Module MA-INF 4113	**Cognitive Robotics**				
Workload 180 h	**Credit points** 6 CP	**Duration** 1 semester	**Frequency** every year		
Module coordinator	Prof. Dr. Sven Behnke				
Lecturer(s)	Prof. Dr. Sven Behnke				
Classification	**Programme** M. Sc. Computer Science		**Mode** Optional	**Semester** 1. or 2.	
Technical skills	This lecture is one of two introductory lectures of the intelligent systems track. The lecture covers cognitive capabilities of robots, like self-localization, mapping, object perception, and action-planning in complex environments. This module complements MA-INF 4114 and can be taken before or after that module.				
Soft skills	Communicative skills (oral and written presentation of solutions, discussions in small teams), self competences (ability to accept and formulate criticism, ability to analyze problems)				
Contents	Probabilistic approaches to state estimation (Bayes Filters, Kalman Filter, Particle Filter), motion models, sensor models, self-localization, mapping with known poses, simultaneous mapping and localization (SLAM), iterated closest-point matching, path planning, place- and person recognition, object recognition.				
Prerequisites	**Required**: None of the following modules have been passed: MA-INF 4101 – Theory of Sensorimotor Systems				
Format	**Teaching format**	**Group size**	**h/week**	**Workload[h]**	**CP**
	Lecture	60	2	30 T / 45 S	2.5
	Exercises	30	2	30 T / 75 S	3.5
	T = face-to-face teaching; S = independent study				
Exam achievements	Written exam (graded)				
Study achievements	Successful exercise participation (not graded)				
Forms of media					
Literature	• S. Thrun, W. Burgard and D. Fox: Probabilistic Robotics. MIT Press, 2005. • B. Siciliano, O. Khatib (Eds.): Springer Handbook of Robotics, 2008. • R. Szeliski: Computer Vision: Algorithms and Applications, Springer 2010.				