

# Study programme Engineering

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<b>Faculty</b>	Faculty of Mechanical Engineering
<b>Type of study</b>	Bachelor
<b>Language of instruction</b>	English
<b>Code of the programme</b>	B0715A270012
<b>Title of the programme</b>	Engineering
<b>Regular period of the study</b>	3 years
<b>Cost</b>	50,000 CZK per semester
<b>Coordinating department</b>	Department of Mechanical Technology
<b>Coordinator</b>	prof. Ing. Ivo Hlavatý, Ph.D.
<b>Key words</b>	

## Study branches

- Additive Technology
- Applied Mechanics
- Engineering Technology
- Hydraulics and pneumatics
- Industrial engineering
- Machine and Process Control
- Robotics

## About study programme

In this bachelor program, the first four semesters of General and Mechanical Engineering are common. Subsequently, students study one of the 7 specializations. Graduates can continue in the field of study in the follow-up Master's degree programs and subsequently in doctoral study.

Graduates will find employment in technical-operational, business and management positions in manufacturing operations in mechanical engineering and other industries, as well as in the departments of production preparation and organization, in the design and construction of technological equipment, in the design and construction of technological operations, development departments and diagnostic workplaces. Graduates can easily orientate themselves in related engineering fields.

## Graduate's employment

Graduates are employed by all employers engaged in the development, production or distribution and servicing of engineering products regardless of the size of the employer. Typical large employers where our graduates find employment are SIEMES, a.g., VÍTKOVICE HEAVY MACHINERY a.s. - VMG, ArcelorMittal Ostrava, as, BREMBO Czech, sro, Škoda Auto, a.s. Mladá Boleslav, Škoda Transportation, a.s., or Třinecké železářny, a. S. Our graduates also find employment in small and medium-sized companies.

Within the framework of assigning qualifications and subsequent employment of our graduates we can name for example Alliance Laundry CE, s.r.o., BORCAD cz, s.r.o., AVL Moravia, s.r.o., Česká zbrojova, a.s. or Huisman Construction, s.r.o.

Given that foreign students are particularly interested in studying the program in English, the list of their potential employers depends on the country where they will operate after graduation.

Graduates can work in engineering as well as self-employed in unregulated professions.

The graduate can work in practice as:

- an expert in the academic sphere and in other institutions dealing with science, research, development and innovation;

- design and manager,
- operations engineer,
- Qualified reseller

and, depending on the specialization completed, such as:

- Calculator
- designer,
- technologist,
- specialist for quality control and management,
- specialist assessing the level of technical projects in business and finance,
- designer of production systems,
- project manager,
- designer,
- grafik.

At present, industry requirements for the number of graduates are significantly higher than the current number of graduates.

## Study aims

The aim of study in the three-year study program Engineering is to prepare graduates for activities in all areas of engineering activities particularly in industrial enterprises for which they acquire the relevant theoretical and professional knowledge and skills.

After the first two years of joint study, students continue to specialize to acquire specific knowledge

in the field of industry and in this area are preparing their final work. Studying specialization, thanks to previous joint study,

does not hinder the flexibility of the student to switch to any field of engineering activity. In this third year, outside specialized study subjects, students process projects related to their final work. In addition to the solution itself, emphasis is placed on the elaboration of high-quality, sufficiently extensive and critical research of the solved problems. Emphasis is placed on the ability to use

modern calculation methods and efficiently evaluate the outputs of technical measurements.

Study of the study program is completed by verification of knowledge from two thematic areas resulting mainly from profiling subjects

and defense of the final bachelor thesis.

The basic aim of the study is to ensure essentially two requirements - that the graduate is able to independently solve the technical tasks that he / she has

He is awaiting him within the profession and would be well prepared to study in a follow-up Master's degree. Therefore, the study program is compiled

gradually from basic theoretical subjects, which are then followed by specialized subjects and at the end of the study then specialized subjects.

The study is based both on the information that students receive in the classroom and on the need for self-study and independent solution of given problems with the support of teachers.

Due to the wide range of engineering problems, students are divided into individual specializations focused on solutions in the final year

specific segments of technical practice. This division is also related to the areas of engineering, which are applied both to the topic of the thesis and to the areas from which the student's knowledge is verified during the state final examinations.

## Graduate's knowledge

The graduates will acquire the basic knowledge of the theoretical areas of mathematics, constructive geometry, physics, computer graphics, computational methods, mechanics of rigid and flexible bodies and environments, material science, thermomechanics and hydromechanics at a level enabling their practical application, such as engineering materials, manufacturing technology, machine and machine parts design, manufacturing system design and control, both cross-sectional to all students and additionally within the scope of a specific specialization. The study program utilizes extensive cooperation with industrial partners both in the organization and provision of teaching and in solving technical problems of practice in the framework of seminar and especially bachelor theses.

- Within the specialization Applied Mechanics, graduates will gain deeper theoretical knowledge in the subjects Dynamics, Elasticity and Strength, Technical Vibration, Machine Parts and Mechanisms, as well as basic knowledge in the courses Finite Element Method, Experimental Methods in Mechanics, Vibration Diagnostics, Material Fatigue and Numerical Mathematics.
- Within the specialization Hydraulics and Pneumatics, students will acquire knowledge about the function of basic hydraulic and pneumatic elements, their application in hydraulic and pneumatic circuits. They will learn schematic symbols, basic connection, design of simple schemes wiring, which they verify on trainers in laboratories and using mathematical simulations. In a broader context, they will acquire knowledge about flow in hydraulic elements and machines, piping, pumping and lubrication technology. They acquire a theoretical and practical knowledge base, which they will use in their application in a unique field.
- Within the specialization of Industrial Engineering the student gains knowledge of industrial technologies, knowledge necessary for designing technological workplaces, production units, organization and management of production and pre-production processes and their evaluation. They will also acquire knowledge of the methodology of industrial management, basics of marketing activities, quality management systems of industrial companies and basics of general and business economics. They will also acquire knowledge of basic legal, safety and hygiene regulations necessary for designing and managing engineering companies, knowledge of methods and techniques of management.
- Within the Robotics specialization, the graduate gains experience as designers of robotic elements, manipulators and peripheral devices of robotized workplaces (conveyors, bins, heads of industrial robots etc.), including collaborative robots, but also as designers of these devices and especially operational technicians ensuring operation, adjustment, programming, diagnostics, maintenance and repair.
- Within the Machine and Process Control specialization, graduates will gain a broad understanding of concepts and methods in the design and operation of industrial equipment measuring, diagnostic and control systems. They will also gain knowledge of the theory and applications of automation and computer science for practical use of computers and their networks for various areas of computer support of production process control.
- Within the specialization Engineering Technology the student gains a deeper knowledge of basic technological processes (forming, welding, machining) and heat treatment of materials, surface treatments of semi-finished products and basics of tool construction. Students will learn about the possibilities of computer support of technological processes and their organization and management.

## Graduate's skills

Graduates will acquire professional skills in terms of using professional terminology and processing technical documentation. They can read technical drawings of products or parts and design the most efficient methods and procedures of their production, they can perform expert analysis of machinery and production technologies, they can analyze and evaluate technical solutions. They know the principles of the main scientific methods of the field and they can use some of their basic variants in practical context. Graduates can prepare, execute and compile a report on the results of laboratory or technical experiment, can verify new production processes, collaborate on the implementation of technological changes and innovation activities.

Other professional skills are developed by individual specializations of the study program Engineering.

- Within the specialization Applied Mechanics, the graduate has mainly practical skills in computer modeling and experiments. They will learn to create moderately complex computational models for static and dynamic finite element analysis in several programs using different software environments. In the field of experimental mechanics, the graduate has skills in the preparation of the experiment and its setting, implementation and evaluation of the results of the experiment. This is especially the area of experimental modal analysis vibration measurement, vibration diagnostics, tensometry and photoelasticimetry.
- Within the specialization of Hydraulics and Pneumatics students will use the acquired knowledge in designing production equipment with hydraulic and pneumatic drives, assembling hydraulic and pneumatic circuits, creating larger systems, designing their control and regulation using modern simulation SW. They will be able to design hydraulic and pneumatic circuits, assemble and commission them, perform diagnostics, upgrades and repairs, plan and manage maintenance.
- Within the specialization of Industrial Engineering, the student can provide and organize technological preparation of production, can design technological workplaces (design arrangement of machines and fixtures, material flow, continuity of workplaces and provide other technical conditions), read technical drawings and design the most efficient ways and procedures, assembly and surface treatment, organize and manage production and pre-production processes and perform their evaluation, verify new

production processes, determine the method of quality control and technical testing and cooperate on production quality management, carry out technical supervision at workplaces, check adherence to technological procedures, apply tools from the field of economic and financial management of the company, to carry out marketing activities, to apply methods of Improve and project business processes in industrial sectors (metallurgy, engineering, automotive). The student is able to use basic legal, safety and hygienic regulations necessary for designing and managing engineering companies. The student has practical skills in the field of management methods and techniques, is able to use quality management systems of industrial companies and knows the basics of general and business economics.

- Within the Robotics specialization, the graduate gains experience and skills in mastering independent routine work in the areas of construction of individual robot elements and their peripherals (conveyors, manipulators, robot effectors, etc.), including the implementation of special sensors (force-torque etc.). Furthermore, the basics of the methodology and procedures of risk analysis of these workplaces. Skills with routine use of 3D CAD software - Creo, V-Rep simulation SW and basics of Robot Studio.
- Within the Machine and Process Control specialization, the graduates will be able to solve practical problems in the implementation of computer support for production systems management. They will be able to use the tools of industrial automation visualization software and design and create simple web information systems applications, configure the operating system from the administrator's point of view, create simple networks and administer them. In the area of measurement, diagnostic and control systems design, graduates will be able to find, organize and interpret relevant information for solving practical problems. They will be able to design and implement simple applications of logic control, adjust parameters of PID controllers.
- Within the specialization Manufacturing Technology the student is able to analyze technological processes from the theoretical and practical point of view, propose corresponding input parameters of processes, using suitable software tools to process processes practically and interpret the obtained results for the needs of industrial practice.

## **Graduate's general competence**

Graduates are able to work in various working positions within the engineering production, from the design and construction of machine parts, groups and whole machines, through the design of production technology and its implementation to the organization of production and quality control of products and their transport.

As this is an extensive field of activities, students are trained for each of these sub-activities, as well as within the specialization.

- Within the specialization Applied Mechanics, the graduate is able to solve more complex problems of mechanical engineering, especially related to mechanics. A typical job is a computer designer or a specialist in measurement. He is also qualified for classic design work as well as for leading a small work team.
- Under the Hydraulics and Pneumatics specialization, they will acquire the skills and general competencies required for the profession of a universal designer with a special focus on hydraulic and pneumatic equipment, but also for related fields such as tribotechnology, fluid and gas transport, pumping technology.
- Within the specialization of Industrial Engineering graduates are able to work mainly in engineering industrial enterprises, but also in engineering departments of other industries, in preparation of production, development and research, as technologists, designers of production systems, project managers, operation technicians or specialists for quality control and management. In business and finance, graduates are able to work as specialists assessing the level of technology projects.
- Within the Robotics specialization, they acquire basic competencies in team work, the importance of individual team roles and their coordination. They have knowledge of using specialized SW tools in the areas of robotics and mechatronics.
- Within the Machine and Process Control specialization, the graduates will gain experience in the field of teamwork and learn to coordinate team activities. Emphasis is placed on the ability to use modern computational methods and efficiently evaluate the outputs of technical measurements. Graduates are equipped with the skills and knowledge to enable them to grow professionally through their creative involvement in the production process or by continuing their master's degree.
- As part of the Engineering Technology specialization, students are trained for a wide variety of technical positions in manufacturing companies. Graduates will find employment in the departments of preparation and organization of production, in the design and construction of technological equipment, tools and fixtures, in the design and construction of technological operations, in the departments of maintenance and other service departments.

## **Study curriculum**

- form Full-time (en)