VSB TECHNICAL UNIVERSITY OF OSTRAVA | FACULTY OF MECHANICAL ENGINEERING

Energy Processes

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Faculty	Faculty of Mechanical Engineering
Type of study	Doctoral
Language of instruction	English
Code of the programme	P0713D070004
Regular period of the study	4 years
Coordinating department	Department of Power Engineering
Coordinator	prof. Ing. Stanislav Honus, Ph.D.
Keywords	Energy Sources, Energy Systems and Technology, Science and Research in Energy Engineering, Environmental Engineering

About study programme

Energy is part of almost all human activities.
The aim of the doctoral study programme "Energy Processes" is to educate graduates for creative scientific research work in the field of energy. The graduate will deepen his/her professional knowledge, skills and competences in this area. Upon successful completion of the study, the graduate will receive the academic title of Ph.D., which represents the highest level of higher education.
The doctoral study programme "Energy Processes" is a follow-up to the follow-up Master's degree programme "Power Machinery and Equipment". However, this doctoral study programme can be studied by graduates of the same or related master's programmes and fields of study from other faculties and universities.
The study is carried out in a full-time or part-time form.
The study takes place according to an individual study plan, which determines the time distribution of studies, professional and scientific activities with a focus on the preparation of a dissertation, study stays at other workplaces, including foreign ones, or a certain minimum pedagogical activity (e.g. conducting exercises).
The student performs activities necessary for the preparation of a dissertation (e.g. experimental work) and activities necessary to meet the qualification conditions of study (e.g. publication activities). The study is completed by the defence of the dissertation. The general topics of the dissertations are published together with the announcement of the "Rules for the Admission Procedure and Conditions for Admission to Doctoral Study Programmes at the Faculty of Mechanical Engineering VSB-TUO" on the faculty website, usually at the beginning of January.
Detailed information on the organization of studies is part of the "Study and Examination Regulations for Study in Doctoral Study Programmes of VSB-TU Ostrava", see:
https://dokumenty.vsb.cz/docs/files/en/dd0741c8-ecee-4f05-8862-b8437b744f62

Graduate's employment

Graduates may further develop their scientific careers as:
- Research workers in research institutes or universities
- Postdoctoral researchers at technical universities or the Academy of Sciences
- Academic staff at higher education institutions with prospects for habilitation

The State Energy Policy of the Czech Republic highlights a long-term shortage of specialists both in the research and education sectors as well as in industry, particularly in research, development, design, production, and management. The number of university graduates is insufficient to compensate for workforce retirements. Therefore, appropriate employment opportunities for graduates can be considered as highly secured.
Other typical positions for graduates include:
- Professionals in energy engineering companies in the fields of development, design, construction, calculations, manufacturing,

assembly, and testing
- Operational, design, and management staff in power plants and heating plants, in energy departments of all types of industrial enterprises as well as in the non-production sector
- Designers involved in investment projects in the energy sector
Senior staff in institutes, institutions, and state administration bodies dealing with energy, safety, and environmental protection

Study aims

The aim of the doctoral study program Energy Processes is to educate graduates as specialized experts capable of independent creative work in the research of energy transformations, development, and improvement of energy technologies.

Graduate's knowledge

Graduates possess expertise in the fields of thermomechanics and thermal machines, measurement of physical quantities, design and optimization of energy systems (including renewable sources), and energy audits. They are able to perform energy and exergy balances, read technical documentation, and use energy software for process modeling, such as combustion calculations or heat exchanger design. They also understand the environmental impacts of energy-related activities and are prepared to apply their knowledge in practice, from operational and design positions to research and innovation.
Doctoral students deepen their specialized expertise related to the topic of their dissertation through independent study of literature and consultations with experts, ensuring alignment with the current state of knowledge in their field in both Europe and worldwide.

Graduate's skills

Graduates of the Energy Processes doctoral program, as energy experts, are capable of independent research activities aimed at expanding knowledge in their field at the international level and improving the energy and economic performance of energy facilities. They are able to initiate the research process with a theoretical analysis, continue with an evaluation of energy transformations, and conclude with the design of optimal technology for the given problem.
They are also proficient in conducting pilot-plant or operational experiments, followed by data evaluation and, if necessary, supplemented with numerical simulations.

Graduate's general competence

Graduates of the Energy Processes doctoral study program are able to:
- Formulate scientific problems independently
- Propose methods of solution and design experimental activities aimed at problem-solving
- Express themselves and present the results of their work both in written and oral form at an international level in a world language
- Evaluate new findings and ideas with regard to the long-term social consequences of their application
- Acquire new professional knowledge and subsequently disseminate it within the expert community

Professions

- Power engineering project manager
- Power engineering researcher
- Power engineering auditor
- Power engineering design engineer

Hard skills

- Energy calculations
- Knowledge of methods and instruments for measuring thermal technical quantities
- Heat sharing and mass transfer

- Renewable energy sources
- Knowledge of creating energy balances and standardization of energy consumption
- Application of mathematical methods in energy and thermal engineering
- Application of natural sciences in energy and thermal engineering
- Energy machinery and equipment
- Modelling of thermal processes and its use
- Knowledge of methods for reducing the effects of thermal processes on environmental components
- Knowledge of the use of alternative energy sources
- Determination of efficiency of thermal and energy equipment
- Ability to determine energy and exergetic balances of equipment
- Knowledge of the effects of thermal processes on the environment

Study curriculum

- form Full-time (en)
- form Part-time (en)