

Module: Automation Systems – Industrial Robots

Level	Bachelor	Short Name	AuSysRob
Responsible Lecturers	Prof. Dr.-Ing. J.-Christian Töbermann		
Department, Facility	Electrical Engineering and Computer Science		
Course of Studies	Information Technology, Bachelor		
Compulsory/elective	Elective	ECTS Credit Points	5
Semester of Studies	(Unspecified)	Semester Hours per Week	4
Length (semesters)	1	Workload (hours)	150
Frequency	(Flexible)	Presence Hours	60
Teaching Language	English	Self-Study Hours	90

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

Exam Type	Portfolio Exam	Exam Language	English
Exam Length (minutes)		Exam Grading System	One-third Grades
Learning Outcomes	<p>The students:</p> <ul style="list-style-type: none"> • are able to describe the design and operation of a stationary industrial robot • know the basic methods for modeling, analyzing, and controlling robots. • are able to apply the methods to various industrial robotics systems. • know and understand the operating principles of various sensors in robotics. • know basic control concepts in robotics • are able to analyze control concepts with respect to their static and dynamic behavior • are able to program an industrial robot, taking into account the advantages and disadvantages of various methods 		
Participation Prerequisites			

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

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

Module Course: Automation Systems – Industrial Robots (Lecture)

(of Module: Automation Systems – Industrial Robots)

Course Type	Lecture	Form of Learning	Presence
Mandatory Attendance	no	ECTS Credit Points	3,5
Participation Limit		Semester Hours per Week	3
Group Size		Workload (hours)	105
Teaching Language	English	Presence Hours	45
Study Achievements ("Studienleistung", SL)		Self-Study Hours	60
SL Length (minutes)		SL Grading System	

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

Exam Type		Exam Language	
Exam Length (minutes)		Exam Grading System	
Learning Outcomes			
Participation Prerequisites			

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

Contents	<ul style="list-style-type: none"> • Elementary Concepts of Stationary Robots • Path Control <ul style="list-style-type: none"> • Interpolation • Point-to-Point Control (PTP) • Cartesian Path Control (Continuous Path) • Crossing Intermediate Positions without Stopping • Synchronizing Robots • Programming Robots <ul style="list-style-type: none"> • Online Programming <ul style="list-style-type: none"> • Teach-In Programming • Force Control-Teach-In, • Master-Slave Programming • The Practical Use of Reference Systems <ul style="list-style-type: none"> • Inteaching a Coordinate System • Inteaching a Tooling Point • Examples of Reference Systems • Offline Programming • Kinematics of Serial Robots <ul style="list-style-type: none"> • Description of a Robot Position • The Kinematic Forward Transformation • The Kinematic Backward Transformation
Literature	Siciliano B., Khatib, O.; Handbook of Robotics; Springer Verlag (last edition)

S.B. Niku: Introduction to Robotics (last edition)
Further literature will be named in the lecture.

Remarks	
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Module Course: Automation Systems – Industrial Robots (Exercises)

(of Module: Automation Systems – Industrial Robots)

Course Type	Exercise	Form of Learning	Presence
Mandatory Attendance	no	ECTS Credit Points	1,5
Participation Limit		Semester Hours per Week	1
Group Size	12	Workload (hours)	45
Teaching Language	English	Presence Hours	15
Study Achievements ("Studienleistung", SL)		Self-Study Hours	30
SL Length (minutes)		SL Grading System	

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

Exam Type		Exam Language	
Exam Length (minutes)		Exam Grading System	
Learning Outcomes			
Participation Prerequisites			

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

Contents	In the exercises during the semester, the students apply what they have learned in the lecture to given or self-study topics for selected application scenarios.
Literature	See lecture
Remarks	