

Study

Master of Science in Engineering

Smart

Discover new career opportunities with a Master's in Engineering

Practical

Apply your specialised knowledge in industry projects

Individual

Structure your studies individually at an institute or centre

Diverse, fascinating and individual

With the Master of Science in Engineering (MSE), you show that you want more: a study programme tailored to your personal interests or a specific career goal. In addition to in-depth, specialised knowledge, the Master's degree programme equips you with essential management skills for your professional future.



Master's thesis

Avalanche monitoring systems of the future will be located under the snow

Early warning of an avalanche can prevent damage to property and even save lives, which is why many mountain regions have radar systems to monitor the conditions. As part of his Master's thesis, Basil Brunner developed a new, practical measurement method for determining snow depth.

During the winter, mountain regions time and again bear witness to avalanches that can cause serious personal injuries as well as damage to the surroundings and property. A lack of measurement data on exposed slopes often results in inaccurate avalanche risk assessments. In contrast to existing radar systems that measure the composition of the snow cover and the snow depth from above, the new upward-looking UWB radar is

buried in the ground. For his measurement device, ZHAW graduate Basil Brunner worked with an ultra-wideband (UWB) impulse radar, which is normally used for monitoring the vital functions of human beings. The new measurement method offers several benefits. The UWB radar modules are inexpensive and require little energy, meaning that battery operation can be guaranteed over an entire winter. And instead of having to erect heavy and large measurement masts, the upward-looking UWB radar is buried in the ground. This simplifies the installation process and prevents the modules from icing up, while also protecting them against gale-force winds and rockfall. In the event of an avalanche, the snow cannot carry the device along with it, meaning that data can continue to be recorded after an avalanche has taken place.



Baton Shala identified and assessed more than 100 economic smart city applications.

Master's thesis

Business models for smart cities

In his Master's thesis, Baton Shala investigated and assessed a large number of potential smart city applications. Together with experts, he developed specific business cases for companies and municipalities.

As part of his in-depth research, Baton Shala identified more than 100 economic smart city applications and developed them using expert surveys and an ideation workshop. Together with the experts, he came to the conclusion that different applications such as smart waste management, co-working spaces, city messaging systems, hackathons and apps for renting parking spaces are easy to implement and, at the same time, relevant for smart cities. The objective of his work was to assess the applications according to economic

criteria and to develop them in a way that simplifies their implementation. The applications did not have to be innovative for the whole world. Some could also simply be new for a specific market or a particular company. His Master's thesis not only gained him recognition at the Swiss Green Economy Symposium 2019, but also opened the door for the next step on his career path. On the basis of his outstanding Master's thesis and the knowledge he acquired, Baton Shala was offered a position at the AWK Group in Zurich, where he now works as a consultant on projects in the areas of smart mobility and smart cities.



Graduate profile

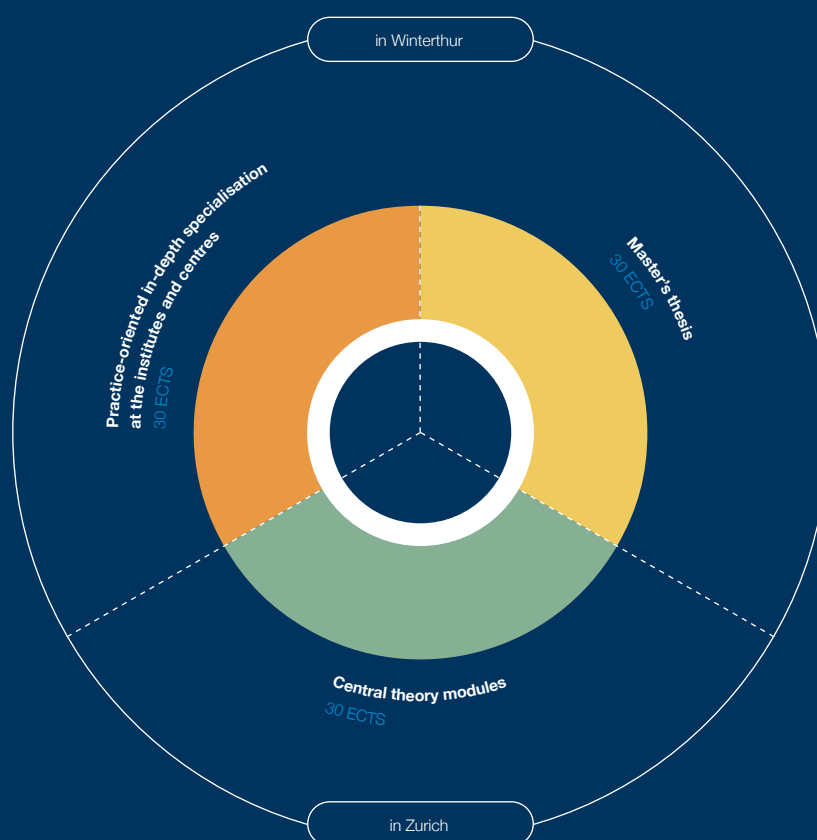
Take off with a Master of Science in Engineering

Becoming an aviation engineer is the dream of many aspiring technical students. Dominic Thaler made his dream a reality, and today works on the development of electric aircraft. A Master's degree from the ZHAW School of Engineering was a major stepping stone on his career path.

Dominic Thaler works in a profession that many engineers dream of. He develops vertical take-off electric aircraft — air taxis, so to speak. He is a development engineer at Aurora Swiss Aerospace, where a new prototype is developed almost every year. From the concept draft on to a detailed design up to the first time the aircraft leaves the ground — the MSE graduate is involved throughout the entire development process. At the very outset of his career, Dominic Thaler decided to train as a watchmaker, but he also wanted to let his creativity run free and invent something new. He was able to realise his ambition thanks to the Mechanical Engineering degree programme at the ZHAW School of Engineering. During his Bachelor's degree programme, he already began focussing on the topic of lightweight construction. To delve more deeply into the subject, he then pursued a Master of Science in Engineering at the ZHAW. He completed his Master's studies as part of a double degree programme split between Switzerland and Washington State University in the US. Upon finishing his studies in 2018, Dominic Thaler was awarded two Master's diplomas. The content of the study programme and the experience he gained abroad both benefit him today in his international workplace.

Full- and part-time study programme

The Master's degree programme may be completed both on a full-time basis, with a study duration of three semesters, or on a part-time basis, with a study duration of four to six semesters. There is also the option of taking on a part-time (50%) position as an assistant at one of the institutes or centres.



Fields of specialisation

Your specialisation in the spotlight

In addition to practical skills, the Master's degree programme provides theoretical and contextual knowledge. The core of the programme is, however, your specialisation at the selected institute or centre. This provides you with the opportunity to deepen and experiment with your newly acquired specialised knowledge as part of actual industry projects in the area of applied research and development.

Our Master of Science in Engineering study programmes

The 14 institutes and centres at the ZHAW School of Engineering offer the following profiles as part of your MSE specialisation.



Aviation

The increasing demand for global mobility and the introduction of new technologies are presenting novel challenges in the aviation sector. The MSE in Aviation tackles these challenges by providing in-depth training in the fields of 'maintenance, repair and overhaul', 'aviation infrastructure operations' and 'unmanned aviation'.



Civil Engineering

The MSE in Civil Engineering provides civil engineers with the relevant skills for planning, designing and implementing a broad range of building structures. The programme provides participants with the ability to realise sustainable and efficient designs of buildings, bridges, railway lines or waterways.



Data Science

Graduates of the MSE in Data Science design, develop and implement various data products or data pipelines for companies and public institutions. The study programme focusses on data collection, analysis and processing, machine learning and deep learning as well as on the development of data products.



Business Engineering

The MSE in Business Engineering prepares students for a future in industrial and services companies or in consulting, where they will take on responsibility in business development and business engineering as well as quality, risk, technology and innovation management.



Computer Science

The ongoing digitalisation demands well-trained specialists. Graduates of the MSE in Computer Science can actively contribute to shaping developments in this area. From the research and development of innovative applications to the organisation of data and aspects of cyber security — a wide range of subjects are covered.



Electrical Engineering

From spectrometers to electric cars — the MSE in Electrical Engineering prepares students to be a part in the development of a large number of products. The study programme covers a wide range of subjects, including signal processing, power electronics and embedded systems.

| | Aviation | Business Engineering | Civil Engineering | Computer Science | Data Science | Electrical Engineering | Energy and Environment | Information and Cyber Security | Mechanical Engineering | Mechatronics and Automation | Medical Engineering | Photonics and Laser Engineering |
|------|----------|----------------------|-------------------|------------------|--------------|------------------------|------------------------|--------------------------------|------------------------|-----------------------------|---------------------|---------------------------------|
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| ZAV | • | • | | | | | | | | | | |

The table shows which institute or centre of the ZHAW School of Engineering offers the individual profiles.



‘In addition to the new knowledge I acquired in the Master’s degree programme, I also enjoyed the group work with students from other subjects. It broadened my horizons and prepared me well for my current interdisciplinary role.’

Martina Hauri
Mobility Incubator Project Manager



‘I wanted to go into even more detail and understand the background. That’s why I opted for the Master’s degree programme.’

Dominic Thaler
Structures Design Engineer



‘Specialist knowledge is the foundation. For me, the project management experience I gained during the industry projects at my institute was also especially worthwhile.’

Mathias Bleibler
Head of Process Engineering



Energy and Environment

The MSE in Energy and Environment explores issues relating to traditional and sustainable energy generation, storage and conversion as well as energy distribution and demand-side management. In addition to the efficient use of natural resources and environmental protection, the study programme addresses the general technical, legal and economic conditions as well as the topic of social acceptance.



Mechanical Engineering

The MSE in Mechanical Engineering covers all activities relating to the development, production, use and optimisation of machinery, materials, equipment and products in industry, research technology and regulatory contexts.



Medical Engineering

The MSE in Medical Engineering covers current topics in health sciences and medical technology, such as biomedical technology and digital health as well as medical diagnostics and devices. The focus is on clinical and industrial requirements and the development, optimisation and application of engineering solutions.



Information and Cyber Security

The importance of Information and Cyber Security in industry, business, government and society is increasing. With the Information and Cyber Security degree, graduates can design, build and manage innovative security systems. They consider the requirements from relevant stakeholders as well as regulatory issues.



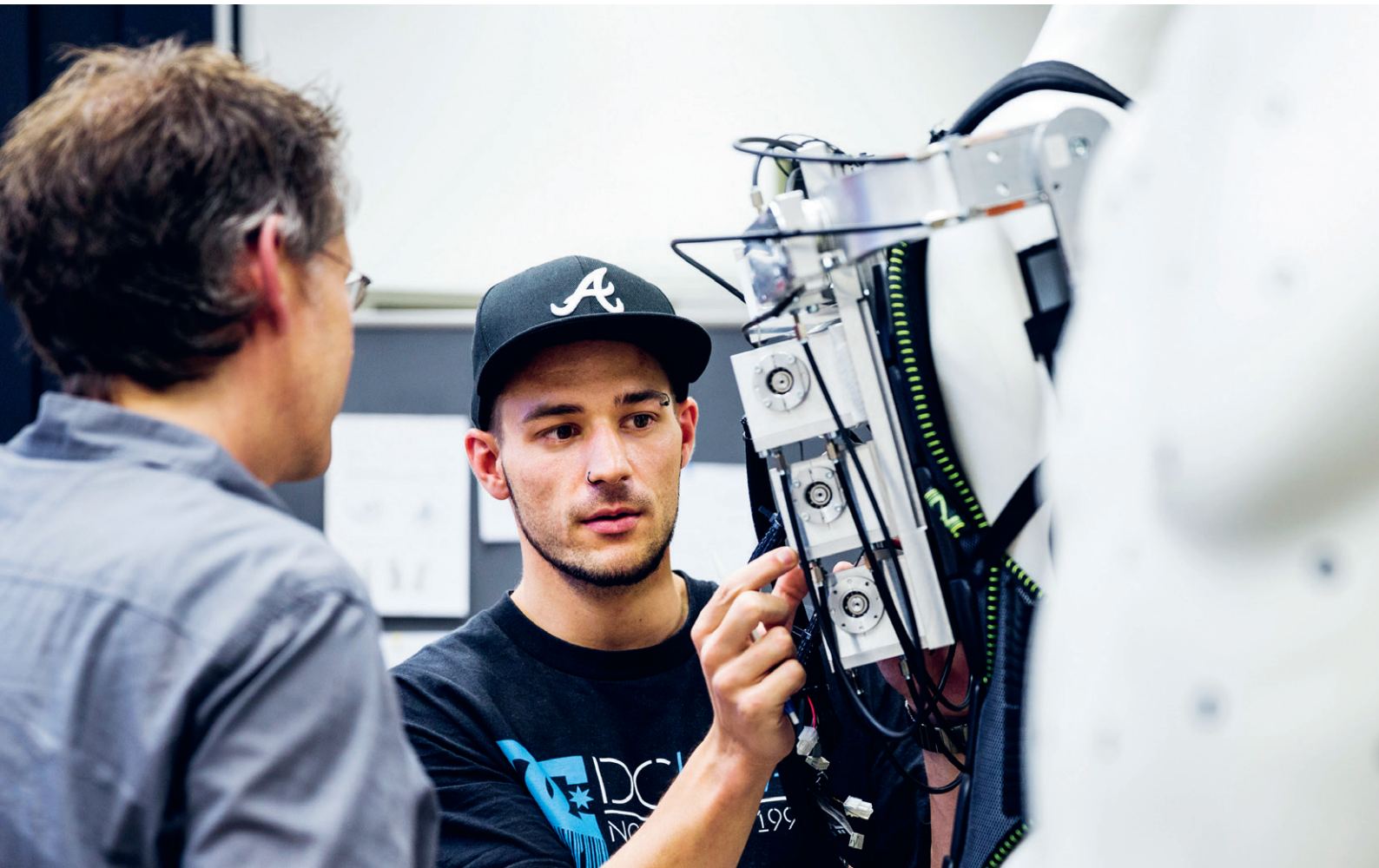
Mechatronics and Automation

The MSE in Mechatronics and Automation explores the design of autonomous systems using sensors, data processing and actuators. As mechatronic technologies and automation are required in many different sectors, the profile teaches students systems theory, enabling them to understand complex processes.



Photonics and Laser Engineering

Graduates of the MSE in Photonics design photonic and optical systems and combine photonic components as well as light-based processes and measurement methods for industry applications. The study programme also provides participants with the ability to assess the feasibility and market significance of new systems.



The choice is yours

Before beginning your Master's degree programme, you get to choose an institute or centre with extensive expertise in your selected profile. This is where you will work on applied research and development projects. Because the institutes and centres design the programme profiles individually, your choice is decisive for the direction your studies take and should thus be well considered.

IniT

Institute of Applied Information Technology

The Institute of Applied Information Technology researches and develops smart information technologies, systems and services with the objective of ensuring that information can be used simply and securely at all times.

ICP

Institute of Computational Physics

The research activities at the Institute of Computational Physics focus on simulations. Computer models form the basis for various innovative solutions in interdisciplinary industrial applications.

IAMP

Institute of Applied Mathematics and Physics

The Institute of Applied Mathematics and Physics carries out sophisticated research and development projects in the fields of applied optics, complex systems, medical physics, biophysics, safety-critical systems and scientific computing and algorithmics.

InES

Institute of Embedded Systems

Distributed embedded systems and industrial communication solutions form the core areas of expertise at the Institute of Embedded Systems. It designs hardware and software components for networks, as well as methods and tools for the development of secure systems.

IDP

Institute of Data Analysis and Process Design

The Institute of Data Analysis and Process Design specialises in quantitative methods of statistical data analysis and machine learning, as well as in stochastic processes, mathematical optimisation and risk modelling for business applications.

IMPE

Institute of Materials and Process Engineering

The Institute of Materials and Process Engineering has extensive expertise in material sciences and process engineering, allowing it to develop innovative materials and coatings as well as processes and facilities.

IEFE

Institute of Energy Systems and Fluid Engineering

The Institute of Energy Systems and Fluid Engineering makes valuable contributions to energy-efficient systems, procedures, processes and facilities in the areas of thermal and electric energy systems and renewable energies.

IPP

Institute of Product Development and Production Technologies

The Institute of Product Development and Production Technologies specialises in innovative product development in the area of mechanical engineering — from the initial idea to the final serial product.

IMES

Institute of Mechanical Systems

The Institute of Mechanical Systems focuses on structures that must withstand high mechanical stress — from optimised components for vehicle construction and additive manufacturing of machine parts, all the way to muscles, tendons and bones in the human body.

ISC

Institute of Signal Processing and Wireless Communications

Recording, transmitting, processing and evaluating message, measurement and sensor signals — the Institute of Signal Processing and Wireless Communications develops solutions ranging from antennae and sensors to digital signal evaluation.

IMS

Institute of Mechatronic Systems

As a nationally leading institution for applied research and development in the field of mechatronics, the Institute of Mechatronic Systems specialises in innovative projects at the interface between mechanics, electronics and IT.

CAI

Centre for Artificial Intelligence

The Centre for Artificial Intelligence is a competence centre for the research and application of AI, ranging from autonomous learning systems and computer vision, perception and cognition to explainable AI and natural language processing.

INE

Institute of Sustainable Development

The Institute of Sustainable Development analyses technological, economic and social changes and their complex interactions from a sustainability perspective.

ZAV

Centre for Aviation

The Centre for Aviation is the only one of its kind in Switzerland and combines technologies, methods and fields of knowledge in order to tackle future challenges in global aviation, making the industry safer, more efficient and more sustainable.

School of Engineering

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You can find more information about the programme here:
www.zhaw.ch/en/engineering/study/masters-degree-programme



Interview

‘The broad range of institutes guarantees our students an individual and interesting study programme.’

Dr Reto Knaack

Programme Director of the Master of Science ZHAW in Engineering

What are the benefits of the Master of Science in Engineering study programme?

With its strong focus on practical training, the MSE offers advanced specialisation in a wide range of profiles — from Mechanical Engineering, Mechatronics and Computer Science to Aviation, Photonics and Medical Technology. The specialist knowledge and methodological skills gained in the Master's degree programme lead to an expansion and differentiation compared to the Bachelor's degree programme. The MSE opens up career opportunities for roles that require a Master's degree. In selected profiles, such as Data Science, it is also possible for graduates to continue studies at the doctoral level. Last but not least, the MSE is a quality label: graduates of the MSE belong to the top 35 per cent of graduates of technical universities of applied sciences.

Why should I study for the MSE at ZHAW?

With 14 institutes and centres, the ZHAW School of Engineering offers its students a wide range of specialisations and a comprehensive portfolio of industry projects in the area of applied research and development, in addition to state-of-the-art laboratories. Two thirds of the Master's degree programme are completed at the institutes or centres as part of industry projects. Thanks to its size, the ZHAW School of Engineering can provide fascinating and comprehensive degree programmes and

modern infrastructure. During the completion of their project work at the School of Engineering, MSE students receive individual and expert support from over 200 lecturers.

How does the MSE at the ZHAW differ from programmes offered by other universities of applied sciences in Switzerland?

The theoretical modules that make up the first third of the study programme are attended in Zurich together with students from other universities of applied sciences. This part of the programme is the same for all students in German-speaking Switzerland, irrespective of the university of applied sciences at which they are enrolled. The decisive difference is found in the two thirds of the curriculum dedicated to project work, which is completed at the respective university of applied sciences. The quality and size of the institutes and centres are important factors in ensuring the ability to offer an interesting project portfolio, modern infrastructure and individual support. This is where the ZHAW School of Engineering has a clear advantage.

What are my prospects after completing my studies?

Graduates have outstanding prospects in the professional world. With your Master's degree, you have an advanced qualification that is recognised and rewarded by companies. The MSE opens the door to more demanding positions, especially in the field of applied research and development. The Master's degree also provides you with the opportunity to continue your academic career.

Reto Knaack earned his doctorate in Astrophysics at ETH Zurich in 2004. While employed at UBS, he led a team of risk analysts. From 2013, he was responsible for the Computer Science degree programme of the former "Hochschule für Technik Zürich" (Zurich College of Technology). Since 2017, he has been Programme Director of the MSE at the ZHAW School of Engineering. He teaches Numerical Mathematics and Scientific Computing in Winterthur and Zurich.