

Modulbezeichnung	Mechatronics & Robotic Systems	
Semester	2	
ECTS-Punkte (Dauer)	5 (1 Semester)	
Art	Pflichtfach	
Studentische Arbeitsbelastung	60 h Kontaktzeit + 90 h Selbststudium	
Voraussetzungen (laut BPO)		
Empf. Voraussetzungen		
Verwendbarkeit	Mall	
Prüfungsform und -dauer	Klausur 1,5 h oder mündliche Prüfung	
Lehr- und Lernmethoden	Vorlesung, Praktikum	
Modulverantwortlicher	A. W. Colombo	
Qualifikationsziele	<p>The students understand and are able to describe the mechatronics and SW structure of robots. They have know-how about robotic applications, centred around industrial processes, they also gain an insight into additional fields including Medical Robotics, Search and Rescue Robots, Agricultural Robots and more. In these areas they gain knowledge about both, the internal hardware components of robots, their many sensors, actuators, and physical configurations, as well as the algorithmic Kinematics and Dynamics and software components required to drive them. Concentrating on the industrial Applications the students become familiar with the periphery of a standard industrial robotic cell, and its interaction in the complete process environment. Knowledge about standard SW-Interfaces to integrate robots in an Industrial Cyber-Physical System are acquired by learning the robot as a CPS-component within a RAMI4.0-compliant automation architecture.</p>	
Lehrinhalte	<p>Overview of different types of robots including structural and behavioral specifications: working-space, energy-sources, etc. Introduction to Robotic Kinematics (forward and backward), Robotic Dynamics. HW- and SW- Interfaces for integrating the robot in an industrial flexible cell. Selection of different types of Sensors, Actuators and Grippers as well as their application domains. Overview of current and emerging fields for robotics: Industrial Robotics, Medical Robotics, Delivery Robotics, Agricultural Robotics: which requirements are important for which application. Overview of traditional industrial robotized process: welding, cutting, cleaning, palletizing, tendering, assembly/disassembly: which kind of robot and energy source is recommendable for each kind of application. SW-Communication Interfaces for connecting a robot to a ICPS-based service cloud. Combining seminars and practical projects, contents will be adapted to the latest outcomes of research and Innovation projects des Institutes I2AR.</p>	
Literatur	<ul style="list-style-type: none"> - John J Craig: Introduction to Robotics, Mechanics and Control. Prentice Hall 2003. - Heimann, B., Gerth, G. und Popp, K.: Mechatronik, 3. Auflage, Hanser 2007. - Roddeck, W.: Einführung in die Mechatronik, Teubner, Stuttgart, 1997. - Vogel, J.: Elektrische Antriebe, Hüthig, Berlin, 1988. - www.stamina-robot.eu - Script / Lecture-Notes. - Steven M. LaValle, Planning Algorithms, Cambridge University Press, 2006 	
Lehrveranstaltungen		
Dozent	Titel der Lehrveranstaltung	SWS
G. Kane	Mechatronics	2
A. W. Colombo	Robotic Systems	2