

Module: Advanced Machine Vision

Level	Master	Short Name	AMV
Responsible Lecturers	Prof. Dr. Ralph Hänsel		
Department, Facility	Electrical Engineering and Computer Science		
Course of Studies	Applied Information Technology, Master		
Compulsory/elective	Compulsory elective	ECTS Credit Points	5
Semester of Studies	(Unspecified)	Semester Hours per Week	4
Length (semesters)	1	Workload (hours)	150
Frequency	WiSe	Presence Hours	60
Teaching Language	German/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	German/English
Exam Length (minutes)		Exam Grading System	One-third Grades
Learning Outcomes	<ul style="list-style-type: none"> • Students can describe the main functionalities of the robot operating system 2 (ROS2) • Students can integrate new functional blocks into ROS2 • Students can describe basic deep learning architectures for object detection and other tasks in machine vision • Students can perform the training of a given object detector model on a custom dataset and evaluate the performance • Students can describe the properties of the environment model • Students can apply different depth estimation technologies to estimate the position of a detected object • Students can describe technologies for ego-motion estimation and joint map generation (SLAM) • Students can state the physical description of light 		
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	Robotics
Remarks	

Module Course: Advanced Machine Vision (Lecture)

(of Module: Advanced Machine Vision)

Course Type	Lecture	Form of Learning	Presence
Mandatory Attendance	no	ECTS Credit Points	3
Participation Limit		Semester Hours per Week	3
Group Size		Workload (hours)	90
Teaching Language	German/English	Presence Hours	45
Study Achievements ("Studienleistung", SL)		Self-Study Hours	45
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	<p>The course is focused on autonomous driving and how vision can play an important role as a sensor in an autonomous robot</p> <p>Processing Environment (ROS2)</p> <p>Image and Light</p> <p>Deep Learning in Machine Vision</p> <p>Environment Model</p> <p>Functional Safety Aspects</p>
Literature	Literature will be given in the lecture
Remarks	

Module Course: Advanced Machine Vision (Lab)

(of Module: Advanced Machine Vision)

Course Type	Practical Training	Form of Learning	Presence
Mandatory Attendance	no	ECTS Credit Points	2
Participation Limit		Semester Hours per Week	1
Group Size	12	Workload (hours)	60
Teaching Language	German/English	Presence Hours	15
Study Achievements ("Studienleistung", SL)		Self-Study Hours	45
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	See lecture
Literature	See lecture
Remarks	