VSB TECHNICAL UNIVERSITY OF OSTRAVA | FACULTY OF MECHANICAL ENGINEERING

# Study programme Energy Engineering

*Generated: 15. 12. 2025*

| | |
|---|---|
| **Faculty** | Faculty of Mechanical Engineering |
| **Type of study** | Follow-up Master |
| **Language of instruction** | English |
| **Code of the programme** | N0713A070003 |
| **Title of the programme** | Energy Engineering |
| **Regular period of the study** | 2 years |
| **Cost** | 50,000 CZK per semester |
| **Coordinating department** | Department of Power Engineering |
| **Coordinator** | prof. Ing. Stanislav Honus, Ph.D. |
| **Key words** | energy machinery and equipment, energy sources, efficiency of energy transformations, waste utilization, alternative and renewable energy |

## About study programme

This Master's study programme is a continuation of the bachelor study programme “Energetics and Environments”. Nevertheless, graduates of other technical programmes and fields, both from VŠB-TUO and other universities, also apply for this programme.
In the basic compulsory study programme, students deepen their knowledge of the theory of fluid mechanics, heat and mass transfer and combustion and become more familiar with the construction and operation of basic power industry units such as boilers, turbines, compressors, power stations, internal combustion engines, cooling equipment, etc. Furthermore, students acquire knowledge in the field of water management in power engineering, air protection and in the field of operation, regulation, diagnostics and maintenance in power engineering.

## Professions

- Power engineering researcher
- Power engineering auditor
- Power engineering design engineer

## Hard skills

- Measurement of electrical and non-electrical quantities
- MS Excel application for thermal calculations
- Modelling of thermal processes and its use
- Calculation of heat losses of facilities, energy distribution, and buildings
- Applications of the basics of thermodynamics in power engineering and thermal engineering
- Knowledge of modelling in SW Ansys Fluent
- Regulation in energetics
- Application of natural sciences in energy and thermal engineering
- Orientation in the field of thermal energy equipment
- Determination of efficiency of thermal and energy equipment
- Energy machinery and equipment
- Knowledge of properties of the gaseous, liquid, and solid fuels
- Orientation in the field of the heating industry, boiler issues, and heat distribution
- Application of mathematical methods in energy and thermal engineering

- Fuel combustion calculations
- Knowledge of methods for reducing the effects of thermal processes on environmental components
- Orientation in the field of properties, principle, and use of compressors
- Orientation in technical drawings
- Knowledge of the use of alternative energy sources
- Heat sharing and mass transfer
- Orientation in the field of properties, principle, and use of pumps
- Knowledge of heat pumps and refrigeration systems
- Energy calculations
- Knowledge of calculations and design of heat exchangers
- Knowledge of energy utilization and waste treatment
- Reading technical documentation
- Orientation in the field of heating and air conditioning
- Energetical protection in power engineering
- Calculations of pressure losses in the flow of gases and liquids
- Orientation in the field of use of secondary energy sources
- Knowledge of principles and use of heat and combustion engines
- Renewable energy sources
- Heat transfer calculations in buildings and facilities
- Knowledge of creating energy balances and standardization of energy consumption
- Ability to determine energy and exergetic balances of equipment
- Knowledge of the effects of thermal processes on the environment
- Orientation in schemes

## Graduate's employment

The content of the study programme is based on the social needs of university-educated energy experts and the objectives of the study programme correspond to labor market demand and it is presumed that graduates will be employed as designers, constructors or operators of energy systems and equipment with technical, economic and environmental knowedge.
The graduate can work in practice as:
• worker in power engineering, development, design, construction, manufacturing, assembly and testing,
• Operations, design and managerial staff in power plants and heating plants, in the energy departments in all types of industrial enterprises and in the non-manufacturing sector, such as waste water treatment plants, waste management companies, etc.
• designer during investment construction in power engineering,
• worker or manager in institutions and state administration departments dealing with energy, safety and environmental care,
• a technician, a calculator or a designer in power companies,
• Inspection and testing technician of power equipment, a person professionally qualified for supervision of thermal waste treatment,
• energy specialist, independent worker for energy audits and for providing consulting and advisory services,
• a worker holding managerial positions in energy companies.

## Study aims

Energetics is among the primary global strategic areas, and vigorously develops.
The general objective of this programme is to educate graduates with the knowledge and skills to be able to solve problems of technical practice in the field of energy, ecology and environment.
The objective is the preparation of university educated specialists with relevant theoretical and professional knowledge who are able to operate or manage power units and individual machines and equipment and design, realize, evaluate and diagnose including an assessment of their effectiveness. Emphasis is also placed on the ability to use modern computational methods and the effective evaluation of technical measurement outputs. Graduates are thus able to present results and cooperate on innovative activities in the energy sector.

Due to the above facts, graduates of this study programme will have a high chance of finding employment in the field.

## Graduate's knowledge

Students will acquire knowledge necessary for design, operation or management work in power engineering, environmental engineering and related fields. Students deepen their knowledge of the theory of fluid mechanics, heat and mass transfer and combustion and become more familiar with the construction and operation of basic power industry units such as power centrals, boilers, turbines, compressors, internal combustion engines. Furthermore, students will acquire knowledge in the field of water management in power engineering, air protection and in the field of operation, regulation, diagnostics and maintenance in power engineering. Students will therefore be equipped with knowledge in the field of utilization of energy sources, its production and transformation and operation of power machines and equipment, which will enable them to grow professionally through creative involvement in the work process or by continuing their doctoral studies. Knowledge of ecological aspects of energy and understanding of environmental impact of energy practice will enable graduates to solve problems of energy practice in a broader social context.

## Graduate's skills

Students can reliably apply their expertise and understanding within a specialized area to solve complex and unpredictable problems with a professional approach using innovative methods, tools and supporting argumentation. Students are able to use technical terminology and process technical documentation in the field of energy, understand technical drawings and have knowledge of the main technical methods of the field (e.g. compilation of energy balances, assessment of energy intensity of processes, etc.) are able to operate, manage power units and individual machines and equipment. They will be able to design, implement, evaluate and diagnose energy works, including energy systems, and assess their efficiency.
Graduates will thus be able to present results and cooperate on innovative activities in the energy sector. Based on the study of compulsory elective courses, graduates are also able to independently perform basic energy measurements in order to optimize the operation of power machines and equipment, they can analyze the possibilities of using alternative energy sources, perform thermal and other energy calculations and design proposals.

## Graduate's general competence

Graduates are able to approach creatively and proactively to work, manage more complex professional activities or projects, including planning, implementation and feedback, take responsibility for all related decisions, effectively work under the guidance or partnership of qualified professionals, and lead multi-member, comprehensive and diverse groups. They are able to formulate and present their own views, reflect views of other members of the group, to communicate information, ideas, problems and solutions comprehensively to professionals and laymen using a variety of techniques, to use knowledge and skills in at least one foreign language.
In addition, graduates are able to use basic ICT skills, consistently assess their own learning and identify their own learning needs in an unknown and changeable environment requiring a high degree of autonomy and helping others find learning needs. Graduates are able to work in various job positions in the field of energy.

## Study curriculum

- form Full-time (en)