Qualification goals
Bachelor Energy Systems Engineering

Faculty European Campus Rottal-Inn

of the Deggendorf Institute of Technology

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Gender neutrality

The use of double forms or other markings of female, male and diverse gender is largely avoided in order to maintain legibility and clarity. All titles for the various groups of members of the university refer equally to members of all genders of the groups concerned.

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1 Objectives of the programme

The programme aims to provide a broad-based interdisciplinary qualification in knowledge-intensive engineering based on scientific knowledge and methods through practice-oriented teaching. This applies, in particular, to the substitution of fossil fuels with renewable energies. In addition to imparting specialised knowledge in the field of engineering basics and renewable energies, key qualifications, which enable students to shape the change in energy systems from fossil raw material base to renewable resources, are also developed. The focus is on decentralised energy systems, energy networks and their operation and management.

The programme also aims at imparting the professional skills, methods expertise and social skills that enable independent application of acquired knowledge and skills, scientific knowledge and methods, and responsible action as an engineer in the field of energy systems.

Students also acquire social and international skills that enable them to act confidently and competently in the complex and inter-cultural economic environment, especially in the area of energy system transformation. International aspects and the expansion of language skills are of great importance given the increasing internationalisation of the economy. The programme focuses especially on imparting practice-oriented knowledge to facilitate the sustainable reorganisation of energy production. Together with a recommended stay of at least one semester abroad, students are well-prepared to meet the challenges of climate change with technical solutions that are required worldwide.

Importance is placed on wide-ranging and qualified interdisciplinary training, which enables graduates to seize a wide range of professional opportunities in commercial and utility companies, as well as in public services or in private practice. Training focuses on implementation-oriented teaching, taking into account the requirements of nationally and internationally operating industrial companies. The programme also prepares graduates for a subsequent management role in the company as well as for their own independent work or company succession.

2 Learning outcomes of the programme

Through generalist education, which focuses on engineering disciplines, and with the supplementation of management skills and key qualifications in the area of sustainable entrepreneurial operations, students should be in a position to grasp overarching interrelations, respond flexibly and thus actively shape the transformation of energy systems. Graduates are taught the ability to grasp the rapid change in technical progress, to help develop technical design and solution options and to assess their technical suitability.

In addition, they should be able to evaluate technical concepts economically and use them for the company based on economic principles. They should also be able to recognise the impact of decisions on business activities, employees and the environment and act responsibly with that in view. The programme also prepares graduates for a subsequent management role in the company as well as for their own independent work or company succession.

3 Study objectives and qualification goals

Knowledge:

Graduates acquire extensive knowledge of mathematics, science and engineering, especially in the core areas of decentralised energy systems, energy networks and their operation and management. Theoretically acquired knowledge can be implemented in a practical and solution-oriented manner. Graduates know the terms and methods relevant to different fields. Due to the knowledge of business administration that is acquired, graduates have the necessary know-how to set up and manage companies. Graduates can research and interpret academic technical texts and apply them to situations in everyday work.

Skills:

- Students have in-depth and application-relevant specialist knowledge of energy systems engineering.
- They have in-depth knowledge of:
    - Development (conception, calculation, planning and building) of regenerative energy systems and smart grids using tools for spatial planning and modern geo-information systems
    - Project planning (system design of sustainable energy systems including storage, supply and distribution technologies)
    - Assembly, commissioning, servicing and maintenance
    - Monitoring and assessment of regenerative energy systems using modern, digitised measuring and control technology
    - Management of energy networks (electricity and gas) in different energy markets
    - Lean management
    - Sustainable corporate governance
    - Working in an international environment

- Students can assess their range of services, identify further training measures and work together internationally, even in large teams.
- Students can analyse and evaluate engineering related problems from the fields renewable energy and energy systems and develop appropriate solutions.

Competencies:

- Students can research and interpret academic technical texts and apply them to situations in everyday work.
- They can solve problems in an application-oriented manner using basic methods.
- Students can present work results in a structured manner and discuss them in front of expert audience.
- They can think and act in an entrepreneurial way and formulate strategies.
- Students should be in a position to grasp overarching interrelations, respond flexibly and thus actively shape the transformation of energy systems.
- Students can implement theoretically acquired knowledge in a practical and solution-oriented manner.
- Students can organise themselves and show a capacity for teamwork and leadership skills during interdisciplinary cooperation.
- They can evaluate technical concepts economically and use them for the company based on economic principles as well as recognise the impact of decisions on business activities, employees and the environment and act responsibly with that in view.
- Students can name stakeholders of companies and classify their relevance for product development and take their goals into account.
- They can reflect on their actions and adapt them to suit ethical, ecological, social and economic requirements.
- Students learn to assess their strengths and weaknesses and their impact on others.
- They can contribute to conflict resolution and handle criticism constructively.
- Students can recognise the need for lifelong learning and acquire the necessary skills.

4 Learning outcomes of modules/module objectives/matrix of objectives

Individual modules, their detailed objectives and competencies to be acquired by graduates are described in the module handbooks for the Bachelor programme of Energy Systems Engineering.

The following table shows the relationship between individual modules and the objectives described in the previous section for the Bachelor programme of Energy Systems Engineering.

Matrix of objectives of the modules in the Bachelor programme of Energy Systems Engineering

Module	Objectives											
	Knowledge				Skills				Competencies			
	Scientific and Technological Basics	Engineering-based Methods	Engineering Practice and Product	General	Scientific and Technological Basics	Engineering-based Methods	Engineering Practice and Product	General	Scientific and Technological Basics	Engineering-based Methods	Engineering Practice and Product	General
Semester 1												
Analytical Principles of Engineering		xx				xx				xx		
Informatics for Engineering I		xx				xx				xx		
Fundamentals of Electrical Engineering		xx				xx				xx		
Physics	xx				xx				xx			
Chemistry	xx				xx				xx			
Foreign Language I				xx				xx				xx
Semester 2												
Mathematics for Engineering		xx				xx				xx		
Informatics for Engineering II		xx				xx				xx		
Electrical and Power Engineering		xx				xx				xx		
Lab Work in Natural Sciences	xx				xx				xx			
Materials and Design		xx				xx				xx		
Inter-cultural Competences				xx				xx				xx
Compulsory Elective Subject of a General Academic Nature (AWP) I		xx				xx				xx		
Foreign Language II				xx				xx				xx
Semester 3												
Applied Mathematics		xx				xx				xx		
Energy Technology		xx				xx				xx		
Measurement and Control Engineering		xx				xx				xx		
Fundamentals of Energy Economy		xx				xx				xx		
Project Work I incl. Scientific Writing			xx				xx				xx	
Foreign Language III				xx				xx				xx
Semester 4												
Project Work II incl. Simulation and Design			xx				xx				xx	
Renewable Energies		xx				xx				xx		
Sustainability	xx				xx				xx			
Plant Engineering		xx				xx				xx		
Compulsory Elective Subject of a General Academic Nature (AWP) II				xx				xx				xx
Compulsory Elective I*				xx				xx				xx

Foreign Language IV				xx				xx				xx
Semester 5												
Internship incl. PLV Seminars			xx				xx				xx	
Semester 6												
Power Grid Technologies		xx				xx				xx		
Energy Storage		xx				xx				xx		
Smart Systems and Technologies		xx				xx				xx		
Compulsory Elective II*				xx				xx				xx
Project Work III incl. Lab Work in Energy Systems			xx				xx				xx	
Semester 7												
Grid Management		xx				xx				xx		
Site Planning and GIS		xx				xx				xx		
Compulsory Elective III*				xx				xx				xx
Bachelor Thesis				xx				xx				xx
Bachelor seminar				x				x				x

Legend: xx strong relation; x medium relation

"Pool of Compulsory Electives I-III":

Advanced Fluid and Energy Technology
Computer Simulation in Energy and Resource Economics
Energy and Resource Efficiency
Energy Economics Policy
Entrepreneurship
Finance and Accounting
Health Safety Environment
International Energy Regulations
Modelling Theory
MRO-Strategies and Process Reliability
Operational Processes
Principles of Energy Systems Management
Process Engineering
Process Optimisation
Safety and Security in Energy Systems
Strategic Planning and Project Management
Technology and Intellectual Property Rights Management