MASTER OF SCIENCE
IN ENGINEERING

Zürcher Hochschule
für Angewandte Wissenschaften
School of
Engineering

Supplementary Module of School of Engineering

Title: DevOps Testing for Cyber-physical Systems

Shortcut: EVA_DevOps_Testing

Number of credits	3 ECTS
Organizer	InIT Institute of Applied Information Technology
Performance record	Grading will be based on the (i) individual exercises by the students during the course and (ii) the project.
Start date	First weeks of fall semester or by arrangement
Implementation mode	14 x 3L Design Workshop
Language	English
Abstract (max. 300 Chars)	You will learn software testing foundations in this module, with a focus on simulation tools (such as PX4, BeamNG, Carla, and SDC-scissor) and continuous delivery technologies for test case generation for object-oriented systems (Java) and Cyber-physical Systems (drones and self-driving cars).
Module content and learning objectives	• In this module, students will learn the foundations of software testing, in the context of object-oriented systems (Java Systems) and Cyber-physical Systems. • The participants will also leverage platforms and Digital Twins (i.e., Simulating environments) tools (e.g., PX4, BeamNG, Carla, SDC-scissor, etc.), test case generation and continuous delivery technologies in the context of Java and autonomous systems (e.g., drones and self-driving cars). • Sometimes, successful projects lead to the publication of relevant conferences or journals. Here a flyer, which can help you imagine the experience and skills you will gain during the module: https://www.christianbirchler.org/media/fyler-eva-module.pdf Format: This module offers a combination of theory and exercises. The exercises are required for the module as they will provide a better understanding of how the theory (published in research works) can be applied in practice. This way the students actively learn during the meeting of the EVA module and through preparation before and after each concrete example.

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	There will be exercises for the students to do individually and a project that will be done in groups of 2-3 students (or individually, depending on the number of registered students). Course mode: The exercises are done regularly in mixed mode: the student(s) that are interested can participate to the module in person, while the other can join digitally over Microsoft Teams. The slides and material of module will be shared upfront. Questions can be made during the presentation of the material. Projects and exercises related meetings are in general done on a weekly basis via MS-Teams. On request, other channels (e.g., Slack) can be created for running the projects. We encourage students to contact the lecturers via MS-teams and/or email for any doubt about the projects, exercises, and the exam.
Preconditions	Undergraduate level skills in programming (e.g., Python or Java)
Literature	- Automatic test suite generation for object-oriented software. SIGSOFT FSE 2011: 416-419 - Cost-effective Simulation-based Test Selection in Self-driving Cars Software with SDC-Scissor. The 29th IEEE International Conference on Software Analysis, Evolution, and Reengineering. - Single and Multi-objective Test Cases Prioritization for Self-driving Cars in Virtual Environments. ACM Transactions on Software Engineering and Methodology (TOSEM). - “Machine Learning-based Test Selection for Simulation-based Testing of Self-driving Cars Software”. Empirical Software Engineering. - Simulation-based test case generation for unmanned aerial vehicles in the neighbourhood of real flights. 16th IEEE International Conference on Software Testing, Verification and Validation (ICST) 2023
Specific regulations	-
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