Courses in English
Course Description

Department	-- please choose from drop down list --
Course title	**Functional Safety**
Hours per week (SWS)	4
Number of ECTS credits	5
Course objective	The ability to demonstrate functional safety requirements for a given system and to design a system with functional safety requirements in mind The ability to implement basic concepts (fault avoidance, software safety, risk assessment) of functional safety, taking into account relevant standards.
Prerequisites	
Recommended reading	D J Smith, K Simpson - Safety Critical Systems Handbook: A STRAIGHTFOWARD GUIDE TO FUNCTIONAL SAFETY, IEC 61508 (2010 EDITION) AND RELATED STANDARDS, INCLUDING PROCESS IEC 61511 AND MACHINERY IEC 62061 AND ISO 13849, Butterworth-Heinemann; 1 edition (November 11, 2010) M Medoff, R Faller - Functional Safety - An IEC 61508 SIL 3 Compliant Development Process, 3rd Edition, exida.com LLC; 3rd Edition edition (July 7, 2014) J Börcsök - Funktionale Sicherheit: Grundzüge sicherheitstechnischer Systeme, 2011, VDE-Verlag S Paulus - Basiswissen Sichere Software: Aus- und Weiterbildung zum SECO Certified Professionell for Secure Software Engineering, 2012, dpunkt.verlag P Löw - Funktionale Sicherheit in der Praxis: Anwendung von DIN EN 61508 und ISO/DIS 26262 bei der Entwicklung von Serienprodukten, 2010, dpunkt Verlag HL Ross - Funktionale Sicherheit im Automobil: ISO 26262, Systemengineering auf Basis eines Sicherheitslebenszyklus und bewährten Managementsystemen, 2014, Carl Hanser Verlag
Teaching methods	
Assessment methods	written exam, oral exam
Language of instruction	English
Name of lecturer	Dr. Jan Phillipps
Email	
Link	

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Course content

To an ever greater extent, daily life is influenced or even controlled by software-intensive systems. Human lives often depend on the reliable and safe execution of the functionality. Examples include airbag control, the autopilot of an airplane, a robotic arm in surgery, or the autonomously driving car of the future.

In these systems, reliability (occurrence of failures without hazard) and safety (failures with hazard potential) play a decisive role. Functional safety methods are used to ensure and analyze reliable and safe execution of these functions during normal operation and to control failures and faults. The areas of application in practice are correspondingly wide-ranging: automotive engineering, aviation, automation technology or medical technology are just a few examples.

In this course, you will learn about various aspects of reliability and security and be able to analyze simple systems, identify vulnerabilities, and identify countermeasures. Among others, the following topics will be covered in the lecture:

- Methods of risk assessment (probability of failure according to ISO 61508, among others) as well as common methods for system analysis (e.g. FMEA, FTA, FHA, ETA)

- Parameters of functional safety, such as fault probability or fault tolerance

- Mathematical methods for reliability and safety analysis

- Methods for monitoring, detecting and controlling random and systematic errors

- Process models and programming guidelines

- Discussion and classification of the relevant standards (including ISO 13849, IEC 62061, IEC 61508, IEC 61511, ISO 26262) regarding statement, content, regulations and implementation in the software development process

Remarks

In these systems, reliability (occurrence of failures without hazard) and safety (failures with hazard potential) play a decisive role. Functional safety methods are used to ensure and analyze reliable and safe execution of these functions during normal operation and to control failures and faults. The areas of application in practice are correspondingly wide-ranging: automotive engineering, aviation, automation technology or medical technology are just a few examples.