Zurich University
of Applied Sciences

School of Engineering

An overview

Imprint

Text: ZHAW School of Engineering
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Print: Peter Gehring AG, Winterthur
August 2019 – 250

Prof. Dr. Dirk Wilhelm
Dean and Managing Director
ZHAW School of Engineering

The world needs capable engineers. We can educate them.

The ZHAW School of Engineering is a well-established institution in the Swiss university landscape and has been closely associated with the development of engineering in Switzerland since it was founded in 1874. The needs of society and industry have shaped the engineer's job description and given rise to new courses. Many things may have changed, but one thing has remained constant: our graduates are highly sought after on the labour market.

Thirteen institutes and centres guarantee a solid, hands-on education over eight Bachelor programmes and the Master of Science in Engineering. In cooperation with business partners and institutions they develop innovative solutions and ensure that the ZHAW School of Engineering is one of the leading Swiss universities, not only in initial and continuing education but also in the field of research and development. Practical relevance, an inter-disciplinary approach and an international dimension are just some of our strengths, benefiting students and lecturers from both Switzerland and abroad. We look forward to making contact with you.

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ZHAW School of Engineering

The ZHAW School of Engineering is a well-established institution in the Swiss university landscape. It is one of the leading Engineering Faculties in Switzerland and has been closely associated with the development of engineering in Switzerland since its foundation.

Engineering Faculty with a long tradition Established back in 1874 as the Winterthur Technical University, the ZHAW School of Engineering is a centre of education steeped in tradition. Today, it is one of eight departments of the ZHAW Zurich University of Applied Sciences. The ZHAW School of Engineering emphasises topics which will be relevant in the future. 13 institutes and centres guarantee high quality in education, research and development, as well as service provision, with a focus on the areas of energy, mobility, information and health.

The range of courses is tailored to the needs of business and provides a scientifically-based education in engineering with a strong practical element and an interdisciplinary approach.

Research and learning in Switzerland's business centre
The region of Zurich is the most densely populated in Switzerland. Many globally active companies in the industry and service sector make it Switzerland's business centre.

The main location of the ZHAW School of Engineering is in Winterthur. Switzerland's sixth-largest city is located just outside the metropolis of Zurich, where the ZHAW School of Engineering is also located.

Peter Spuhler Owner and CEO Stadler Rail Group

"The experience Stadler Rail has had with engineers from the ZHAW School of Engineering has been excellent. Only with skilled professionals is it possible for us to maintain our competitive edge in the face of international competition."

The current needs of industry and society determine the research priorities of the ZHAW School of Engineering. Innovative, research-based solutions are developed in cooperation with business partners and institutions, with 13 specialised institutes and centres collaborating in an interdisciplinary manner. Research and development accounts for over one third of the activities of the ZHAW School of Engineering.

Interdisciplinary research takes places primarily in the energy, mobility, information and health sectors. With projects encompassing everything from alternative energy transformation, the area of data science, medical technology and traffic studies to the internet of things, we make a significant contribution to future-oriented research fields.

Students also benefit from cooperation with business partners and institutions in Switzerland and abroad: they collaborate on projects and gain from the close integration of research and teaching.

Jürgen Braun Head of Technik & Engineering
ABB Robotics Switzerland

"What ZHAW School of Engineering means for me: constructive cooperation, a competent partner, flexibility and exciting ideas!"

Thomas Stanger Project Manager Siemens Mobility AG

"We developed the expertise required for this application in a multi-year collaboration with the ZHAW School of Engineering. The result is also a resounding success with our rail customers."

Sinet Project – Innovation in the rail network

Signal box malfunction is a common cause of delays and cancellations in rail transport. As a result, communication between signal box and track is more important than ever in increasing the use of tracks.

Together with Siemens Mobility AG, the Institute of Embedded Systems (InES) of the ZHAW School of Engineering has developed a network technology able to keep trains running in the event of isolated failures. Instead of point-to-point connections, the Sinet Project uses a redundant network technology. Technical installations along the track share a single cable and are linked together into a chain. The beginning and end of this chain are closed to form a circle so that redundant information can be fed into the chain from both sides.
If a link in the chain fails, the other links receive their information via a second path. Using this system along the track saves cables and hence costs with, at the same time, a lower failure rate. In addition to the savings made, this system also increases reliability.

EU project H-DisNet – heating and cooling with salt solution Across Europe, heating and cooling accounts for roughly 50 per cent of energy consumption. Improving the efficiency of heat and cooling supply systems in the future is important. In collaboration with six European partners, the ZHAW School of Engineering has developed a new technology for energy supply networks. The project, named H-DisNet, is part of the EU's Horizon 2020 research programme.

The idea: unlike conventional thermal heat supply networks such as district heating or low-temperature networks, thermo-chemical networks do not transport thermal energy as such. Instead, chemical potential – in this case, in the shape of concentrated salt solutions – is transported to the location where heat is required and used to produce useful heat or cooling. The essential advantage of this method is that no heat is lost in transport and storage. The ZHAW's Institute for Energy Systems and Fluid Engineering is currently testing the method's reliability and economic efficiency in a real-life application.

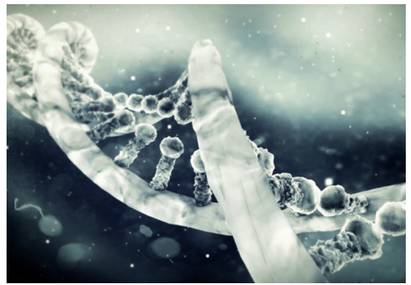
Serena Danesi Project Leader H-DisNet

"If we manage to transform thermal potential into chemical potential, many sources of waste heat can be efficiently used as heat sources, regardless of where the waste heat is produced or when heat is required elsewhere."

Kurt Stockinger Project Leader BioSODA

"The purpose of this project is not unlike translation from one language to another and the project thus enables a simpler way of communicating with vast quantities of bioinformatics data."

BioSODA project – Google function for bioinformatics databases Rapid progress in DANN sequencing is transforming life sciences into an ever more data-intensive discipline. One of the major challenges is the efficient analysis of dozens of bioinformatics databases containing vast amounts of biological knowledge. The Swiss Institute of Bioinformatics, for instance, is currently developing a systematic collection of proteins so that it can describe and better understand their properties. Proteins are responsible for most cell functions, among them the cell's structure, its internal organisation and its waste disposal system. This is why this database is an important knowledge base for biologists and medical researchers. It enables them to analyse potentially genetically determined diseases and to develop active agents. However, these types of database currently rely on technologies that require significant background knowledge in IT. The aim of BioSODA is therefore to develop a Google-type search function so that users without previous technical knowledge can run searches intuitively while fully concentrating on the scientific aspect of their research. The project is supported by the Swiss National Science Foundation's Big Data research programme.



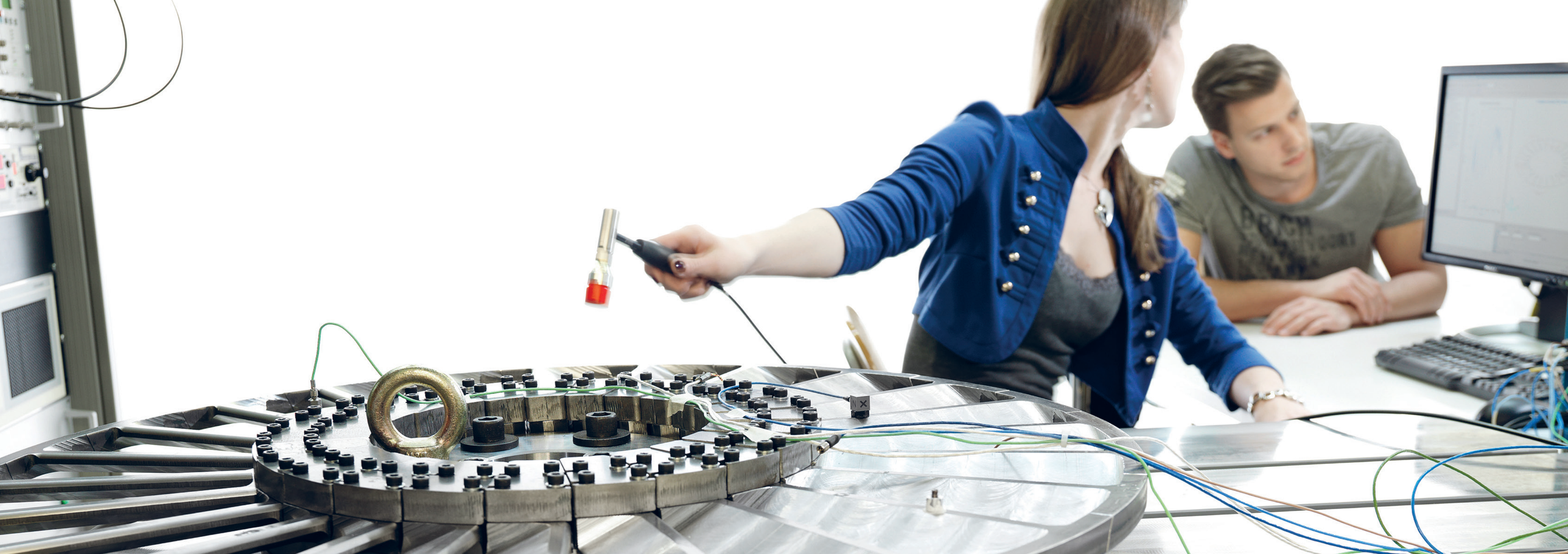
Massimo Di Pardo Senior Researcher at Centro Ricerche Fiat

“Both in terms of researching new manufacturing tool concepts and combining research activities with technical applications, the collaboration with the ZHAW has been extremely effective.”

Robo-Mate project – half human, half machine

The intelligent Robo-Mate exoskeleton has been jointly developed by twelve partners from seven European countries. This wearable, force-amplifying exoskeleton has been designed to improve working conditions in the industry sector. The EU research project has been coordinated by the ZHAW’s School of Engineering.

Robo-Mate combines human flexibility and technical strength in a versatile exoskeleton. Its main aim is to assist workers in lifting heavy items, thus potentially reducing the number of work-related accidents and illnesses. Various sensors recognise and interpret the movements of the user. Unlike previously available robot systems, Robo-Mate, with its intuitive control, can be used flexibly in various industry sectors. Robo-Mate prototypes are currently being tested in a number of field studies.



Studying at the ZHAW School of Engineering is attractive, theoretical and practice-oriented. With eight Bachelor degree programmes and the Master of Science in Engineering we provide an ideal platform for a successful career as an engineer.

The location of the ZHAW School of Engineering also offers many advantages. In Winterthur, as in Zurich, the campus borders directly on the old town and is just a few minutes away from the train station. Students benefit from extensive infrastructure with modern laboratories and equipment. ZHAW also offers a wide range of sporting activities and inexpensive dining options in the cafeteria.

Bachelor degree programmes The School of Engineering offers a wide range of Bachelor degree programmes and specialisations, some of which are not offered by any other institution in Switzerland. The range of courses is tailored to the needs of business and provides a scientifically-based education in engineering with a strong practical element and an interdisciplinary approach:

- Aviation
- Electrical Engineering
- Energy and Environmental Engineering
- Mechanical Engineering
- Computer Science
- Systems Engineering
- Transportation Systems
- Engineering and Management

Practically relevant and application-focused dissertations are an important element of the education and training offered at the ZHAW School of Engineering.

Pascal Frei Graduate in Mechanical Engineering, now Design Engineer at RUAG Space

“As a design engineer, I design modern light-weight construction mechanisms for space technology. Doing this I still constantly apply the principles of statistics, mechanics and materials science, which I first learned at the School of Engineering.”

A bachelor's thesis put into practice: Microlino

The electrically powered Microlino is set to conquer the roads. Inspired by cult model Isetta, the project first started in Winterthur. In collaboration with the two partners Designwerk and Micro Mobility Systems, eight ZHAW School of Engineering graduates developed the concept for this urban miniature vehicle. Two teams of three Mechanical Engineering students each were tasked with the development of the car's undercarriage and structure as well as the design of its body. An additional team of two Systems Engineering students concentrated on the electric drive concept. The requirements in terms of safety, design and price posed a great challenge for the three teams. In close collaboration with the partner companies, the junior engineers adapted their concept step by step until it met all the material, weight and design requirements. Simultaneously, decisions concerning the drive, the undercarriage, the electric components and the remaining components needed to be made. The resulting 3D CAD model, designed by the ZHAW students, formed the basis for the construction of a Microlino prototype.

Pascal Studerus
Graduate in Mechanical Engineering

"It appears my project convinced the right people: I was offered the position of Project Leader for the Microlino."

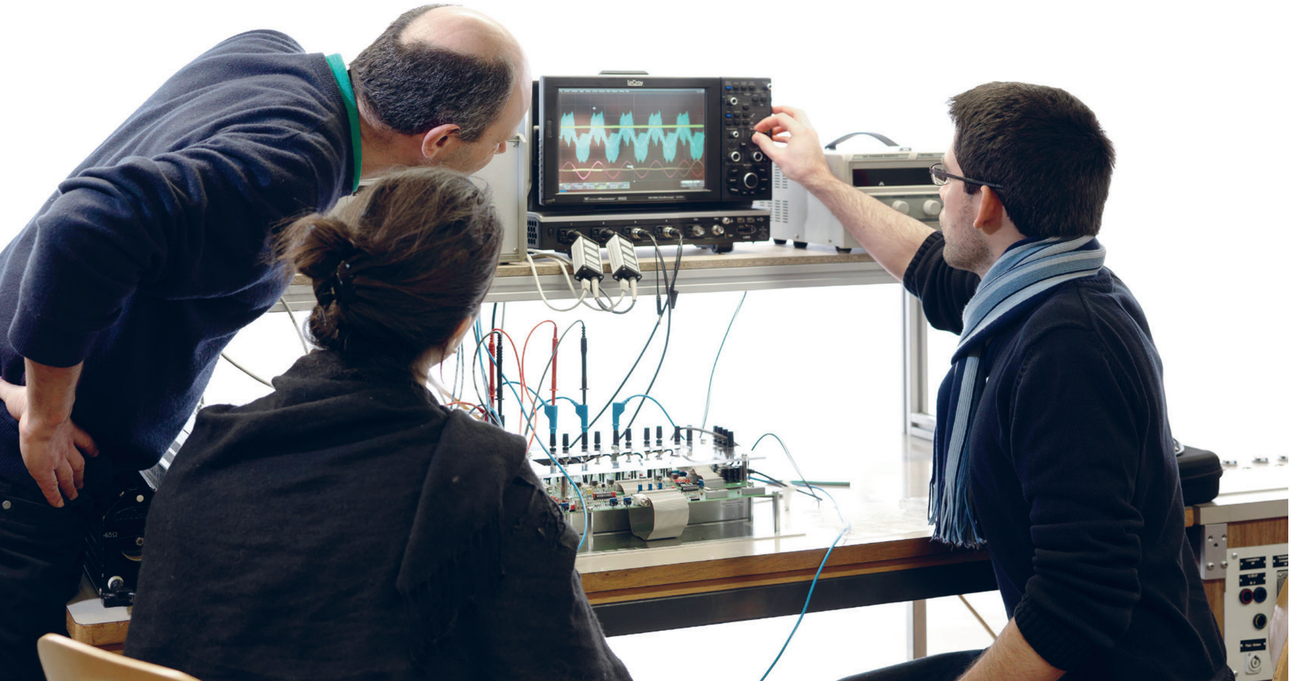
Fabian Schollenberger
Graduate of the MSc in Engineering (MSE)

"I was in charge of the entire product development. This included the construction of both the prosthetic hand and the matching bracelet required to control it."

Master's thesis: 3D-printed prosthetic hand for children

"Having to rely on a prosthetic limb as a child is a difficult situation to start with", says Fabian Schollenberger.

He believes the least we can do is to keep down the costs. In his master's thesis, he therefore developed a prosthesis for everyday use which is easy to operate and inexpensive to produce. Most parts of the prosthetic hand were 3D-printed. Not only is this process comparatively fast and cheap, it also allows for a precise fitting to the designated wearer of the prosthesis. The control of the hand was a particular challenge. Conventional prostheses work with myoelectrics, that is, sensors amplifying existing muscle signals are used to move the artificial hand. For his low-cost prosthetic hand for children, the student instead used a control bracelet with acceleration and angle sensors. The gripping motion is triggered when the sensors pick up the corresponding arm movement. The movements of the prosthetic hand are designed to emulate the temporal sequence of a natural hand's gripping motion. The user can determine the strength of the grip with their control bracelet.



Master of Science in Engineering (MSE)
Highly motivated and outstanding graduates can go on to take the Master of Science in Engineering. Only the best 35 per cent qualify for this Master's programme, which follows on from all technical Bachelor programmes and enables students to focus on a specialist area in one of six fields.

An individual study schedule means Master's students can deepen their specialist knowledge quite specifically depending on their interests and their professional ambitions. In one of our institutes, they work on real research and development projects from the industry. The projects are often funded by the federal government or by foundations. The Master of Science in Engineering (MSE) was developed jointly by the Swiss Universities of Applied Sciences.

What is more, the ZHAW School of Engineering has signed a double degree agreement with Washington State University and Grand Valley State University. This gives Master's students the opportunity to follow on a double degree programme in Switzerland and the United States.

Matthias Bleibler Team Manager R&D Automation at Bühler AG today, he previously spent two years working in China for Marti EPC Ltd.

"I am very satisfied with my Master's programme at the ZHAW School of Engineering. I particularly liked participating in specific industrial projects. What was also special was that I was able to co-supervise undergraduate project work as part of my Master's dissertation. I opted for the China module as my elective, which opened the door to Asia."

Continuing education

Nadia Kramer System Developer at iart interactive, graduate of the MAS in Computer Science

"The MAS in Computer Science enabled me, as a qualified architect, to switch to a different industry. The new skills I gained from this course formed the ideal basis for me to specialise even further within computing."

Continuing education for engineers is one of the most fundamental requirements in today's knowledge-based society. The constantly changing needs and requirements of exacting customers call for flexible and dynamic enterprises and exceptional employees.

The ZHAW School of Engineering offers a number of opportunities for continuing education in a wide range of technical fields. The courses are designed to meet the needs of customers and their employers. There are over 40 courses, most of which are modular.

International

The ZHAW School of Engineering promotes international relationships in research and training. With an international profile in six of its degree programmes, it prepares future engineers for a career in an international environment. Foreign students also benefit from this opportunity.

International relations The ZHAW School of Engineering supports and promotes international student exchanges with other universities. We constantly strengthen and expand the ties with our partner institutions. We currently collaborate with as many as 90 universities in 30 countries. The ZHAW School of Engineering offers most degree programmes in its international profile, which includes, among other things, attending semesters abroad. A special programme to promote international student exchanges supports our own students during their stay abroad as well as guest students at the ZHAW School of Engineering.

Foreign students at the ZHAW School of Engineering
Guest students have the opportunity to attend one or two semesters at the ZHAW School of Engineering. We offer exciting subject field combinations, cutting-edge, English-taught classes and outstanding infrastructure. In the bachelor's degree programmes, our international guest students may attend numerous modules (some of which are taught in English) alongside Swiss students. Master's students also have the opportunity to study abroad. Of course, we support our guests, both when planning their exchange semesters and while they are here with us.

Joaquin Cavero Cahis Aviation student from Barcelona (Spain)

"My stay helped me to find my feet in a new environment. I think the ZHAW School of Engineering is great and would recommend it to anyone who would like to develop personally and experience new things."

Double Degree
Engineering and Management *bachelor's students* have the opportunity to obtain a double degree with the Windesheim University of Applied Sciences (Netherlands). After successfully completing the first five semesters at the School of Engineering, students acquire the remaining ECTS credits required over the course of the subsequent two semesters in the Netherlands, where they also conclude their studies with a bachelor's thesis. The latter is co-supervised by lecturers of the School of Engineering and Windesheim University. Students obtain both a Swiss and a Dutch degree in the process, which grants them easy access to consecutive degree programmes throughout the European Education Area.

For *master's students,* the ZHAW School of Engineering offers a two-year double degree programme with the Washington State University (WSU) and the Grand Valley State University (GVSU). Students complete their first year of studies in Switzerland and the second year in the United States, during which time they also write their master's thesis. Upon graduation from the double degree programme, students receive a Swiss university of applied sciences degree and a university degree of the partner university. This gives them full access to the American university system and the possibility of completing a doctorate in the United States.

Dominic Thaler Double degree graduate

"The opportunity to obtain a master's degree in Switzerland and the United States in just two years is incredible. Living abroad, I grew as a person and my English has improved quite considerably."

At a glance

Foundation:
1874 as the Winterthur Technical University

Dean and Managing Director:
Prof. Dr.
Dirk Wilhelm

Areas of competence
- Research and Development
- Study
- Continuing education
- Services

8 Bachelor programmes with Specialisations

Aviation
- Technical Engineering
- Operational Engineering

Electrical Engineering
- Automation, Drives and Energy Systems
- Computer Engineering
- Wireless Communications, Signal Processing and Sensor Electronics

Energy and Environmental Technology
- Renewable Thermal Energy Systems
- Renewable Electrical Energy Systems
- Sustainable Development / Environment

Computer Science
- Advanced Software Engineering
- Cloud Computing
- Communication Networks and Services
- Information Engineering
- Artificial Intelligence
- Mobile Applications Software

Mechanical Engineering
- Biomechanical Engineering
- Computational Fluid Engineering
- Smart Products and Production
- Systems and Automation Technology
- Thermal Energy Technology
- Process Engineering

Systems Engineering
- Robotics and Mechatronics
- Medical Technology

Transportation Systems
- Modelling and Simulation of Transport Systems
- Mobility Data
- Logistics
- Transportation Engineering

Engineering and Management
- Industrial Engineering
- Data and Service Engineering
- Business Mathematics

Continuing Education
- 3 international Master Degrees
- 3 Master of Advanced Studies (MAS)
- 5 Diploma of Advanced Studies (DAS)
- 21 Certificate of Advanced Studies (CAS)
- 9 Continuing education courses (WBK)

Master of Science in Engineering (MSE) with 11 specialisations

- Aviation
- Business Engineering
- Civil Engineering
- Computer Science
- Data Science
- Energy and Environment
- Electrical Engineering
- Mechanical Engineering
- Mechatronics and Automation
- Medical Engineering
- Photonics

At a glance

Partner Universities worldwide

18 x Germany
11 x Spain
10 x USA
6 x South Korea
4 x Finland
3 x Denmark
3 x Netherlands
3 x Austria
3 x Taiwan
3 x Czech Republic
2 x China
2 x Iran
2 x Ireland
2 x Italy
2 x Japan
2 x Poland
1 x Australia
1 x England
1 x Estonia
1 x France
1 x Canada
1 x Malaysia
1 x Mexico
1 x Norway
1 x Portugal
1 x Sweden
1 x Switzerland
1 x Singapore
1 x Slovakia
1 x Thailand
1 x Turkey

Employees

235 Lecturers
328 Mid-level staff (research employees and assistants)
97 Administrative/ technical staff

660 Employees

Number of students

2211 Bachelor and Master degrees
939 Continuing education

3150 Students

Volume percentage according to performance areas

(Cost percentage of overall volume)

54 % Teaching
4 % Continuing education
41 % R&D
1 % Services

External funds for extended performance mandate in millions*

3.94 Continuing education
24.70 R&D
1.09 Services

29.73 External funds for extended performance scope

* External funds consist of third-party contributions, other funding from the federal government, contributions from CTI, SNF, EU and other international research programmes.

All figures are based on the 2018 financial year.

At a glance

13 Institutes and Centres

InIT
- Software Systems
- Human Information Interaction
- Information Security
- Information Engineering
- Service Engineering

www.zhaw.ch/init/en

IAMP
- Applied Optics
- Medical Physics and Biophysics
- Safety-Critical Systems
- Applied Complex Systems Science
- Scientific Computing and Algorithmics

www.zhaw.ch/iamp/en

IDP
- Business Engineering and Operations Management
- Finance, Risk Management and Econometrics
- Data Analysis and Statistics
- Transport and Traffic Engineering
- Measurement and Testing Technology

www.zhaw.ch/idp/en

IEFE
- Energy Efficiency
- Renewable Energy
- Energy Stores and Networks

www.zhaw.ch/iefe/en

IMES
- Biomechanical Engineering
- Lightweight Lightweight Construction Engineering
- Applied Mechanics

www.imes.zhaw.ch/en

IMS
- Robotics and Automation
- Control Engineering and Advanced Control
- Drive Engineering and Power Electronics
- System Engineering
- Industry 4.0

www.zhaw.ch/ims/en

INE
- Sustainable Energy Systems
- Sustainable Mobility
- Integral Logistics
- Risk Management and Technology Assessment

www.zhaw.ch/ine/en

ICP
- Sensor Technology and Measuring Systems
- Elektrochemical Cells and Microstructures
- Organic Electronics and Photovoltaics
- Multiphysics Modeling and Imaging

www.zhaw.ch/icp/en

InES
- Communication Network Engineering
- Secure and Dependable Systems and Networks
- Internet of Things
- Autarkic Systems
- Low-Power Wireless Embedded Systems
- System on Chip Design
- Realtime Platforms

www.zhaw.ch/ines/en

ISC
- Electronic Radio Frequency Technology
- Telecommunications and Wireless Communication
- Data Signal Processing

www.zhaw.ch/isc/en

IMPE
- Surface Technology
- Material Fibre
- Methods Development

www.zhaw.ch/impe/en

ZAV
- Aircraft Technologies
- Aviation Operations

www.zhaw.ch/zav/en

ZPP
- Product Innovation
- Process Development
- Development and Construction
- Manufacturing

www.zhaw.ch/zpp/en

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