Zurich University
of Applied Sciences

School of Engineering

Study – an overview

Studying at the ZHAW School of Engineering is attractive, practice-oriented and provides an ideal platform for a successful career as an engineer.

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Study

1'300 students cannot be wrong: studying at the ZHAW Zurich University of Applied Sciences School of Engineering is attractive, theoretical and practice-oriented. With seven Bachelor's degree programmes and a Master of Science 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, mechatronics, transportation and renewable energy generation. Engineers are responsible for developing and implementing innovations, and their extensive expertise makes them much 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 – experienced and innovative

The ZHAW School of Engineering (SoE) has a long and rich tradition like no other engineering school: The «Technikum Winterthur», as it was formerly known, was founded back in 1874 and is the oldest technical university in Switzerland – a tradition that we live up to today: with 15 institutes and centres of excellence, the SoE guarantees a high standard of education, research and development and service. The SoE is well-known and enjoys an excellent reputation throughout industry and commerce, i.e. your future work arena.

Wide range of programmes The SoE offers a broad choice of Bachelor's degree programmes and specialisations, some of which are not offered by any other institution in Switzerland:

- Aviation (Operation & Management, Technics & Engineering)
- Electrical Engineering
  (Energy Systems, Information Technology)
- Mechanical Design and Engineering
  (General Mechanical Design and Engineering, Mechanical Engineering Informatics, Materials and Process Engineering)
- Computer Science
- Systems Engineering
  (Mechatronics, Biomedical Engineering)
- Transport Systems
- Engineering and Management (Industrial Engineering, Service Engineering and Marketing, 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.

And should you get the urge to continue your education after a few years of working, we offer a comprehensive selection of advanced programmes and professional development courses.

What is a Bachelor's degree? With a Bachelor's degree, students at universities in Europe gain an internationally recognised academic qualification that qualifies them for a career. Full-time study leads to the Bachelor of Science after six semesters.

The Bachelor's degree programme comprises a total of 180 ECTS credits. ECTS is the «European Credits Transfer System», which enables the performance of students to be compared on an international level. Approximately 30 hours of study (including self-study) corresponds to one ECTS credit point.

Programme structure Each degree programme is divided into compulsory and optional study units (modules). Modules can be combined with ones from different degree programmes, offering you a greater choice and allowing you to build up a personal profile. The programme directors will be happy to provide you with specific 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 continue to the main study period, where the programme will focus on a particular area of specialisation. During the final year of your studies, you will write a Bachelor's thesis.

Upon graduating, 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. One of the main objectives of the Bachelor's degree programme is to create generalists who have a sound understanding of engineering. The programme emphasises independence, creativity, logical reasoning and linguistic competence. In short, we are looking for committed students who expect a high standard of education.

During the programme, you will acquire the following competences:

Professional competence You understand the specialist subject matter and can transfer new findings from engineering sciences into your professional sphere. You are able to address cultural, political and social issues in a competent manner and express yourself in a clear and convincing way.

Methodological competence You can detect and analyse problems and approach them systematically, taking into account technical and economic aspects. You can tackle complex problems independently or in teams.

Social competence You are competent in the area of social interaction and possess essential qualities such as cooperativeness, a capacity for teamwork, leadership abilities and communication skills.

Personal competence You will work on a variety of topics that promote independence, flexibility, resilience, learning ability and structured thinking. You will also learn how to enhance your knowledge independently.

As a systematic means of promoting social and personal competence, the SoE has launched the project Non-Technical Skills for Engineers (NoTechS).

Practice-oriented studies We will teach you the theoretical and technical knowledge required for your day-to-day work and will 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 these projects, since the research results are constantly integrated into the curriculum. You will be involved in solving practical tasks throughout the entire programme. While working on various projects and on your Bachelor thesis, you will tackle current issues and problems in close collaboration with companies.

Combining work and study All programmes can be completed on a part-time basis, provided that you work less than 24 hours per week. During a minimum of eight semesters, you will study on three consecutive days (including Saturday). Preferably, your work will be related to the chosen degree programme, as this would allow you to combine a portion of the practical work with your job, thereby acquiring up to 30 credits.

International Are you interested in studying at a university abroad for a semester or for a full academic year? And maybe even writing your Bachelor's thesis there? The SoE has been promoting national and international student exchanges with other universities for many years and is constantly striving to build new relationships with relevant partner institutions, especially within the context of the ERASMUS programme.

Studying at the ZHAW School of Engineering is subject to certain criteria. This section contains important information about entry requirements, our admissions procedure and our study calendar and infrastructure.

Admission and entry
Entry without examination No examination is required for holders of any of the following:

- A federally recognised technical (or relevant commercial) professional baccalaureate (Berufsmatura) combined with a completed apprenticeship in an area related to the chosen degree programme
- Cantonal or federal Swiss baccalaureate (Matura) and at least one year's professional experience in an area related to the chosen degree programme
- Diploma in a technical field from a recognised technical college
- Professional qualification in a technical field in each individual case, the SoE will decide whether additional qualifications in mathematics and physics must be acquired beforehand.

Entrance examination Graduates from different training disciplines will usually be required to pass an entrance examination. The programme director will decide as appropriate in each instance. The registration deadline for the examination is 31 March. The examination is usually held at the end of May / beginning of June.

We recommend that you attend the preparation course in advance of the examination. More information can be obtained from the Academic Office of the SoE.

Admission with foreign diploma Applicants with a foreign diploma must provide additional documentation and prove adequate German language skills. More information can be obtained from the Academic Office of the SoE.

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

Examinations Students undergo a performance assessment for each module attended, which forms the basis for awarding grades and credit points. Students must pass all modules during this phase in order to progress to the main study period. A Bachelor's thesis must be completed during the final semester.

Fees Different fees are payable both before and during study, including the matriculation fee and the tuition fees.

Registration Registrations should be submitted to the Academic Office (in writing) by 30 April. Registration forms will be available from December onwards, either from the Academic Office or on our website.

Advice centres For issues relating to study, grants and discrimination, or in crisis or conflict situations, a team of advisers and counsellors is available free of charge in the ZHAW's different advice centres.

Aviation

Day after day, a wide variety of professions work together to ensure safe and smooth flight operations: 24 hours a day, seven days a week. The Aviation programme offers a generalist, interdisciplinary qualification that will enable you to maintain a constant overview of the varied and highly complex area of aviation.

Aviation is a wide-ranging industry, dominated by technology. In your first year of study, you will therefore learn the principles of engineering, including mathematics and physics. From your second year onwards, you will have the opportunity to participate in interesting and exciting projects as part of your studies: during the aviation internship, you will work independently on developing concepts for test flights – and will even play a part in implementing them! Or you can discover the world «virtually» with the research simulator – without actually ever leaving the ground.

After the fourth semester, you will have the opportunity to complete an internship in the aviation industry during the semester break, which will allow you to make your first professional experience in aviation. In the final year of study, you will combine your theoretical knowledge with your practical skills while undertaking project work and writing your Bachelor's thesis, and you will prove your expertise by working together with industry partners.

Links with other universities abroad will offer you the chance to work on projects together or to take part in a student exchange programme. Our Aviation degree programme offers you a high level of practical relevance and is oriented towards the requirements of the aviation industry. Two specialisations are available:

Specialisation in Operation & Management

Your career You can expect exciting assignments at airports (e.g. in airport and security management), with airlines (e.g. in operational engineering, training or network management) and in the air force (e.g. as a pilot or in the operations control).

Your expertise You will specialise in an operational function, such as airline operations, at airports, in air traffic control or national authorities. The Operation & Management specialisation can be combined with a licence course for commercial pilots or air traffic controllers.

Specialisation in Technics & Engineering

Your career Career opportunities will present themselves with manufacturers and maintenance companies in areas such as type certification and maintenance, servicing, repair work and solutions development. Other opportunities will open up to you in the fields of Aeronautical Information Management (AIM) and air traffic control technology.

Your expertise You will specialise in a technical area, such as aircraft maintenance, system engineering or aircraft type certification.

Electrical Engineering

Electrical engineering is a fascinating and varied field. It requires highly qualified electrical engineers who are able to develop optimal solutions to technically challenging problems. Electrical engineering offers a wide variety of attractive careers, including in the areas of microelectronics, micro controllers, embedded systems, automation, control technology, circuit design, signal processing, electronics, energy generation, communication engineering, mobile communications and optics.

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 competences. The forward-looking subject of «Renewable Energies» was recently introduced as a new focus area.

The SoE's Electrical Engineering degree programme provides everything you need for a successful career as an electrical engineer and opens up a broad spectrum of specialisations and career opportunities. You will contribute towards technological progress in a diverse range of companies (including international ones). In addition, the acquired technical knowledge will offer a platform for self-employment and will enable you to introduce your own innovations.

You can choose one of two specialisations, depending on your interests:

Specialisation in Energy Systems

Your career You will develop and plan products, equipment and systems across the entire spectrum of power and energy flows, from the smallest to the largest. You will also be responsible for putting them into service and maintaining them. As a technically competent teamplayer in many different areas, you will make a direct contribution towards the success of our economy.

Your expertise During your specialised studies, you will acquire technical knowledge from courses such as Renewable Energies, Power Electronics, Drive Technology, Control Technology and Automation. These courses may be supplemented with ones from the Information Technology specialisation.

Specialisation in Information Technology

Your career Electrical engineering is characterised by fascinating and multifaceted areas of work. Electrical engineers specialising in Information Technology will, for instance, develop sensor circuits for monitoring our environment, hardware and software for introducing modern entertainment technology onto the market (e.g. digital cameras, DAB receivers), and new types of industrial measurement and control technology in proven Swiss quality.

Your expertise During your specialised studies, you can choose from the following courses: Microelectronics, Embedded Systems, Process Architectures, Communication Engineering and Mobile Communication, High Frequency Technology and Applied Optics. These courses may be supplemented with others from the Energy Systems specialisation.

Computer Science

Computer science is changing at a rapid pace and requires a high degree of logical reasoning, creativity and team communication skills. There is a great demand for resourceful engineers who, thanks to their solid grasp of known technical principles, are able to develop innovative solutions independently.

The degree programme will provide you with a solid understanding of software, communications and computer technology, as well as imparting mathematical, scientific and business-related knowledge. As a whole, you will receive a solid, theoretical and practice-oriented education that will prepare you optimally for a range of interesting and demanding tasks in the areas of software development, project management and ICT management. Three focus areas are available to you during your specialised studies:

Focus area Embedded Systems

Your career This focus area is aimed at computer scientists and electronics engineers who wish to work in the fast-growing field of software systems and sensor technology. Working in this area, you may be involved in designing regulatory systems for more efficient energy use, developing control systems for traffic and power stations or building control applications, robots and manufacturing equipment.

Your expertise You will complete courses such as Embedded Software Engineering, Applied Optics, Mobile Communication, Network and Driver Programming. These courses may be supplemented with ones from other focus areas.

Focus area Service Engineering

Your career Computer scientists develop and implement innovative business ideas in commercial and social areas. Examples include Google, Facebook and Amazon. If you are interested in designing services or business and organisation processes in the area of IT, this is the ideal focus area for you. Engineers working in this field can, for instance, develop intuitive user interfaces, create new e-commerce services, organise IT departments and design user-friendly services, including for special needs (e.g. websites for the visually impaired).

Your expertise You will attend courses such as Infrastructure Management, Service Engineering, Data Warehouse and Information Engineering, which you can supplement with courses from other focus areas.

Focus area Software Engineering

Your career Software Engineering is aimed primarily at developers of software and communications technology. Engineers working in this field will, for instance, design networks and communication equipment, enhance and integrate software applications, plan the architecture of complex IT systems, and programme simulations, animations and games.

Your expertise You will acquire specialist knowledge during courses such as Advanced Software Engineering, Distributed Systems, Internet Security and Enterprise Applications. These courses can be supplemented with ones from other focus areas.

Mechanical Design and 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. You will decide on your area of specialisation at the start of the programme, selecting one of the following three:

Specialisation in General Mechanical Design and Engineering

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 use in manufacturing and production. Your tests, measurements and simulations will lead you towards new efficient and energy-saving processes.

Your expertise You will acquire mathematical and scientific knowledge, along with technical knowledge in materials engineering, mechanics, product development, CAD, hydro- and thermodynamics and measurement and control technology. You can specialise by selecting two of the five focus areas: Integrated Development and Production, Lightweight Construction Engineering, Energy and Process Engineering, System and Automation Engineering, and Biomechanical Engineering.

Specialisation in Mechanical Engineering Informatics

Your career As a computer scientist in the field of mechanical engineering, you will use your engineering knowledge of equipment and products to plan and deploy the latest informatics tools in an optimal way, including in areas such as product development and production. You will develop calculation programs, use complex simulation tools in a competent manner and apply the latest measurement methods.

Your expertise You will learn the fundamentals of mathematics and natural sciences, and will become familiar with the technical principles of mechanical engineering and informatics, including mechanics, CAD, measurement and control technology, databases and operating systems. In addition, you will configure and maintain networked IT systems.

Specialisation in Materials and Process Engineering

Your career You will be a highly sought-after expert in the most important areas of the machinery and chemical industries. You will select raw materials and develop these materials and coatings, thereby boosting the areas of micro- and nanoengineering and biomedical, energy and solar engineering. You will simulate and design environmentally friendly processes for producing new raw materials.

Your expertise In addition to acquiring mathematical and scientific knowledge, you will become familiar with the principles of process engineering, product development and hydro- and thermodynamics. You will solve practical tasks by directly applying your broad knowledge of plastics, metals, ceramics, biocompatible materials, nanomaterials, composite materials and coatings.

Systems Engineering

Biomedical engineering and mechatronics are two innovative areas of systems engineering, a new engineering discipline that is rapidly gaining in importance. Systems engineering is based on the growing complexity of modern technical products that combine mechanical, electronic and software-technical components. Upon graduating from the programme, you will be an expert with a broad understanding of the field and will be able to develop solutions to challenging tasks in areas such as robotics, biomedical engineering and automation engineering.

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

Specialisation in Mechatronics

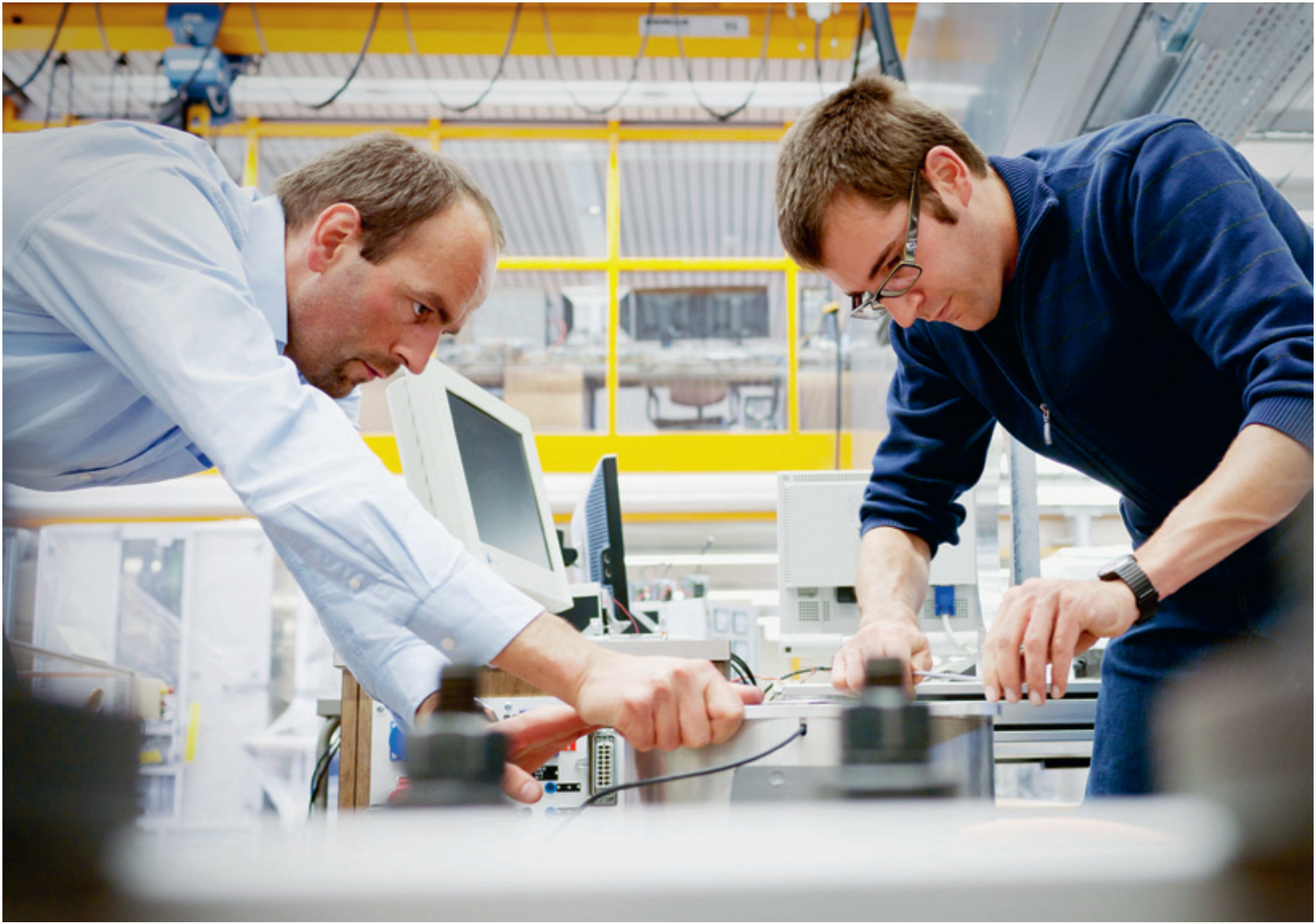
Your career A specialisation in Mechatronics will open up interesting career opportunities with high-tech companies, in areas such as sensor and actuator technology, control engineering and robotics. One of your main tasks will be to develop mechatronic products. You will understand how to evolve products from an idea into a prototype and into a final product. You will be involved in many challenging project management tasks in areas such as development, simulation, commissioning, manufacturing, maintenance, marketing, consulting and training.

Your expertise After your comprehensive basic training, you will enhance your knowledge in various specialist areas, especially that of 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 the development of technical medical products. 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.



Transport Systems

Switzerland has very dense rail and road networks. Transalpine freight traffic, agglomeration traffic and public transport continue to grow, presenting a constant stream of new challenges for all those affected. As a result, there is a great demand for highly qualified experts who can offer and implement sustainable solutions. The Transport Systems degree programme produces these engineers by addressing the transportation system in its entirety.

Graduates of the Transport Systems degree programme will be sought-after generalists who have an eye for the feasible as well as specific knowledge of interrelationships and interfaces. You will acquire subject-specific knowledge and become familiar with the fundamentals of mathematics and the natural sciences.

You will also develop an understanding of the economic interrelationship 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.

Emphasis is placed on practical relevance. You will find solutions to topical problems and apply your knowledge during project management and quality management activities. You will know the overall transportation system and its most important exponents based on your own practical experience. Furthermore, you will be appropriately qualified to take on demanding tasks such as deploying different modes of transport in sensible ways, with the objective of reducing CO_2 emissions and reacting to climate change.

The Transport Systems degree programme is unique and was created in close collaboration with the industry, authorities and relevant bodies.

Specialisation in Engineering

Your career Engineers specialising in this area will have the opportunity to work on a variety of exciting tasks: you will develop foundations and variants in engineering companies, support the planning process in planning offices, and maintain vehicle fleets and infrastructure for logistics providers. In addition, you will regulate standards, approvals and commissionings for official bodies.

Your expertise The Engineering specialisation teaches technical knowledge on subjects such as vehicle systems, vehicle engineering, certification, commissioning, traffic engineering, safety and control technology, signalling, handling equipment and logistics.

Specialisation in Transport Management

Your career As a transport systems engineer specialising in this area, you will be involved in a wide variety of tasks: you will support planning processes in planning offices, develop timetables and services for transport companies, and maintain vehicle fleets and infrastructure for logistics providers. You will also be in a position to assume managerial duties shortly after graduating.

Your expertise This specialisation focuses on areas such as operating and logistics processes, safety engineering, operational safety, risk management, information and communications systems, traffic management and telematics.

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 appropriately and efficiently.

During your studies, you will 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 that corporate objectives and planning guidelines are implemented in an operational sense. Interesting career paths will open up 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 risk and creating customer profiles. In addition, you will determine market requirements and predict future trends. As a sought-after expert, challenging tasks await you in finance and insurance, in retail, in customer and market research, in management consulting, and in 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 Service Engineering and Marketing

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, processes communications tools and IT systems are deployed in an optimal way. Career opportunities will present themselves in 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 process management, operations management, operations research, service engineering, data management, data analysis and marketing.

Master of Science in Engineering

Outstanding and ambitious Bachelor-level graduates may continue their studies directly with the Master of Science in Engineering. This consecutive Master's degree programme enables students to specialise in a specific subject and prepares them for management roles in technical areas.

The Master of Science in Engineering (MSE) was developed in collaboration with all universities of applied sciences in Switzerland. The degree enhances our range of academic programmes, while at the same time offering students a more advanced level of university education. The SoE offers specialisations in Energy and Environment, Business Engineering, Information and Communication Technology, and Industrial Technologies.

The programme has a high degree of practical relevance; you will work on specific industry projects in one of our institutes and centres. Furthermore, it will serve as an extension to your basic training and will develop your existing knowledge of mathematics and the natural sciences. It will also prepare you for management 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.

Modern infrastructure
Inexpensive food and drink
Accommodation
Sporting activities
Music, entertainment and leisure
VSZHAW
ALUMNI ZHAW
Engineering & Architecture

Campus

One of the many attractions of the ZHAW School of Engineering is its central location in the heart of the city. The campus borders the Winterthur old town and is only a ten-minute walk from the train station. Zurich, St. Gallen and places further away are reached easily by regional and intercity trains.

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

Inexpensive food and drink A canteen is located on the SoE campus, offering food and drink at low prices.

Accommodation The SWOWi (Studentischer Wohnraum Winterthur) is responsible for arranging accommodation in the ZHAW student houses in Winterthur and for organising accommodation grants.

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

Music, entertainment and leisure Winterthur offers many ways to let your hair down, including the Lounge Bar, the theatre, the sports clubs and the Photo Museum. And in the ZHAW itself, you will find the «alpha-cappella» choir.

VSZHAW The students' union VSZHAW operates its own shop for study materials and laptops, and its website offers a job section and a book exchange.

ALUMNI ZHAW Engineering & Architecture Your alumni offers active networking and will represent your interests after graduation. You can join the alumni in your third year of study.

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of Applied Sciences

School of Engineering

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