Dieses Wahlpflichtmodul ist ein Angebot der:

Fachhochschule Dortmund

University of Applied Sciences and Arts

Master Embedded Systems for Mechatronics

Requirements Engineering

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Requirements Engineering (MOD1-04)

Code Number	Workload	Credits	Semester	Frequency	Duration
10140/41	180 h	6	Sem. 1	annually	1 Semester

1	Course Title	Contact hours	Self-Study	Planned Group Size
	Requirements Engineering	4 SWS / 60 h	120 h	25 students

2	Course Description
	Requirements engineering (RE) is the very first activity in software, systems, and service development. This course builds on software engineering skills from 1st semester (UML, SysML). Deriving a comprehensive set of requirements is a mandatory and critical task in the early phase of the systems engineering design flow. Requirements are the starting point and main angle for design, verification & validation, and for the test and integration of systems. Configuration and change request management are connected with RE. Defining requirements and dealing with requirements in a structured way is still a major area for research on tools and methodologies – especially for large and complex mechatronic systems. In this module, students will get specific knowledge about the state of the art and the main future challenges in Requirements engineering.

3	Course Structure
	1. Introduction (What is a requirement?, problem vs. solution) 2. Frameworks (e.g. Jackson's WRSPM Modell) 3. Requirements Engineering Process (stakeholder, activities) 4. System and system context 5. Elicitation of requirements (techniques and supporting activities, Kano model) 6. Textual requirements documents 7. Requirements modeling (e.g. goal-oriented modeling, requirements patterns) 8. Non-functional requirements 9. Validation of requirements 10. Requirements Management (attributes, prioritization, traceability, change management, RE tools, CMMI, ReqIF exchange format) 11. Software product lines and variability management

4	Parameters
	• Course characteristics: compulsory • Course frequency: every year - summer semester • Capacity: 25 students • Course admittance prerequisites: none • Skills trained in this course: practical, methodological, and personal skills • Assessment of the course: Paper/essay on literature review about recent research as individual homework (50%) and group work as homework (50%): DOORS demonstration and presentation of example • Teaching staff: Prof. Dr. Erik Kamsties, (n.n.)

5	**Learning outcomes**
	5.1 Knowledge • Knows frameworks and models for RE • Knows relevant RE processes and interfaces to other processes • Knows concepts and recent research on product line and variability management 5.2 Skills • Can model requirements with RE tools • Can set up and integrate RE tools into tool chains and design flows • Can derive requirements in a structured and comprehensive way 5.3 Competence - attitude • Understands the importance of RE in the early project phase • Can set up and lead RE in a cross domain team
6	**Teaching and training methods** • Lectures introducing concepts, methods and tools • Group work to train concepts and methods, to develop skills and to work on case studies • Literature review and Essay writing • Home work to add contributions on a case study as group work • Presentations to communicate and demonstrate homework
7	**Course mapping** Module shared with Master Digital Transformation and Master Informatik Input for: • MOD-E10 – Automotive Systems Connects to: • MOD2-01 – Mechatronic Systems Engineering • MOD2-03 – R&D Project Management
8	**References** Pohl, K.; Requirements Engineering: Fundamentals, Principles, and Techniques, Springer 2010. Robertson, S. and Robertson, J.; Mastering the Requirements Process: Getting Requirements Right, Addison-Wesley, 2012. van Lamsweerde, A.; Requirements Engineering: From System Goals to UML Models to Software Specifications, John Wiley & Sons, 2009.