



İZMİR INSTITUTE OF TECHNOLOGY

DEPARTMENT OF ENERGY SYSTEMS ENGINEERING

İzmir Yüksek Teknoloji Enstitüsü
Gülbahçe, 35433 Urla/İzmir/Türkiye
ese@iyte.edu.tr



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The Department of Energy Systems Engineering (ESE) at İzmir Institute of Technology (IZTECH) was established on April 22, 2014, by the decision of the Higher Education Council. Its founding purpose is to train engineers who will develop sustainable, efficient, and innovative solutions in the processes of energy production, transmission, and consumption. The department is built upon the scientific foundation of the Energy Engineering Master's Program, which has been conducted since 1998.



UNDERGRADUATE & GRADUATE

ENERGY SYSTEMS ENGINEERING

Bachelor’s Programme

The Department of Energy Systems Engineering (ESE) at İzmir Institute of Technology aims to educate competent engineers at both national and international levels in the fields of energy production, conversion, and management. The undergraduate program provides students with a strong academic foundation during the initial years through comprehensive education in fundamental engineering sciences, mathematics, and physics. In the later stages of the program, students are equipped with advanced knowledge in areas such as the analysis of renewable and conventional energy resources, the design and optimization of energy systems, energy efficiency, and sustainability. Upon graduation, students possess both the academic qualifications necessary for pursuing graduate studies and the professional competencies required to work at various levels within the energy sector.

Curriculum Bachelor’s Programme 8 Semester (240 ECTS)

During the first two semesters, students receive a strong foundation in science and engineering. Starting from the third semester, they take specialized courses in the field of Energy Engineering, designed to prepare them both academically and professionally. Two mandatory internships in the energy industry, along with the completion of a Bachelor's thesis, are required to earn the Bachelor of Science (BSc) degree. The medium of instruction is English.

Start of Programme and Orientation Phase	Key Skills for Engineers
-Introduction to ESE -Development of Reading and Writing Skills -Career Planning and Development	-Physics -Basic Calculus -Chemistry -Basic Linear Algebra
Digital Competences and Statistics	
-Computer Aided Technical Drawing -Introduction to Computer Programming -Probability and Statistics	
Mandatory Courses for the Third to Eighth Semester	
-Thermodynamics -Differential Equations -Statics -Materials Science and Engineering -Measurement Techniques -Numerical Methods in Energy Systems Engineering -Fundamentals of Electrical and Electronic Circuits	-Heat Transfer -Fluid Mechanics -Mass and Energy Balances -Electromechanical Energy Conversion -Mass Transfer -ESE Economics -System Analysis and Control -ESE Design I & II -Summer Practice I & II
Elective Courses	
-Engineering Mathematics -GIS for ESE -HVAC -Exergy -Heat Exchanger Design -Cooperative Education Course -Energy Efficiency -Waste to Energy -Introduction to Power System Analysis	-Hydrogen and Fuel Cells -Integrative Energy Systems for Buildings -Introduction to Geothermal Energy -Introduction to Wind Energy -Introduction to Bioenergy -Introduction to CFD

Graduate’s Programme

The graduate program in Energy Systems Engineering (ENE) at İzmir Institute of Technology is rooted in the Energy Engineering Master's Program, which was initiated in 1998, long before the official establishment of the department. As one of Turkey's pioneering graduate programs in the field of energy, it has evolved over the years into a strong academic structure, enriched by extensive scholarly experience and strong industry connections. With the official founding of the department in 2014, this well-established graduate education was integrated into a broader academic framework. The graduate program aims to equip prospective engineers with advanced knowledge and research skills for specialization in the energy sector. Adopting an interdisciplinary approach, the curriculum focuses on areas such as sustainability, energy technologies, system analysis, and optimization. Through both thesis-based master's and doctoral programs, students are offered pathways toward academic careers or sector-specific expertise.

Research Topics and Fields of Study

Graduate students at İzmir Institute of Technology have the opportunity to actively participate in research projects conducted in collaboration with faculty members, including those supported by TÜBİTAK, the European Union, and industry partnerships. Research topics cover current and applied areas such as solar, wind, geothermal, biomass energy systems, energy storage solutions, waste-to-energy technologies, microgrids, energy efficiency and management systems. Through involvement in these projects, students gain valuable field experience while also having the opportunity to publish their work and establish international collaborations. Graduates of the program are equipped with the skills necessary to pursue careers not only in academia but also in various areas of the energy sector, such as R&D, system design, project management, and consultancy. Our alumni take on active roles in public institutions, private companies, and international organizations, contributing significantly to shaping energy policies and advancing technological transformation.

Fossil fuels significantly determine our current energy supply and can only be replaced over a long period of time. However, the current climate crisis necessitates quick alternatives. Since innovative technologies and methods are needed for an energetic and sustainable use of the underground, future geoenenergy engineers face big challenges.

These technologies and methods include "clean" decarbonised fossil energies, geothermal energy as an alternative energy source and the large-scale storage of hydrogen from surplus renewable energy which, when all combined, will enable us to provide our society with sustainable energy 24/7.

Did you know that CO₂ can be stored in "empty" oil and gas reservoirs, preventing it from entering the atmosphere in the first place?

MONTANUNIVERSITÄT LEOBEN

Franz Josef-Straße 18
8700 Leoben
+43 3842 402-0
unileoben.ac.at
info@unileoben.ac.at

Join Montanuniversität Leoben and find more information on admission at the Study Support Center.



ADVANCED RESOURCES

GEOENERGY ENGINEERING



BACHELOR'S & MASTER'S STUDIES

GEOENERGY ENGINEERING



BACHELOR'S PROGRAMME

Geoenergy, Deep Drilling, Reservoir Simulations...are you with us so far? No? Don't worry! Before you dive into all of the relevant fields for Geoenergy Engineering, you will spend your first four semesters learning the basics.

After this, you will be taught about looking for and characterising geological reservoirs (Geosciences), the developing and simulating of reservoirs (Reservoir Engineering), developing them using deep drilling (Drilling Engineering), as well as extracting and storing energy (Production Engineering).

At the end of your bachelor's programme you will not only have gained the qualification for a subsequent master's programme, but you will have also acquired a solid foundation for entering the energy sector professionally.

CURRICULUM BACHELOR'S PROGRAMME

7 Semester (210 ECTS)

The first two semesters, in which scientific and engineering fundamentals are taught, are fairly similar for all degree programmes. Starting in the third semester, bachelor's students will be taught profound knowledge that enables them to enter the professional field. A mandatory internship in related industry, as well as the writing of a bachelor's thesis, constitute the requirements for academic degree Bachelor of Science (BSc).

Please note that the main language of instruction for this bachelor's programme is German. At the time of applying, you will have to submit proof of German language proficiency level A2 not older than 2 years, according to the Common European Framework of Reference for Language (CEFR).

Start of Programme and Orientation Phase	Key Skills for Engineers
- Transferable Skills - Introduction to STEM	- Chemistry - Mathematics - Physics - Technical Mathematics
Digital Competences and Statistics	Introduction to Study Programme
- Introduction to Data Modeling - Algorithms and Programming - Statistics	- Bacc Fundamentals - Fundamentals of Geosciences - Courses from the Elective Catalogue
Mandatory Courses for the Third to Seventh Semester	
- Cost Accounting and Investment Calculation - Accounting - Mining Law - Geoenergy Economics - Drilling Engineering and Well Design - Completion Engineering and Well Design - Reservoir Engineering Fundamentals - Fluid and Heat Transport in Porous Media	- Reservoir Thermodynamics - Geoenergy Production Principles - Sedimentology - Petroleum Geology - Hydrogeology and Geothermal Systems - Scientific Report Writing and Presentation Skills for Geoenergy Engineers - Bachelor Thesis Seminar
Elective Courses	
- Fundamentals of Geosciences - Electrical Engineering - Engineering Mechanics - Mechanical Technology	- Physical Chemistry - Numerical Methods - Fluid Mechanics - Geophysical Well Logging and Petrophysics - Do-it Lab Geoenergy Engineering

You can find a list of detailed curricula from all the study programmes available at Montanuniversität Leoben at unileoben.ac.at.

MASTERS' PROGRAMMES

For the subsequent master's programme you can choose a field of study based on your interests.

In the International Study Program in Petroleum Engineering you can gain further insights into the different disciplines such as Drilling Engineering, Geoenergy Production Engineering und Reservoir Engineering. The language of instruction is English.

The master's programme Geoenergy Engineering focuses on the energetic use of the underground in the broader sense. This also encompasses geothermal energy as a renewable energy source, as well as the underground as a storage medium for energy and CO₂. The language of instruction is English.

If you would rather face economical-technical challenges, then the master's programme Industrial Management and Business Administration is the right choice for you. This programme is also taught in English.

There are additional master's programmes during which you will study at Montanuniversität Leoben as well as at international universities and you will graduate with two degrees.

FIELDS OF WORK

As a graduate of Geoenergy Engineering you can find a job, e. g., at international energy industry companies, at authorities and in the research and development sector. You can also work at drilling and extraction sites, plan production sites and assess reservoir deposits. Pipeline and plant construction are included in your set of skills. In this way, you will combine the traditional and the alternative energy sectors, playing an important role in the ongoing energy transition.