

# CAS in Systems Engineering

for Smart Industries

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Our partner:



FH Zentralschweiz

## Concept

The CAS in Systems Engineering offers advanced training in complex system description, development and verification for engineers. At the same time, it prepares engineers for leading roles within increasingly interdisciplinary and complex system tasks.

The one-year CAS program is taught in full-day sessions, starting with a five-day intensive week. The following one- or two-day courses on specific topics will give you a 360° perspective on the subject and its implementation. The program concludes with a project, this should be with your firm.

Our partners at SE-Training offer a set of complementary topics, which might be interesting depending on personal needs and career specialization.

## Objectives

The objectives of this CAS program are to provide you knowledge of Systems and Requirements Engineering, in particular:

- abstracting
- stakeholder analysis and relevance
- deriving and managing requirements
- architecting
- sub-systems
- interface management
- verification and validation
- model-based Systems Engineering

In addition, you should obtain a 360° holistic view on the subject and directly adjacent fields, such as:

- project management
- risk and quality assurance
- intellectual property
- digital transformation

Finally yet importantly, you will learn to apply new knowledge within the courses in group work based on examples as well as within your project assignment.

## Target Audience

If you have graduated as an engineer or in natural science at university level, work in the field of engineering, would like to step up and be responsible for larger systems, then you should attend this CAS program.

# Content and Planning

The CAS sessions are divided into formal lessons and group work so that you can start to implement the delivered topics into practice.

## Systems- and Requirement Engineering Basics

The CAS will start with an intensive week, focusing on the basics of systems engineering and requirements management. Here you will obtain fundamentals on the following topics:

- the relevance of systems and requirements engineering for the industry

- abstracting
- stakeholder, stakeholder analysis and stakeholder management
- requirements engineering methods
- system architecture and system description
- interfaces and interface management
- verification and validation

### **Model Based Systems Engineering (MBSE)**

This course on an increasingly popular systems engineering method contains:

- systems engineering, model-based engineering, model-based systems engineering, an introduction
- an overview of the most well-known methods in MBSE; important aspects in selecting a method
- languages: an overview of the most well-known general purpose languages

As a systems engineer, you will not only interact on a technical basis but are in close liaison with project management and quality assurance and will need to focus on legal aspects, especially intellectual property rights. In this context, the following three courses are integrated into the CAS program.

### **Project Management and Lean Methods for Systems Engineering**

During this course, you will work on a case study to gain insight into modern project management. Content:

- Describe the problem and possible solution ideas in a simple way in order to obtain support from management.
- Build a project canvas clearly describing

the project and the responsibilities of the team by using a visual tool for focussed collaboration.

- Short sprints are supported with active and visual sharing of the status, using a six questions method.
- A close out of the project is created that captures the hard and soft facts.

### **Intellectual Property Basics**

To get an insight on the landscape in the frame of intellectual property rights, this course will focus on:

- innovation protection as investment protection
- portfolio of immaterial goods rights (brand, patent, design, author...)
- “SMART” case study
- freedom to operate
- law enforcement in this field

### **Quality Assurance (QA) and Systems Engineering**

Quality assurance and management are critical in that they are both integrated into the internal systems perspective and become even more important for regulated and controlled environments (e.g., aerospace, pharma). This course will focus on:

- QA key concepts of systems engineering incl. configuration management
- QA principles: integrity and identification/traceability
- QA main elements: organization, manuals, non-conformance reviews, audits
- risk management
- inspection

## Digital Transformation and Systems Engineering

One key aspect of the modern industry is undoubtedly digitalization, Industry 4.0, IoT etc. Regarding systems engineering, the focus is not the contributing technologies, but rather a holistic view of the global system and the customer value. During this course you will learn to work in this context based on a case study:

- business level outcomes will be mapped and KPIs identified
- the interaction between people, machines and equipment will be clarified
- critical actor and business level value proposition will be described

## Systems Engineering Project

To conclude the program, you will complete a real-life project (preferably within your own company). This is your opportunity to apply everything you have learned!

## Tailoring by Courses from our Partners SE-Training

Depending on your personal needs and career specializations, the CAS program can be complemented by stand-alone training courses delivered by SE-Training GmbH. Completion of these courses yields points contributing to your final diploma.

- Design Thinking and Lean Innovation: Advanced
- MBSE and SysML: Intermediate
- Systems Reliability
- Acoustics Systems Engineering
- Configuration Management

Detailed information on the courses' content can be found under [se-training.net](https://se-training.net)

## Timetable

The actual timetable is available under [hslu.ch/cas-syseng](https://hslu.ch/cas-syseng).

The CAS will take place once a year. The following table provides a brief overview:

Topics	Duration: [days]						
	5	2	1	1	1	2	–
Systems and Requirements Engineering Basics	■						
Model Based Systems Engineering (MBSE)		■					
Projektmanagement and Lean Methods for SE			■				
Intellectual Property Basics				■			
Quality Assurance and Systems Engineering					■		
Digital Transformation and Systems Engineering						■	
Systems Engineering Project		■	■	■	■	■	

One calendar year, starting around the end of August

# Formal administration aspects

## Admission requirements

University (incl. University of Applied Sciences) level graduation in engineering or natural science and a minimum of 2 years of practical experience.

Persons with a degree in higher vocational education and training must have at least two years of professional experience in a field relevant to this continuing education and training. At latest at the end of this program they must have the appropriate scientific knowledge in the field of this program.

Persons without a tertiary degree will only be admitted in exceptional cases in a sur-dossier procedure.

Please refer to the Academic Regulations for more detailed information.

## Costs

Information on costs and general conditions is available on our website and part of the application form [hslu.ch/cas-syseng](https://hslu.ch/cas-syseng). Concerning attendance of complementary courses with our partners, please contact the head of program.

## Location

The classes will be held at the Lucerne School of Engineering and Architecture in Horw (Technikumstrasse 21). The campus is easily accessible by public transport.

## Duration and Time Allocation

The CAS program is taught over 12 full days (1-, 2- or 5-day blocks) spread over a calendar year. It corresponds to roughly 100 hours of lessons, 110 hours of self-study and 150 hours for the Systems Engineering Project. The exact dates can be found at [hslu.ch/cas-syseng](https://hslu.ch/cas-syseng). The duration of complementary courses without a partner are not included.

## Application

The application form can be found at [hslu.ch/cas-syseng](https://hslu.ch/cas-syseng)

## Certificate

The Certificate of Advanced Studies of the Lucerne School of Engineering and Architecture in Systems Engineering will be awarded upon successful completion of the course's final exams and successful completion of the Systems Engineering project assignment. As an attendee, you will obtain 12 ECTS credits. Complementary courses by our partner, SE-Training, taken during the CAS, will be listed on the diploma. If you attend a minimum of 5 days of complementary courses and attend an exam, an additional 3 ECTS credits will be awarded.



**Prof Dr Gerhard S. Székely**  
Head of Program

**Registration and  
further information**  
Lucerne School of  
Engineering and Architecture  
Continuing and Executive Education

Technikumstrasse 21  
6048 Horw

T +41 41 349 34 80  
wb.technik-architektur@hslu.ch  
hslu.ch/t-weiterbildung



For more information about  
our CAS in Systems Engineering