Module Description, available in: EN

Software Assurance

General Information

Number of ECTS Credits

3

Module code

TSM_SoftwAs

Valid for academic year

2026-27

Last modification

2025-04-17

Coordinator of the module

Stephan Neuhaus (ZHAW, stephan.neuhaus@zhaw.ch)

Explanations regarding the language definitions for each location:

- Instruction is given in the language specified for each location and module execution.
- Documentation is available in the language(s) listed for each location and module execution. If the documentation is in multiple languages, the percentage distributed is indicated (100% = all documentation provided).
- The examination, including both questions and answers, is provided entirely (100%) in the language(s) specified for each location and module execution. The exams are on-site.

	Lausanne			Lugano	Zurich		
Instruction					**X** E 100%		
Documentation					**X** E 100%		
Examination					**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