### inf453 - Combination of Specification Techniques

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<th>Module label</th>
<th>Combination of Specification Techniques</th>
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<td>Module code</td>
<td>inf453</td>
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<tr>
<td>Credit points</td>
<td>6.0 KP</td>
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<td>Workload</td>
<td>180 h</td>
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| Used in course of study| - Master's Programme Computing Science > Theoretische Informatik
                              - Master's Programme Embedded Systems and Microrobotics > Akzentsetzungsmodule |
| Contact person         | Module responsibility                   |
|                        | - Andreas Hein                          |
|                        | - Ernst-Rüdiger Olderog                 |
|                        | - Die im Modul Lehrenden                |
| Authorized examiners   | - Andreas Hein                          |
|                        | - Ernst-Rüdiger Olderog                 |
|                        | - Die im Modul Lehrenden                |
| Entry requirements     | inf400/inf401 Theoretische Informatik I and II |
| Skills to be acquired in this module | Introduction to the specification languages Z for data, CSP for processes, and their combination CSP-OZ for reactive systems with data and process parts. |

### Professional competence
The students:

- specify data and processes with Z, CSP and CSP-OZ formally
- check data refinement relations formally
- verify CSP-OZ specifications with FDR model checker

### Methodological competence
The students:

- are able to integrate complementary specification methods

### Social competence
The students:

- work together in small groups to solve problems
- present solutions to problems to groups of other students

### Self-competence
The students:

- learn persistence in pursuing difficult tasks
- learn precision in specifying problems

### Module contents
The course addresses a research trend in formal methods, the combination and integration of different specification methods. It focuses on a concrete combination CSP-OZ of the specification techniques CSP (Communicating Sequential Processes) for processes and Z and Object-Z for data, respectively. Reactive systems are described by CSP-OZ.

As a preparation, the specification languages Z and CSP are described, followed by the combination CSP-OZ with its process-oriented semantics. The concepts of refinement and inheritance and the possibility of automatic verification of a sublanguage of CSP-OZ with the FDR model checker for CSP will be discussed. Finally, the course explains possibilities of extending CSP-OZ for the specification of time-critical systems.

**Topics:**

- specification of complex data and operations in Z, type definition and pattern calculations of Z, data refinement
- specifications of communicating processes in CSP, operational semantics of CSP, three abstract semantic models
for CSP: Trace semantics, failures semantics, failures-divergences semantics, process refinement in the above semantics, FDR model checker for CSP

- combined specification method CSP-OZ, transformational semantics as CSP-process, theorems of refinements,

object-oriented concepts of class and inheritance in CSP-OZ

Reader's advisory

Essential:


Recommended:


Links

Language of instruction: German
Duration (semesters): 1 Semester
Module frequency: unregelmäßig
Module capacity: unlimited
Module level: ---
Lern-/Lehrform / Type of program: je nach Studiengang Pflicht oder Wahlpflicht
Vorkenntnisse / Previous knowledge:
- inf400 Theoretische Informatik I
- inf401 Theoretische Informatik II

Examination

Final exam of module: At the end of the lecture period
Time of examination: exercises and oral exam
Type of examination:

Course type

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<th>Comment</th>
<th>SWS</th>
<th>Frequency</th>
<th>Workload attendance</th>
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<tr>
<td>Lecture</td>
<td>3.00</td>
<td>WiSe</td>
<td>42 h</td>
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<tr>
<td>Exercises</td>
<td>1.00</td>
<td>WiSe</td>
<td>14 h</td>
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Total time of attendance for the module: 56 h