

**Module Description, available in: EN**

## Software Assurance

**General Information****Number of ECTS Credits**

3

**Module code**

TSM\_SoftwAs

**Valid for academic year**

2025-26

**Last modification**

2025-04-17

**Coordinator of the module**

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**Explanations regarding the language definitions for each location:**

- Instruction is given in the language defined below for each location/each time the module is held.
- Documentation is available in the languages defined below. Where documents are in several languages, the percentage distribution is shown (100% = all the documentation).
- The examination is available 100% in the languages shown for each location/each time it is held.

	Lausanne			Lugano	Zurich		
<b>Instruction</b>					X E 100%		
<b>Documentation</b>					X E 100%		
<b>Examination</b>					X E 100%		

**Module Category**

TSM Technical scientific module

**Lessons**

2 lecture periods and 1 tutorial period per week

**Entry level competences****Prerequisites, previous knowledge**

Students will need knowledge in software engineering, specifically testing. Students will need to be reasonably fluent in a variety of languages including but not limited to C and Python. Knowledge of some assembly (e.g., x86, x86-64, or ARM) will be advantageous.

**Brief course description of module objectives and content**

Students shall gain an overview over current methods for software assurance. This may include, but is not limited to,

- \* advanced techniques for automated debugging; and
- \* advanced techniques for formal correctness of programs.

## Aims, content, methods

### Learning objectives and competencies to be acquired

- Students get an overview of advanced techniques for software assurance that are related to automated debugging. This may include, but is not limited to, delta debugging, automated fault repair, and mining function specifications.
- Students know techniques and tools for automated test case generation, such as fuzzing, how they work, to what class of faults they apply, how to interpret their outputs, and how to use them in their own projects.
- Students receive an in-depth introduction to techniques of formal correctness, such as symbolic execution or automated correctness proofs

### Module content with weighting of different components

- Automated debugging
- Formal methods

### Teaching and learning methods

Lectures will be part ex-cathedra lectures, part in-class exercises.

These exercises are designed to be done either individually or in groups and can be done remotely. There may also be guest lectures.

### Literature

Andreas Zeller, *Why Programs Fail*. Morgan Kaufman. Second Edition, 1770. (Yes, that's the date that Amazon has for the book. In reality, the second edition is from 2008.)

Ari Takanen, *Fuzzing for Software Security Testing and Quality Assurance*. Artech House Publishers. Second Edition, 2018. Seokhie Hong (Ed.), *Side Channel Attacks*. MDPI. 2019.

David J. Smith and Kenneth G. L. Simpson, *The Safety Critical Systems Handbook: A Straightforward Guide to Functional Safety: IEC 61508 (2010 Edition), IEC 61511 (2015 Edition) and Related Guidance*. Butterworth-Heisman. Fifth edition, 2020.

## Assessment

### Additional performance assessment during the semester

The module does not contain an additional performance assessment during the semester

### Basic principle for exams

**As a rule, all standard final exams are conducted in written form. For resit exams, lecturers will communicate the exam format (written/oral) together with the exam schedule.**

### Standard final exam for a module and written resit exam

Kind of exam

Written exam

Duration of exam

120 minutes

Permissible aids

*Aids permitted as specified below:*

Permissible electronic aids

None

Other permissible aids

hand-written summary of no more than 4 sheets of A4 paper

**Exception: In case of an electronic Moodle exam, adjustments to the permissible aids may occur. Lecturers will announce the final**

permissible aids prior to the exam session.

**Special case: Resit exam as oral exam**

**Kind of exam**

Oral exam

**Duration of exam**

30 minutes

**Permissible aids**

*Aids permitted as specified below:*

**Permissible electronic aids**

None

**Other permissible aids**

hand-written summary of no more than 4 sheets of A4 paper