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Studies

Some 2000 students can’t be wrong: studying at the ZHAW Zurich University of Applied Sciences School of Engineering is attractive, grounded in theory and practice-oriented. With eight Bachelor degree programmes and a Master of Science programme in Engineering, we offer everything you need for a successful career as an engineer. A career in engineering is varied, exciting and creative. It encompasses many different areas, including research and development, construction and production, and the deployment of state-of-the-art technologies in areas such as communication, computer science, mechatronics, biomedical engineering, transportation and renewable energy generation. Engineers are responsible for developing and implementing innovations, and their extensive expertise makes them highly sought-after by many different companies. Do you have a keen interest in the fascinating world of engineering? Or in the interplay between economics and technology? Then the ZHAW School of Engineering is the right place for you!
Your university – future-oriented and innovative

The ZHAW School of Engineering focuses on topics that will be relevant in the future. With 13 institutes and centres of excellence, the School of Engineering guarantees a high standard of education, R&D and services with an emphasis on the areas of energy, mobility, information and health. The range of courses offered is geared to the needs of the economy and provides a scientifically sound engineering education with a high degree of practical orientation, an interdisciplinary approach and state-of-the-art technology.

Wide range of programmes The ZHAW School of Engineering offers a broad choice of Bachelor degree programmes and specialisations, some of which are not offered by any other institutions in Switzerland:

- Aviation
- Electrical Engineering
- Energy and Environmental Engineering
- Mechanical Engineering
- Computer Science
- Systems Engineering (Robotics & Mechatronics, Biomedical Engineering)
- Transportation Systems
- Engineering and Management (Industrial Engineering, Data and Service Engineering, Business Mathematics)

Outstanding Bachelor-level graduates may take the Master of Science in Engineering (MSE), an innovative degree programme involving all universities of applied sciences in Switzerland.

What is a Bachelor’s degree? With a Bachelor’s degree, students at universities in Europe obtain an internationally recognised academic qualification that equips them for a career. Full-time study leads to a Bachelor of Science after six semesters, or after eight semesters if studying part-time.

The Bachelor’s degree programme comprises a total of 180 ECTS credits. ECTS stands for the European Credits Transfer System, which allows the performance of students to be compared at an international level. Thirty hours of study (including self-study) corresponds to one ECTS credit point.

Programme structure The degree programme is divided into compulsory and optional study units (modules). Various degree programmes offer individual modules jointly, providing you with greater choice and allowing you to develop a personal profile. The programme directors would be happy to provide you with any information regarding content.

The Assessment Level corresponds to a foundation year with a focus on mathematics and natural sciences. Students who pass the Assessment Level may advance to the main course of study, where the programme will focus on a particular area of specialisation. During the final year of your studies, you will write a Bachelor thesis. Following the successful completion of your studies, you will be awarded the title of Bachelor of Science ZFH in (programme/specialisation).
Programme objectives

Our graduates are practice-oriented engineers who balance the conflicting requirements of people, technology and the environment in a responsible manner.

During the programme, you will acquire the following skills:

- **Professional skills**: You will master the specialist subject matter and be able to transfer new insights from engineering science to your career. In addition, you will acquire important specialist skills for the process of digital transformation.

- **Methodological skills**: You will be able to detect and analyse problems and approach them systematically, taking into account technical and economic aspects. You will be able to tackle complex problems independently or in a team.

- **Social skills**: You will be able to address cultural, political and social issues competently and express yourself in a clear and convincing manner. You will develop your key qualities such as cooperativeness, the ability to work in a team and leadership skills.

- **Personal skills**: You will deal with topics that promote independence, flexibility, resilience, learning ability and structured thinking. You will also learn how to enhance your knowledge independently.

Practice-oriented studies

We will teach you the theoretical and technical knowledge required for your day-to-day work and show you how to apply it in practice. Our institutes and centres undertake innovative research and development projects in collaboration with partners from industry and commerce. You will benefit directly from this as you will be involved in solving practical problems throughout the entire programme. While working on various projects and on your Bachelor thesis, you will deal with current issues and topics in close collaboration with businesses.

Combining work and studies

Some degree programmes can also be completed on a part-time basis. You generally study on three attendance days per week for at least eight semesters. The curriculum usually corresponds to that of the full-time programme. If you exercise a profession in a field of work that is pertinent to your field of study, this will be taken into account.

Work-study Bachelor’s degree programme

Do you hold an academic baccalaureate and would like to study at a university of applied sciences without first having to complete a twelve-month internship? The work-study Bachelor’s degree programme offers you this opportunity. You will complete a four-year Bachelor programme and concurrently acquire practical experience in a company. The ZHAW School of Engineering offers practice-integrated studies in all Bachelor degree programmes. The course contents correspond to those of a standard Bachelor programme.

International Profile

Are you interested in studying at a university abroad for a semester or a full academic year? And maybe even writing your Bachelor thesis there? We promote national and international student exchanges with other universities. After the first year of study, students studying Aviation, Electrical Engineering, Computer Science, Mechanical Engineering, Systems Engineering or Engineering and Management can also opt for the International Profile. This includes attendance at English-language specialist modules, evidence of particularly good foreign language skills, courses in cross-cultural communication/management, and a prolonged stay abroad during the study programme.
Certain conditions must be met before commencing studies at the School of Engineering. This section contains important information about admission requirements and our academic programme.

**Admission requirements**

**Admission with vocational baccalaureate** Candidates holding a vocational baccalaureate recognised by the Swiss Confederation who have also completed basic vocational training in an occupation related to their chosen study discipline are eligible for admission to the programme. A completed commercial apprenticeship is not a sufficient qualification for admission to the Electrical Engineering, Mechanical Engineering and Systems Engineering Bachelor degree programmes, however.

Graduates from a professional education institution in an occupation related to the course of study and holders of a specialised baccalaureate in a profile similar to the course of study are also eligible for admission to the programme.

Candidates holding a federal diploma from a professional education institution in an occupation that is not related to their chosen study discipline may also be admitted to the programme if they can show that they have at least one year of work experience in a field related to their chosen study discipline.

**Admission with academic baccalaureate**

- **Internship prior to commencing the programme** Holders of an academic baccalaureate must provide evidence of having completed a professional internship of at least 12 months in length.

- **Work-study Bachelor’s degree programme** In order to be admitted to the four-year work-study Bachelor’s degree programme the candidate must, in addition to holding an academic baccalaureate, provide evidence of a training contract (≈ internship contract) with a company. The ZHAW School of Engineering maintains partnerships with different companies for that reason. Please contact our administration office for details.

**Additional admission requirements** Those with an equivalent qualification or a foreign diploma may contact the School of Engineering’s administration office for further information.

**Programme calendar** The academic year begins in autumn (in calendar week 38) and comprises two semesters. Lecture-free periods will vary depending on the programme and the academic year. Lessons take place according to a weekly timetable that is fixed for each semester.

**Examinations** Students undergo a performance assessment for each module attended. This assessment serves as the basis for awarding grades and credit points. Students must pass the assessment stage in order to progress to the main study programme. A Bachelor thesis must be completed during the final semester.

**Costs** Various fees will be payable both before and during studies. These include the registration fee and the semester tuition fees.

**Application for registration** Applications may be submitted by 30 April using the online form on our website. You will find this form at www.zhaw.ch/en/engineering

**Advice centres** Once you have commenced your studies, a team of advisers from various ZHAW advice centres is available, free of charge, to assist with any issues relating to your studies, grants, discrimination or in the event of any conflict situation.
Aviation

Every day, a wide variety of professions works together to ensure safe and seamless flight operations 24 hours a day, seven days a week. The Aviation degree programme offers interdisciplinary training to become a generalist so that you are always able to maintain an overview in the highly complex area of aviation.

Aviation is a wide-ranging industry that is dominated by technology. During your studies, you therefore learn the principles of engineering, including mathematics, physics and computer science. Starting in the first semester of study, you will have the opportunity to participate in interesting and exciting projects as part of your studies. You may even implement them during your aviation internship, once you have worked independently on developing concepts for test flights.

Or you can discover the world “virtually” with the research simulator – without ever actually leaving the ground. In addition to engineering training, you will acquire knowledge in the areas of aviation law, aircraft systems, aviation infrastructure, meteorology, human factors, systems engineering and safety risk management.

In your final year of study, you will combine your theoretical knowledge with practical experience, and prove your skills through project work and your Bachelor thesis.

Links with other universities abroad will also give you the opportunity to work on collaborative projects or to take part in a student exchange. Our Aviation degree programme offers you a high level of practical relevance and is geared to the needs of the aviation industry. There are two options for specialisation:

Specialisation in Technical Engineering

Your career Career opportunities will present themselves in the areas of certification and maintenance of aircraft or systems, in solution development with manufacturers or in maintenance operations, or in air traffic control technology.

Your expertise You will specialise in a technical area such as aircraft manufacture and maintenance, air traffic control equipment or aircraft type certification.

Specialisation in Operational Engineering

Your career You can expect exciting challenges at airports, including in airport or security management, with airlines in network management or in dispatch, in air traffic control, in the development of new processes, or in an expert capacity.

Your expertise You will specialise in one of the operational areas such as the organisation of airline operations, at airports, in air traffic control or with national authorities.

Provided that the corresponding aptitude test is passed, there is also the possibility of combining the Bachelor programme with training to become a commercial pilot. With this dual qualification (Bachelor’s degree and licence), you will be ideally prepared for a career start in the cockpit, and also be qualified to assume additional responsibilities.
Electrical Engineering

Electrical engineering is a fascinating and varied field. It requires highly-qualified electrical engineers who develop optimal solutions to technically challenging problems. Electrical Engineering offers a wide variety of attractive careers, including in the areas of microelectronics, circuit design, embedded systems, automation technology, sensor technology, control technology, robotics, digital signal processing, digital technology, image processing, mobile communications, communications engineering and photonics.

During the programme, you will acquire mathematical and scientific knowledge, and will become familiar with the technical principles of electrical engineering. In later semesters, you will enhance your professional skills. The robust technical and hands-on training will enable you to recognise problems and to deal with them independently. This includes, in particular, your project work and Bachelor thesis where you will work in close cooperation with industry partners on current issues in research and development. Throughout your studies, we will train you in interdisciplinary thinking and action.

The Electrical Engineering degree programme at the ZHAW School of Engineering offers thorough and up-to-date basic training as well as a broad range of specialisations and opportunities for advancement. In addition, you will acquire the technical tools required for self-employment and be able to advance your own innovations.

In the third year of study, you will deepen your specialist knowledge with freely selectable optional modules in the following areas:
- Automation, Drives and Energy Systems
- Computer Engineering
- Wireless Communications, Signal Processing and Sensor Electronics

As an electrical engineer, you will contribute to technological progress in a diverse range of companies, including international companies. Electrical engineering plays an important role in almost all technical products and services. As a result of your extensive knowledge in the area of digital technologies, you will also be well equipped for future challenges associated with digital transformation.
Energy and Environmental Engineering

The power generation industry is facing radical change at a breathtaking pace. Those wishing to help shape this area and find new solutions to complex problems will need an interdisciplinary engineering background as well as knowledge of the economy and sustainability. The future fields of application in the industry are as diverse as the challenges, and offer exciting work.

The programme will give you a comprehensive understanding of technical and scientific principles. It takes a forward-looking approach by combining mechanical and electrical engineering skills in the area of electrical and renewable thermal energy systems in combination with the knowledge of economic interrelationships and issues of sustainability. In the third year, you can enhance your technical knowledge in one of three specialisations.

Specialisation in Renewable Thermal Energy Systems

Your career You will deal with thermal processes, energy-related systems, equipment components and entire systems. The possible fields of application range from development and technical planning to repair and maintenance, through to design and sales, or the improvement of products and processes relating to energy efficiency.

Your expertise The specialisation of Renewable Thermal Energy Systems offers modules which deal with topics such as thermal energy systems and energy efficiency, combustion, waste water and waste gas treatment, fuel cells, refrigeration, heat pumps, geothermal energy, wind and water power as well as solar energy.

Specialisation in Renewable Electrical Energy

Your career The focus will be on systems in the area of electrical energy engineering. You will increase the energy efficiency of electrical processes and plan new, economically attractive systems for the supply of electrical power. These will include photovoltaic systems combined with electrical storage systems and the integration of renewable energy into the power grid.

Your expertise You will become a specialist in the following areas: electrical power systems and power grids, power electronics, electrical storage systems and storage system production, photovoltaic systems and technologies.

Specialisation in Sustainable Development / Environment

Your career As a project manager for facilities and systems across the entire spectrum of energy and environmental engineering, you will be responsible for long-term needs assessments. You will conduct efficiency and environmental compatibility analyses for energy suppliers or consumers, with potential employers including power utilities, public authorities, banks and insurance companies or companies in the cleantech sector.

Your expertise You will be able to map out long-term prospects for the development of a new energy supply and assess the impact of developments in technology. Appropriately, we offer modules on innovation management, foresight and future methodology for energy and environmental scenarios, on business models in energy and environmental engineering and on business dynamics, which is the dynamic modelling of the behaviour of economic systems.


**Computer Science**

Computer science has a ubiquitous presence and permeates all areas of everyday life. New areas of application emerge almost daily and at a rapid pace. The diverse job descriptions for computer scientists change and expand just as quickly. Today, there is great demand for highly-qualified engineers with good communication skills who can work in a team to develop innovative solutions.

The degree programme will provide you with a solid basic understanding of the overall context of computer science such as, for example, in software development, communications and computer technology, as well as the theoretical and scientific fundamentals. The coordinated theoretical and practice-oriented education is optimal for preparing you for the professional world, where a host of fascinating and very diverse jobs awaits you. These include optimising IT systems in process development and production or managing and developing complex IT systems and applications within companies. As project manager, you will be responsible for developing and integrating new products.

**Various specialisation opportunities** In your final year of study, you deepen your specialist knowledge with optional modules. The extensive options in the Computer Science degree programme take account of the breadth of computer science today and allow you to create an individualised profile and specialisation.

The consecutive optional modules currently offered are:
- Advanced Software Engineering
- Cloud Computing
- Communication Networks and Services
- Digital Signal Processing
- DotNet Technology and Frameworks
- Information Engineering
- Internet of Things
- Artificial Intelligence
- Microcomputer Systems
- Mobile Applications
- Software and System Security
- Service Engineering
- Visual Computing


The Computer Science Bachelor degree programme is offered at the Winterthur and Zurich campuses.
Mechanical Engineering

Mechanical engineering is the driver of technical innovation. Mechanical engineers play a part in the development and production of almost all new products. As the front-runner of the Swiss export industry, mechanical engineering is one of the most important branches of production and offers many different career opportunities.

In the degree programme, you will acquire mathematical and scientific knowledge in chemistry and materials technology, electrical engineering, mechanics and machine dynamics, CAD and virtual product development, measurement and control technology, fluid dynamics and thermodynamics, as well as in applied heat transfer. At the same time, you apply the knowledge acquired to projects of your own, develop products and thus learn all steps from conception through to production.

Your career
You will develop and design innovative products or put new equipment into operation. You will also be responsible for designing machines and processes for manufacturing and production. Your tests, measurements and simulations will lead you towards new, efficient and energy-saving processes. You will support customers at a global level when solving their tasks and will sell complex technical products.

Your expertise
You can specialise by selecting two of eight focus areas: Biomechanical Engineering, Computational Fluid Engineering, Computational Light Weight Design, Innovative Materials and Surfaces, Smart Products and Production, Systems and Automation Engineering, Thermal Energy Technology and Process Engineering. Following the completion of the Mechanical Engineering degree programme, you will understand complex contexts and will solve associated mechanical engineering problems. In addition, you will be in a position to think in terms of systems and will be able to recognise and analyse these issues.
Degree programmes
Systems Engineering
Robotics and Mechatronics

Systems Engineering
Robotics, mechatronics and biomedical engineering are innovative areas in systems engineering. This new engineering discipline is rapidly gaining in importance. Systems engineering is based on the growing complexity of modern technical products that combine mechanical, electronic, optical and software-technical components. The programme will qualify you as an expert who, as a generalist with sound knowledge, understands complex systems and develops solutions for challenging tasks in robotics, biomedical engineering or automation engineering.

We offer a solid basic education and an introduction to the specialist areas of mechanical engineering, electrical engineering, optics, computer science and control engineering. The programme also addresses topics surrounding the field of engineering, such as business, law, ethics, technology assessment, ecology and sustainability. Students may choose from two specialisations:

Specialisation in Robotics and Mechatronics
Your career Your specialisation as a robotics and mechatronics engineer will open up interesting career opportunities with high-tech companies in areas such as sensor and actuator technology, control engineering and robotics. One of your main tasks will be to develop mechatronic products. You will understand how to create products by transforming an idea into a prototype and then a prototype into a final product. You will be involved in many challenging project management assignments in areas such as development, simulation, commissioning, manufacturing, maintenance and marketing, as well as consulting and training.
Your expertise After your comprehensive basic training, you will enhance your knowledge in various specialist areas, especially in controlled, complex mechatronic systems.

Specialisation in Biomedical Engineering
Your career In Switzerland, biomedical engineering is a varied and forward-looking field that offers a broad range of career prospects in medtech companies, hospitals and clinics. As a biomedical engineer, you will work on complex, technology-based medical systems and will be a specialist in medical technology product development. At a later stage, you will also be able to tackle project management tasks, particularly in the areas of development, commissioning, manufacturing, maintenance and marketing.
Your expertise You will acquire a deep knowledge of biomechanics, biosignal analysis, medical imaging and image processing, orthopaedics and robotic surgery, becoming a much sought-after expert in the field of biomedical engineering.
Transportation Systems

The transportation industry is facing radical changes. Electrification, digitalisation and robotic automation have opened up new mobility concepts (electric cars, automated cars, guidance systems) and business models (car sharing, on-demand transportation services). The industry is intensively searching for highly-qualified young professionals. In this context, the Transportation Systems degree programme offers you an engineering education that is unique in Switzerland.

Graduates of the Transportation Systems degree programme will be sought-after generalists who have an eye for the feasible as well as specific knowledge of inter-relationships and interfaces in the complex overall transportation system. Based on scientific fundamentals, you will acquire knowledge about the economic inter-relationship between passenger and freight transport, the principles of engineering for the system integration of vehicles and facilities and the utilisation of capacities in logistics and traffic facilities.

Extremely high importance is attached to practical relevance and international exchanges. In addition to practical and research exercises, in the project modules you will work on current issues facing our business partners. Once you graduate, you will have deep knowledge of the overall transportation system and its key stakeholders. As a result, you will be qualified to undertake demanding tasks in the areas of mobility and logistics, and also issues relating to lowering CO₂ emissions in traffic.

Individual specialisation opportunities

In your final year of study, you will deepen your specialist knowledge with optional modules, allowing you to create an individualised profile:

- Logistics (1+2)
- Transport Engineering (1+2)
- Modelling & Simulation (1+2)
- Mobility Data (Mining+Analytics)
- Enterprise Resource Planning
- Surveys & Random Sampling
- Control Engineering & Customer Information
- Network Development

Thanks to the university’s close collaboration with industry, authorities and organisations, the Transportation Systems degree programme is continually adjusted in terms of content to the needs in professional practice. The curriculum is oriented equally towards the current and the future needs of the transportation industry. The interdisciplinary approach, together with the individualised profile, offers you access to a broad range of career opportunities. Graduates of the degree programme devise creative traffic solutions in planning offices, develop timetables and services for transport companies, or maintain vehicle fleets and infrastructure facilities for logistics providers.
Engineering and Management

The Engineering and Management degree programme will appeal to anyone with a keen interest in both engineering and business-related issues. A modern engineer’s profile offers excellent career prospects in all industry and service sectors. Industrial engineers analyse and optimise business processes, design products and services in customer-oriented ways and deploy resources expeditiously and efficiently.

During your studies, you will determine your priorities and specialise in one of the following three areas:

Specialisation in Industrial Engineering

**Your career** As an industrial engineer, you will design, plan and implement operating procedures within companies. At the interface of management, development and distribution, you will ensure operational implementation of corporate objectives and planning guidelines. Interesting career opportunities will be open to you in the areas of production planning, supply chain management, quality management, logistics, transport and consulting.

**Your expertise** You will acquire comprehensive specialist knowledge in business process management, operations management, operations research, project and quality management, computer science and quantitative modelling.

Specialisation in Business Mathematics

**Your career** Banks, insurance providers and service companies all use mathematical and statistical methods to analyse, model and optimise products and business processes in specific market environments. Typical tasks include optimising investments, calculating risks and creating customer profiles. In addition, you will determine market requirements and predict future trends. As a sought-after expert, challenging roles await you in finance and insurance, retail, customer and market research, management consulting and public administration.

**Your expertise** This programme, the only one of its kind in Switzerland, combines mathematics, computer science and economics. You will become a specialist in mathematics-based financial analysis, database management, data analysis, statistics and data mining.

Specialisation in Data and Service Engineering

**Your career** Your tasks will include designing services in line with customer requirements. At the interface of management, employees and customers, you will ensure that people, communication tools and IT systems are deployed in an optimal manner. You will find career challenges in the areas of customer and market research, IT- and web-based services, the health sector and management consulting.

**Your expertise** In particular, you will acquire specialist knowledge in the areas of business administration, operations management, operations research, service engineering, data management and data analysis.
Master of Science in Engineering

Following completion of their Bachelor’s degree, top graduates are able to immediately continue their studies and obtain a Master of Science in Engineering. This consecutive Master’s degree programme enables students to specialise in one of seven disciplines and prepares them for management positions in technical environments.

The Master of Science in Engineering (MSE) was developed in collaboration with all universities of applied sciences in Switzerland. Only the top 35 percent of all Bachelor-level graduates qualify to pursue studies to obtain a Master's degree. The ZHAW School of Engineering offers specialisations in Energy and Environment, Business Engineering and Production, Information and Communication Technologies, Industrial Technologies, Civil Engineering and Building Technology, as well as Spatial Development and Landscape Architecture.

The MSE is strongly practice-oriented. Thanks to the ability to plan studies individually, you will be able to deepen your specialist knowledge in accordance with your personal interests and your career aspirations. For this purpose, you will work on specific industry projects in one of our institutes and centres. During your studies, you will enhance your basic training and broaden your basic knowledge of mathematics and the natural sciences. We will also prepare you for management tasks and team leader positions.

The Master's degree comprises 90 ECTS points. Upon graduation, you will be awarded the title of Master of Science ZFH in Engineering with Specialisation in (description of specialisation). You may complete the MSE programme on a full-time or a part-time basis, starting either in autumn or spring.
The campus

One of the many attractions of the ZHAW School of Engineering is its central location in the heart of the city. The campus directly borders the city centre in both the Winterthur and Zurich locations and is only a few minutes away from the railway station.

**Modern infrastructure** We offer extremely well-equipped laboratories, a library, a modern IT infrastructure and hotspots with a wireless LAN connection.

**Affordable food and drink** A canteen is located on the School of Engineering campus, offering food and drink at low prices.

**Accommodation** The SWOWI (Studentischer Wohnraum Winterthur) is responsible for arranging accommodation grants and accommodation in ZHAW student housing in Winterthur.

**Sports activities** A wide range of sporting activities and facilities are available free of charge. Special courses in sailing, golf and snowkiting are also available at affordable rates. The sports programme is coordinated by the ASVZ (Academic Sports Association Zurich).

**Music, entertainment and leisure** Being a student is not just about learning. Winterthur and Zurich offer many ways to relax, including bars, music clubs, theatres, sports clubs and museums. And at the ZHAW itself, you will find the alpha-cappella choir as well as a theatre group.

**VSZHAW** The student union VSZHAW operates its own shop for study materials and laptops, and its website offers a jobs section and a book exchange.

**ALUMNI ZHAW Engineering & Architecture** Your alumni offers active networking and will represent your interests after graduation, for example, in legal matters or when seeking employment.

*Note:* The Computer Science degree programme will be held at the Zurich location.