

**MSE**

MASTER OF SCIENCE  
IN ENGINEERING

ENGLISH



Master of Science in Engineering (MSE)

I chose to study the MSE in Industrial Technologies because I was motivated by the possibility of attending courses at different Swiss universities and getting to know new people and environments. This will allow me to grow both from a scientific point of view and at a social and cultural level. Thanks to all this, I am sure that, once I finish the Master's studies, exciting new career opportunities will open up in Switzerland and abroad.

Luca Ferrari, MSE student

When I moved to Lugano I was looking forward to acquiring new experiences. Studying for the MSE is the best way to improve my theoretical and practical skills. The international background makes this experience all the more exciting and satisfying: meeting young people from different cultures and studying and working together on joint projects not only encourages the growth of personal relations but has also boosted my passion for the world of Business Engineering and Production on a daily basis.

Silvia Colombo, MSE student

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Visit us at [www.msengineering.ch](http://www.msengineering.ch)

# Studies and career prospects

The Master of Science in Engineering (MSE) programme trains both technical and management leaders, destined for careers in industry and the public sectors. Students acquire the skills needed for careers in departments such as research and development, production, logistics, consultancy and public institutions and are capable of taking responsibility for managing interdisciplinary projects.

The Master's degree programme is structured on a modular basis and represents 90 ECTS credits. The theoretical part of the programme accounts for at least one third of the credits; the other two thirds are acquired through supplementary lectures and modules, projects and especially by completing a Master's thesis.

## Learning content

As a holder of a Master's degree you are a recognized specialist in that discipline. You have a proven ability to master complexity and you are equipped with the fundamentals for further professional development. On the MSE, you learn:

- the mathematical and scientific fundamentals of your subject
- to apply these fundamentals to find new solutions in research projects

- to apply the latest technologies in the development of new products and processes
- to put solutions into practice as a project manager
- the basics of business management
- to move and communicate self-confidently in international circles

## Practical relevance

The focus is on practice. In the MSE programme you will be actively involved in current research projects being performed at the Universities of Applied Sciences. You will generally write your Master's thesis in cooperation with an industrial company. You will then be able to make a seamless transition to the world of work, familiarised with the challenges that await you there from your project assignments during your Master's programme.

## MSE – a stepping stone

Only the best 35% of Bachelor's graduates are eligible for admission to a Master's degree. Since students are able to plan their studies on an individual basis, you can extend your specialist knowledge in line with your personal interests and desired career. In the process, you can

forge contacts with the best specialists from all over Switzerland.

You work on research projects that are funded by the confederation or by private foundations. A Master's degree prepares you for careers that require additional in-depth qualifications, such as in the fundamentals of a subject or in project management. It is a perfect stepping stone to an international career.

**The Master's degree enables you to take on managerial positions. The programme gives you an in-depth knowledge of your subject, an extended theoretical grounding, knowledge of the natural sciences and mathematics, plus the basics of business administration and project management.**



**“Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less”. Ever since I first read this Marie Curie quote, I’ve wanted to gain new experience overseas. MSE is a new challenge, which is allowing me to consolidate my theoretical and practical knowledge. More precisely, it’s giving me the chance to improve my skills in wireless communication systems – my specialization area. Moreover, the MSE international environment is helping me to extend my professional network. The many different cultures make the MSE studies very exciting and are helping me to acquire international experience. After completing the course, I plan to return to Ecuador, my home country, with new motivation and new ideas to start my career there.**

**Grace Bermeo, MSE student**

# Individualised study programme

The MSE is the highest academic qualification awarded by a University of Applied Sciences in the fields of engineering, IT, architecture, construction and planning and is offered on a joint basis by all the Swiss Universities of Applied Sciences.

You pursue your studies at the University of Applied Sciences of your choice. You will attend theory modules in Bern, Lausanne, Lugano or Zurich, which are taught by lecturers from all the Universities of Applied Sciences and attended by peers from the different regions of Switzerland.

## Individual study programme

The learning objectives, modules and project themes are geared to the individual students' specialist areas. Together with your personal advisor, you will draw up your study plan within this framework and focus your profile. The details will be fixed in an individual study agreement signed at the beginning of your Master's programme.

## Advisor

You will receive academic support from an advisor throughout your studies. Advisors are lecturers who assist you in individualizing your studies and in determining the contents of your subject specialization.

## International

You can complete individual semesters abroad. You will also receive organizational support if you wish to participate in an international research project.

**Lecturers from all over Switzerland teach on the MSE programme. Students agree on their own personal study programme with their advisor.**

# Theoretical, contextual and specialised knowledge

Students will acquire theoretical, contextual and specialized knowledge during the MSE programme. Different modules are offered for each of these three areas. You will choose the modules you wish to take in agreement with your advisor.

## **Subject specialization**

The subject specialization constitutes the centrepiece of the degree programme. You will acquire knowledge in your specialist subject in practically-oriented, topical projects and apply it in your Master's thesis. Your scientific work will make a substantial contribution towards solving a current problem encountered in practice.

## **Theory modules**

The Universities of Applied Sciences providing the MSE programme offer around 100 theory modules. Suitable modules are available for each subject specialization. Your advisor will assist you in compiling your timetable.

## **Context modules**

The programme of study is rounded off by an introduction to management and communication. Courses are offered in company management, law, complex processes, communication, ethics, and international markets and globalization.

**Tuition is in the language of the region in which it is given and/or in English. The theory and context modules can be attended at either one or several of the central locations.**

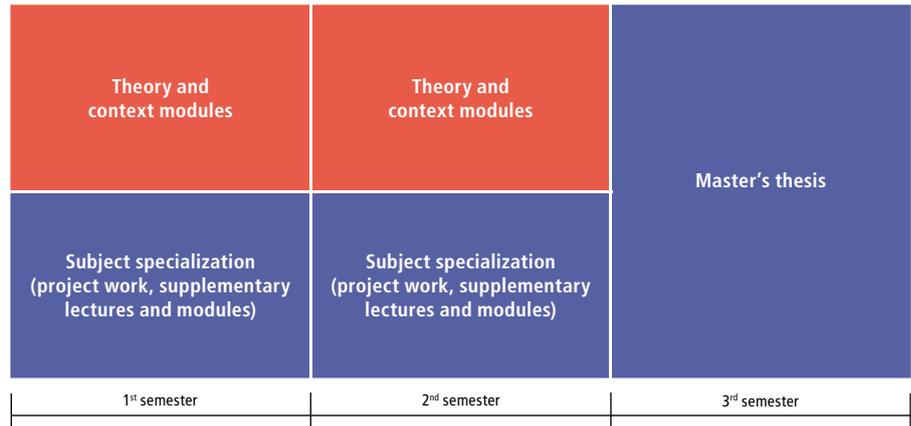


Stadler Rail is dependent on well-trained engineers with practical experience and initiative. We therefore value our cooperation with Switzerland's Universities of Applied Sciences and like to recruit our engineers from amongst their MSE graduates. These graduates have already acquired experience in industry and in working on projects and are thus in a position to rapidly take on demanding tasks.

Peter Spuhler  
Owner and CEO  
Stadler Rail Group

# Programme structure

Students studying for a Master's degree register at the University of Applied Sciences at which they would like to take their specialization and write their Master's thesis. The theory and context modules are held at the central locations of Bern, Zurich, Lausanne and Lugano. The subject specialization and Master's thesis account for around two thirds of the study time, the theory and context modules for around one third.



Example of a study plan for full-time study with the standard time allocation

Calendar week	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37
Tuition period	[Orange]															[Orange]																																				
Tuition-free period	[White]															[Orange]				[White]																						[Orange]				[White]						
Exam session	[White]															[Blue]		[White]																						[Blue]				[White]								
Holidays	[White]															[Light Blue]		[White]																						[Light Blue]				[White]								
	Autumn semester																										Spring semester																									

Schedule for an academic year



Alstom has a long history of supporting and engaging in cooperation projects with the Universities of Applied Sciences. We also co-fund a Chair at the University of Applied Sciences and Arts Northwestern Switzerland (FHNW). We played a key role in shaping the MSE programme of study, and therefore graduates have correspondingly high prospects of being able to pursue a challenging career in industry and especially in globally active corporations. Highly attractive technical positions in development, production, engineering or project management are waiting to be filled by excellent engineers!

**Dr. Bernd Gellert**  
Vice President Technology Excellence  
Alstom Thermal Power

# Seven specializations

The title of “Master of Science in Engineering” can be obtained in seven specializations. The specialist areas are represented by specialized research units, known as Master Research Units.

## Master Research Unit (MRU)

You define the specializations for your programme through your choice of university and the corresponding Master Research Unit (MRU). The MRU that you select will affect the focus of your entire Master’s programme and should thus be chosen with care. You will find descriptions of all MRUs and useful links on the MSE website.

An MRU is generally staffed by some 20 researchers, including professors, research fellows and research assistants.

Universities of Applied Sciences and their MRUs: [www.msengineering.ch](http://www.msengineering.ch)

## Business Engineering and Production

- Business process management
- Operations management and analytics
- Supply network management
- Product and service innovation

1

## Energy and Environment

- Energy engineering
- Process engineering
- Environmental engineering

2

## Industrial Technologies

- Product development and production technology
- Materials technology
- Mechatronics and automation
- Embedded systems and microelectronics

3

## Information and Communication Technologies

- Communication and information systems
- Software engineering and software technology
- Data and information management

4

## Civil Engineering and Building Technology

- Structural concept and design
- Geotechnics and natural events
- Construction and production technology
- Sustainable construction, maintenance and repair of existing structures and building technology

5

## Geomatics

- Geoinformation technology

6

## Spatial Development and Landscape Architecture

- Spatial development
- Landscape architecture

7

# Specialization “Business Engineering and Production”

Graduates who have specialized in “Business Engineering and Production” are in a position to develop, produce and market services or mass-produced industrial goods. They are specialized in configuring and optimizing material, information and value chains. You will learn specific methods and concepts in mathematics, information technology, business management and management science modules.

In the “Business Engineering and Production” specialization, students are acquainted with the methods used by engineers for analyzing, planning and controlling industrial processes and systems.

## Competence fields

- Business Process Management: management of in-house and inter-company business processes. Mapping of organizational structures and processes in communication and information systems.
- Operations Management and Analytics: optimum configuration and control of industrial and service processes, especially on the basis of formal models and methods of data analysis. Guaranteeing quality and availability standards for products and services.
- Supply Network Management: configuration and management of complex global added-value systems. Systematic handling of the complexity of global networks with a strategic time horizon.
- Product and Service Innovation: analysis of market developments and customer needs, innovation processes and the development of products and services based on these in order to satisfy future customer needs.

Specialization offered by:  
 University of Applied Sciences and Arts Northwestern Switzerland  
 Lucerne University of Applied Sciences and Arts  
 University of Applied Sciences and Arts of Southern Switzerland  
 Zurich University of Applied Sciences

**Professional profile: as a Master’s graduate with the “Business Engineering and Production” specialization, you manage, configure and control production processes and operational procedures in both industry and the services sector.**

# Specialization “Energy and Environment”

Graduates who have specialized in “Energy and Environment” are experts in energy, process and environmental engineering including renewable energies. They have learned how to develop efficient processes that sustain resources and have acquired in-depth knowledge of electrical energy engineering, thermal machines, fluid mechanics, and heat and material transport, for example.

## Competence fields

- Energy Engineering: concepts, modelling, implementation and operation of efficient systems for converting, storing, making available and using energy, use of renewable energy.
- Process Engineering: concepts, layout, planning, implementation and operation of thermal processes, plant and machinery, use of renewable energies.
- Environmental engineering: analysis, planning and implementation of measures in the event of environmental problems involving air, water and soil and also for process-integrated environmental protection.

Specialization offered by:  
Bern University of Applied Sciences  
University of Applied Sciences and Arts Northwestern Switzerland  
University of Applied Sciences of Eastern Switzerland  
University of Applied Sciences and Arts Western Switzerland  
Lucerne University of Applied Sciences and Arts  
University of Applied Sciences and Arts of Southern Switzerland  
Zurich University of Applied Sciences

**Professional profile: as a Master’s graduate with the “Energy and Environment” specialization, you work in the development, investment-goods and planning sector or for energy providers. You analyse processes and advise the management on the sustainable supply of energy and the efficient use of natural resources.**



The practical approach that MSE graduates adopt to solving complex questions is a key prerequisite for successfully developing a technology and introducing it into the market. The in-depth engineering knowledge acquired in combination with work on practically-oriented development and research projects during the Master's course provides the basis for graduates to rapidly assume responsibility within our young company. iNovitas AG offers young graduates a great deal of scope for channelling in their own ideas, enabling them to play an active role in shaping the company's development.

**Dr. Hannes Eugster**  
Managing Director  
iNovitas AG

# Specialization “Industrial Technologies”

In the “Industrial Technologies” specialization students learn skills for the development, production, use and optimization of technical products such as plant, machinery, vehicles, robots, devices and tools.

The focus is on electrical, electronic, mechanical and mechatronic systems. Students will also deepen mathematical competencies in simulation analysis and verification.

## Competence fields

- Product Development and Production Technology: integral design and development of technical products, and development and implementation of cost-efficient production technologies based on reliable processes.
- Materials Technology: development of materials and material surfaces and their production methods. Selection of the appropriate materials for a product and subsequent integration into the product manufacturing process.
- Mechatronics and Automation: conception, analysis, modelling and implementation of mechatronic components and systems as well as of automated components, machines and systems.
- Embedded Systems and Microelectronics: analysis, architectures, design, implementation and testing of software and hardware modules for embedded microelectronic systems and components.

Specialization offered by:  
Bern University of Applied Sciences  
University of Applied Sciences and Arts Northwestern Switzerland  
University of Applied Sciences of Eastern Switzerland  
University of Applied Sciences and Arts Western Switzerland  
Lucerne University of Applied Sciences and Arts  
University of Applied Sciences and Arts of Southern Switzerland  
Zurich University of Applied Sciences

**Professional profile: as a Master’s graduate with the “Industrial Technologies” specialization, you work in research and development, in production and in the management of companies in an industrial environment.**

# Specialization “Information and Communication Technologies”

The ICT specialization covers IT and telecommunications. As a Master’s graduate you will be able to plan and implement system architectures. You will typically be in charge of a team and be responsible for the development of distributed, interoperable and extendable software systems. Your team will use the latest development, simulation and modelling tools, systematically apply tests and work in a user-oriented way. You will be able to analyse risks of IT systems and to take adequate countermeasures.

## Competence fields

- Communication and Information Systems: planning, risk analysis, implementation and operation of secure, efficient and reliable communication and information systems. Development and operation of intelligent networks, embedded systems, mobile, pervasive and cloud-based applications and services in the IoT environment.
- Software Engineering and Software Technology: analysis, architecture design, development, extension and testing of software systems that meet all user and system requirements, run reliably, securely and efficiently and are easy to interact with.
- Data and Information Processing: acquisition, processing, modelling, consolidation, management, analysis, searching and visualization of data and information with efficient sequential, parallel or distributed algorithms and optimization methods, automated learning from data.

Specialization offered by:

Bern University of Applied Sciences

University of Applied Sciences and Arts Northwestern Switzerland

University of Applied Sciences of Eastern Switzerland

University of Applied Sciences and Arts Western Switzerland

Lucerne University of Applied Sciences and Arts

University of Applied Sciences and Arts of Southern Switzerland

Zurich University of Applied Sciences

**Professional profile: as a Master’s graduate with the “Information and Communication Technologies” specialization, you take on positions of responsibility in software and service companies and manufacturing industry. There you share responsibility for the planning, development, implementation and operation of information and telecommunication systems and components.**



The MSE gave me the opportunity to study the subject of software engineering in greater depth. I was able to look into research topics such as static code analysis and determine their practical relevance. Practically-oriented projects constitute an important and extensive part of the MSE. This is why I would give consideration to my preferred topics and projects when selecting my advisor already. And it's certainly worthwhile taking up new topics.

**Mirko Stocker**  
Lecturer, member of the scientific staff and product manager  
Institute for Software  
HSR Hochschule für Technik  
Rapperswil

# Specialization “Civil Engineering and Building Technology”

In the “Civil Engineering and Building Technology” specialization, you, as an engineer, broaden and deepen your knowledge of the construction industry. The areas covered include structural engineering, transport, geotechnics, hydraulic engineering, construction technology and the maintenance and repair of buildings.

You learn to plan complex building projects on an interdisciplinary and structured basis and to manage these under cost and time pressure. You will constantly consider the application of new technologies and acquire knowledge on natural hazards, the maintenance and repair of buildings and sustainable construction.

## Competence fields

- Structural Concept and Design: development and implementation of sophisticated supporting structures with allowance for special static modes of action. Development of new materials and construction methods, concepts and implementation for transport infrastructure and traffic route construction.
- Geotechnics and Natural Events: analysis and assessment of natural events as well as planning, project development and supervision of structures and measures in the fields of geotechnics and nature-oriented water engineering and municipal water management.
- Construction and Production Technology: planning, managing and implementing construction projects and production processes. Management of investment activity, architecture, engineering and the supplier industry, analysis and optimization of the performance of buildings.
- Sustainable Construction, Maintenance and Repair of Existing Structures and Building Technology: planning, project development and implementation of cost-efficient and ecological construction projects subject to special requirements in terms of building physics and building culture.

Specialization offered by:  
Bern University of Applied Sciences  
University of Applied Sciences and Arts Northwestern Switzerland  
University of Applied Sciences of Eastern Switzerland  
Lucerne University of Applied Sciences and Arts  
Zurich University of Applied Sciences

**Professional profile: as a Master’s graduate with the “Civil Engineering and Building Technology” specialization, you manage complex construction projects, plan and implement sustainable buildings and will constantly evaluate the application of new technologies in the process.**

# Specialization “Geomatics”

With a Master’s degree in the specialization of “Geomatics”, you are an expert in the capture, processing and visualization of geoinformation.

You acquire the know-how to capture, analyse and model complex spatial processes with the latest geo sensors and methods. You can abstract specific problems and develop new solutions.

## Competence field

– Geoinformation Technology: modelling, capturing, processing, integration, analysis, visualization and management of geodata or geoinformation. Conceptualization and implementations of demanding positioning, navigation and monitoring tasks for a range of applications and accuracy requirements.

## State examination for the title of Licensed Cadastral Surveyor

As a Master’s graduate with the “Geomatics” specialization, you will be admitted to the state examination for acquiring a Swiss Federal License for Cadastral Surveyors.\*

\* *Condition: candidates must submit proof of having completed the theoretical training required for a Licensed Cadastral Surveyor.*

Specialization offered by:  
University of Applied Sciences and Arts Northwestern  
Switzerland

**Professional profile: with a Master’s degree specializing in “Geomatics”, you design, implement and operate geoinformation systems and geodetic measurement solutions.**

**You work for private providers of geoinformation services, in the development departments of international companies, for energy and water utilities, transport companies, communications service providers or public agencies.**



I did an MSE because I wanted to expand my knowledge in the field of spatial planning, regional development and Swiss planning legislation. By taking the MSE degree course, I wished to develop professionally and put my work in landscape planning on a broader footing. The course also gives students the opportunity to familiarize themselves with subject areas of interest and to study these in greater depth.

Susanne Schellenberger  
Project Collaborator  
ILF Institute of Landscape  
Architecture  
HSR Hochschule für Technik  
Rapperswil

# Specialization “Spatial Development and Landscape Architecture”

With a Master’s degree in the specialization of “Spatial Development and Landscape Architecture”, you have acquired skills for the development and design of housing settlements and open land, and also infrastructures. You deepen your methodological, strategic and theoretical knowledge on the basis of practical and complex problems.

After completing your Master’ course, you initiate, plan and realise projects on an interdisciplinary basis. You are also in a position to mediate between public and private stakeholders or specialists in individual disciplines. You will learn to deal with public participation processes.

## Competence fields

### – Spatial Development

- Spatial Planning: at local and regional level (Canton), high quality inner development, sustainable land use planning with a focus on sustainability, functional spaces and management of the planning process.
- Urban Planning: urban development, urban renewal, city and settlement development with the focus on urban transformation, subsequent densification and longterm structuring of urban spaces.
- Transport Planning: development of sustainable concepts for transport and mobility, closely coordinated with land use planning.

### – Landscape Architecture

- Landscape Development: ecological, planning and technical knowledge for landscape planning and design. Development of concepts for nature-oriented tourism.
- Open land and gardens: methods and strategies for creative shaping of urban spaces with consideration to complex requirements. Drawing up professional designs and concepts.

Specialization offered by:  
University of Applied Sciences of Eastern Switzerland Zurich  
University of Applied Sciences

**Professional profile: as a Master’s graduate with the “Spatial Development and Landscape Architecture” specialization, you take care of housing developments, plan urban open spaces, and compile agglomeration programmes and landscape development concepts for enhancing our living environment. You will work as spatial planner or landscape architect for public authorities or the private sector.**

# MSE – The general conditions at a glance

## **Admission**

To gain admission students must have completed a Bachelor's degree with good or very good grades. The University of Applied Sciences that you select will determine your suitability for the course once you have submitted your registration. If necessary, the University may hold a supplementary admission interview. The subject studied for your Bachelor's degree must be related to the competence field of the specialization you select. Holders of an equivalent educational qualification may also be admitted to the programme.

## **Full-time study**

The program is scheduled over three semesters.

## **Part-time study**

The MSE can also be completed on a part-time basis, requiring a correspondingly longer period of study. You can start the programme in either the spring or the autumn semester.

## **Registration**

Students should contact the University of Applied Sciences that offers their desired programme.

## **Degree**

Graduates of the Master's degree are awarded the title "Master of Science [Name of the University of Applied Sciences] in Engineering, with specialization in [name of the area of specialization]".

## **International validity**

The title "Master of Science in Engineering (MSc)" is protected, recognized by the Swiss authorities and internationally valid.

## **Costs**

Each University of Applied Sciences sets its own tuition fees. Students are entitled to receive a grant if the MSE constitutes part of their initial training.

## **Contact**

Information is available from the individual Universities of Applied Sciences. The contact information is set out at the back of this brochure.

## Specializations proposed

	Berner Fachhochschule	Fachhochschule Nordwestschweiz	Fachhochschule Ostschweiz	Haute Ecole Spécialisée de Suisse occidentale	Hochschule Luzern	University of Applied Sciences and Arts of Southern Switzerland	Zürcher Hochschule für Angewandte Wissenschaften
Business Engineering and Production							
Energy and Environment							
Industrial Technologies							
Information and Communication Technologies							
Civil Engineering and Building Technology							
Geomatics							
Spatial Development and Landscape Architecture							

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