

Supplementary Course (EVA) at ZHAW School of Engineering

Title: DevOps Testing for Cyber-physical Systems
Short Code: rEVA_DevOpsTest

ECTS Credits	3
Profile	Computer Science (CS)
Responsible Institute /Centre	Institute of Applied Information Technology (InIT)
Responsible lecturer and contact information	Prof. Jürgen Spielberger (spij@zhaw.ch) Dr. Sebastiano Panichella (panc@zhaw.ch)
Type and duration of examinations	Grading will be based on the (i) individual exercises by the students during the course and (ii) the project.
Start date and duration	Semester: Autumn Detail: 14 x 3L Design Workshop, Start first week of fall semester or by arrangement
Location	Winterthur
Course type	Weekly semester rhythm <ul style="list-style-type: none"> • Contact hours: 10 (hrs) • Guided self-study: 80 (hrs) • Independent self-study: 0 (hrs)
Language of instruction	English
Short description (max. 300 characters)	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).
Contents and Learning Objectives	<p>In this module, students will learn the foundations of software testing, in the context of object-oriented systems (Java Systems) and Cyber-physical Systems.</p> <ul style="list-style-type: none"> • 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. <p>Here a flyer, which can help you imagine the experience and skills you will gain during the module: https://www.christianbirchler.org/media/flyer-eva-module.pdf</p> <p>Format: This module offers a combination of theory and exercises. The</p>

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	<p>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.</p> <p>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).</p> <p>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 MSTEams. 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.</p>			
Prerequisites	Undergraduate level skills in programming (e.g., Python or Java)			
Literature	<ul style="list-style-type: none"> - Automatic test suite generation for object-oriented software. SIGSOFT FSE 2011: 416-419 - Cost-effective Simulation-based Test Selection in Selfdriving 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 Simulationbased 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 			
Special requirements	-			
Offer for profiles	Aviation (Avi)	<input type="checkbox"/>	Business Engineering (BE)	<input type="checkbox"/>
	Computer Science (CS)	<input checked="" type="checkbox"/>	Data Science (DS)	<input type="checkbox"/>
	Electrical Engineering (EIE)	<input type="checkbox"/>	Energy & Environment (EnEn)	<input type="checkbox"/>
	Mechanical Engineering (ME)	<input type="checkbox"/>	Mechatronics & Automation (MA)	<input type="checkbox"/>

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	Medical Engineering (Med)	<input type="checkbox"/>	Photonics and Laser Engineering (Pho)	<input type="checkbox"/>
	Information and Cyber Security (ICS)	<input checked="" type="checkbox"/>	Civil Engineering (CE)	<input type="checkbox"/>