustainability.

**System-on-Chip** prepares students to meet the global challenges involved in integrating wireless and wired communication electronics, utilising the next generation of micro-electronics and system-on-chip designs. The programme spans areas from radio frequency (RF) circuits through to data conversion and digital circuits.

**Water Resources** is a broad programme that covers the most important scientific and technical aspects of water resources and water treatment. Students will have the opportunity to specialise in fields in which LTH has world-leading expertise.

**Wireless Communication** prepares students for an exciting career within a rapidly expanding industry. The programme focuses on the physical and lower layers of wireless communication. The aim is to give students in-depth system knowledge, which in turn requires insights into the various components in a wireless system.
LTH organisation:

All researchers are linked to one of LTH’s 19 departments (see organisation chart below). Under the departments are further sub-divisions into subjects or research groups. A number of researchers are also part of a ‘centre’, which is an externally funded, cross-disciplinary research programme. Many are also involved in research portals that serve as a network for researchers, with a focus on acting as an interdisciplinary meeting place for researchers at LTH and LU with a clear link to wider society.
Centres:

- AFC Antidiabetic Food Centre
- CAST – Consortium for Aerosol Science and Technology at Lund University
- CEBMMS – Centre of Excellence in Biological and Medical Mass Spectrometry
- CECOST – Centre for Combustion Science and Technology
- Cemec – Centre for Electromagnetic Energy Conversion
- Centre for Societal Resilience
- Centre for Retail Research
- Create Health – Strategic Centre for Translational Cancer Research
- Moisture Research Centre – research on damp in buildings
- Functional Food Science Centre
- GIS Centre – Centre for Geographical Information Systems
- HARE C – Disability and Rehabilitation Research Centre
- K FCP – Competence Centre Combustion Processes
- LUMLC – Lund University Medical Laser Centre
- Lumi – Lund University Research Programme in Medical Informatics
- LUNARC – Centre for Scientific and Technical Computing at Lund University
- LLC – Lund Laser Centre
- LUCRAM – Lund University Centre for Risk Assessment and Management
- MAPCI – Mobile and Pervasive Computing Institute at Lund University
- Metalund – Centre for Medicine and Technology for Working Life and Society
- Mobile Heights
- Nanometre Structure Consortium
- National Centre for Education in Physics
- NRC – Neuronano Research Centre
- PIC-LU Process Industrial Centre at Lund University
- Polymer Centre
- Re-Flex (Flexible Reality Centre)
- Swedish Hybrid Vehicle Centre
Research portals:

- Energy Portal
- Sea Portal (Havsportalen)
- Innovation Portal (Innovationsportalen)
- Food and Pharmaceutical Portal (Livsmedels- och läkemedelsproduktion)
- Light Portal (Ljusportalen)
- Communication Technology Portal (Kommunikationsteknikportalen)
- Materials Portal (Materialportalen)
- Lund Alliance for Biomedical Imaging and Bioengineering (LABIB)
- Membrane Portal (Membranportalen)
- Production Portal
- Software Portal (Programvaruportalen)
- Transport Portal (Transportportalen)
- Urban Arena
- Faculty of Engineering
- Max IV Laboratory
- Science Village Scandinavia
- ESS – European Spallation Source
- Illustration: Cobe Architects
- LTH / LU
- IDEON
- Science Highway
- LUND
- MALMÖ
- ÖRESUND BRIDGE
- COPENHAGEN
- Kastrup Airport
- Lund