

Module Handbook (<https://modhb.uni-kl.de/>)

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## Module INF-61-33-M-6

Autonomous Mobile Robots (M, 8.0 LP)

### Module Identification

Module Number	Module Name	CP (Effort)
INF-61-33-M-6	<i>Autonomous Mobile Robots</i>	8.0 CP (240 h)

### Basedata

CP, Effort	8.0 CP = 240 h
Position of the semester	1 Sem. in SuSe
Level	[6] Master (General)
Language	[DE/EN] German or English as required
Module Manager	Berns, Karsten, Prof. Dr. (PROF   DEPT: INF) (/staff/528/)
Lecturers	Berns, Karsten, Prof. Dr. (PROF   DEPT: INF) (/staff/528/)
Area of study	[INF-ES] Embedded Systems and Robotics
Reference course of study	[INF-88.79-SG] M.Sc. Computer Science (/mhb/FB-INF/cos-536/)
Lifecycle-State	[NORM] Active

### Courses

Type/SWS	Course Number	Choice in Module-Part	SL	PL	CP	Sem.
4V+2U	INF-61-33-K-6 (/mhb/courses/INF-61-33-K-6/)	P	U-Schein	PL1	8.0	SuSe

- About [INF-61-33-K-6] (/mhb/courses/INF-61-33-K-6/): Title: "Autonomous Mobile Robots"; Presence-Time: 84 h; Self-Study: 156 h
- About [INF-61-33-K-6] (/mhb/courses/INF-61-33-K-6/): The study achievement "[U-Schein] proof of successful participation in the exercise classes (ungraded)" must be obtained.
  - It is a prerequisite for the examination for PL1.

## Examination achievement PL1

- Form of examination: **oral examination (20-60 Min.)**
- Examination Frequency: each semester
- Examination number: 66133 ("Autonomic Mobile Robots I, II")

## Evaluation of grades

The grade of the module examination is also the module grade.

### Contents

From [INF-61-33-K-6] **Autonomous Mobile Robots** (/mhb/courses/INF-61-33-K-6/):

- AMR system components
- Kinematics and dynamics of wheel-driven robots
- Collision avoidance
- Navigation
- SLAM (Simultaneous Localisation and Mapping)
- Algorithms for the estimation of positions
- Vision in mobile robotics

### Competencies / intended learning achievements

Upon successful completion of the module, students will be able to

- explain the conception and construction of autonomous systems
- apply kinematic and dynamic modeling of wheel-based robots
- explain algorithmic principles for localization in autonomous systems,
- select and apply suitable algorithms for autonomous systems in a problem-oriented way,
- apply basic positioning techniques,
- derive key challenges of mapping and localization,
- characterize central challenges of image processing for mobile robots,
- design complex control architectures,
- derive central challenges in the coordination of autonomous systems.

### Literature

From [INF-61-33-K-6] **Autonomous Mobile Robots** (/mhb/courses/INF-61-33-K-6/):

- R- Siegwart and I.R. Nourbakhsh (2004). Introduction to Autonomous Mobile Robots. The MIT Press.
- S. Iyengar and A. Elfes (1991). Autonomous Mobile Robots - Perception, Mapping and Navigation, volume 1. Institute of Electrical and Electronic Engineers.
- Jones, J. L. (1993). Mobile Robots — From Inspiration to Implementation. Addison Wesley.
- Concrete literature will be announced in the lecture.

### Requirements for attendance of the module (informal)

#### Modules:

- [INF-02-09-M-2] Digital Systems and Computer Architecture (M, 8.0 LP) (/mhb/modules/INF-02-09-M-2/)
- [INF-02-10-M-2] Computer Organization and System Software (M, 8.0 LP) (/mhb/modules/INF-02-10-M-2/)
- [INF-60-02-M-5] Fundamentals of Robotics (M, 6.0 LP) (/mhb/modules/INF-60-02-M-5/)
- [INF-60-03-M-5] Fundamentals of Embedded Systems (M, 8.0 LP) (/mhb/modules/INF-60-03-M-5/)

### Requirements for attendance of the module (formal)

None

## References to Module / Module Number [INF-61-33-M-6]

Course of Study	Section	Choice/Obligation
[EIT-88.A20-SG#2021] M.Sc. European Master in Embedded Computing Systems (EMECS) [2021] (/mhb/FB-EIT/cos-566/)	[Free Elective Area] Elective Subjects	[W] Elective Module
[EIT-88.?-SG#2021] M.Sc. Embedded Computing Systems (ESY) [2021] (/mhb/FB-EIT/cos-677/)	[Free Elective Area] Elective Subjects	[W] Elective Module
[INF-88.79-SG] M.Sc. Computer Science (/mhb/FB-INF/cos-536/)	[Specialisation] Specialization 1	[WP] Compulsory Elective
Module-Pool	Name	
[EIT-AC-MS-C-TW-MPOOL-7 (/mhb/modulepools/EIT-AC-MS-C-TW-MPOOL-7/)]	General Elective Modules Master A&C	
[INF-SIAK-DT-ENG-MPOOL-6 (/mhb/modulepools/INF-SIAK-DT-ENG-MPOOL-6/)]	SIAK Certificate "Digital Transformation" - Modules INF "Engineering"	
[MV-MBINFO-MPOOL-6 (/mhb/modulepools/MV-MBINFO-MPOOL-6/)]	Wahlpflichtmodule Maschinenbau mit angewandter Informatik	