

## Module: Software Verification

<b>Level</b>	Bachelor	<b>Short Name</b>	SWV
<b>Responsible Lecturers</b>	Schäfer, Andreas Prof. Dr.		
<b>Department, Facility</b>	Electrical Engineering and Computer Science		
<b>Course of Studies</b>	International Track		
<b>Compulsory/elective</b>	Elective	<b>ECTS Credit Points</b>	5
<b>Semester of Studies</b>	(Unspecified)	<b>Semester Hours per Week</b>	4
<b>Length (semesters)</b>	1	<b>Workload (hours)</b>	150
<b>Frequency</b>	WiSe	<b>Presence Hours</b>	60
<b>Teaching Language</b>	German/English	<b>Self-Study Hours</b>	90

The following section is filled only if there is **exactly one** module-concluding exam.

<b>Exam Type</b>	Portfolio Exam	<b>Exam Language</b>	German/English
<b>Exam Length (minutes)</b>		<b>Exam Grading System</b>	One-third Grades
<b>Learning Outcomes</b>	<p>Students can specify requirements of functions using preconditions and postconditions.</p> <p>Students can use tools to verify code with respect to the specification.</p> <p>Students can use loop invariants to define the behavior of loops and use invariants for verification.</p> <p>Students can model real time systems using timed automata.</p> <p>Students can specify requirements for real time systems using temporal logics and use tools to verify the requirements.</p>		
<b>Participation Prerequisites</b>			

The previous section is filled only if there is **exactly one** module-concluding exam.

<b>Consideration of Gender and Diversity Issues</b>	<ul style="list-style-type: none"> <li>✓ Use of gender-neutral language (THL standard)</li> <li>✓ Target group specific adjustment of didactic methods</li> <li>✗ Making subject diversity visible (female researchers, cultures etc.)</li> </ul>
<b>Applicability</b>	
<b>Remarks</b>	

## Lehrveranstaltung: Software Verification

(zu Modul: Software Verification)

<b>Lehrveranstaltungsart</b>	Lecture	<b>Lernform</b>	
<b>LV-Name englisch</b>			
<b>Anwesenheitspflicht</b>	nein	<b>ECTS-Leistungspunkte</b>	1
<b>Teilnahmebeschränkung</b>		<b>Semesterwochenstunden</b>	1
<b>Gruppengröße</b>		<b>Arbeitsaufwand in Stunden</b>	30
<b>Lehrsprache</b>	German/English	<b>Präsenzstunden</b>	15
<b>Studienleistung</b>		<b>Selbststudiumsstunden</b>	15
<b>Dauer SL in Minuten</b>		<b>Bewertungssystem SL</b>	

Der folgende Abschnitt ist nur ausgefüllt, wenn es eine lehrveranstaltungsspezifische Prüfung gibt.

<b>Prüfungsleistung</b>		<b>Prüfsprache</b>	
<b>Dauer PL in Minuten</b>		<b>Bewertungssystem PL</b>	
<b>Lernergebnisse</b>			
<b>Teilnahmevoraussetzungen</b>			

Der vorige Abschnitt ist nur ausgefüllt, wenn es eine lehrveranstaltungsspezifische Prüfung gibt.

<b>Lehrinhalte</b>	Dafny <ul style="list-style-type: none"> <li>• Preconditions and Postconditions</li> <li>• Loop invariants</li> <li>• Complex data structures and heap</li> </ul> Verification for popular languages <ul style="list-style-type: none"> <li>• OpenJML / Frama-C / Nagini/ ...</li> </ul> Real Time Systems <ul style="list-style-type: none"> <li>• CTL and CTL Model Checking</li> <li>• Uppaal and Timed Automata</li> </ul>
<b>Literatur</b>	<ul style="list-style-type: none"> <li>• Leino, K. Rustan M. <i>Program Proofs</i>. MIT Press, 2023.</li> <li>• Paper on JML / Uppaal / ...</li> </ul>
<b>Bemerkungen</b>	

## Module Course: Software Verification

(of Module: Software Verification)

<b>Course Type</b>	Practical Training	<b>Form of Learning</b>	Presence
<b>Mandatory Attendance</b>	yes	<b>ECTS Credit Points</b>	4
<b>Participation Limit</b>		<b>Semester Hours per Week</b>	3
<b>Group Size</b>	12	<b>Workload (hours)</b>	120
<b>Teaching Language</b>	German/English	<b>Presence Hours</b>	45
<b>Study Achievements ("Studienleistung", SL)</b>		<b>Self-Study Hours</b>	75
<b>SL Length (minutes)</b>		<b>SL Grading System</b>	

The following section is filled only if there is a course-specific exam.

<b>Exam Type</b>		<b>Exam Language</b>	
<b>Exam Length (minutes)</b>		<b>Exam Grading System</b>	
<b>Learning Outcomes</b>			
<b>Participation Prerequisites</b>			

The previous section is filled only if there is a course-specific exam.

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