

## Course

# ATS - Autonomous Systems

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### ^ General information

<b>Long name</b>	Autonomous Systems
<b>Approving CModule</b>	<a href="#">ATS_BaET</a> , <a href="#">ATS_BaTIN</a>
<b>Responsible</b>	Prof. Dr. Chunrong Yuan Professor Fakultät IME
<b>Level</b>	Bachelor
<b>Semester in the year</b>	summer semester
<b>Duration</b>	Semester
<b>Hours in self-study</b>	69
<b>ECTS</b>	5
<b>Professors</b>	Prof. Dr. Chunrong Yuan Professor Fakultät IME
<b>Requirements</b>	Capability of algorithm analysis and implementation Knowledge of signal processing and mathematics Capability of software and project development Basic knowledge of embedded software
<b>Language</b>	German and English
<b>Separate final exam</b>	Yes

## Final exam

### Details

Oral exam, with the option of written examination if necessary (e.g.: in case of a large number of participants)

### Minimum standard

At least 50% with correct answers

## Exam Type

Oral exam, with the option of written examination if necessary (e.g.: in case of a large number of participants)

## ^ Lecture

### Learning goals

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#### Knowledge

Sensors  
Wheel/motor sensors  
Heading sensors  
Positioning sensors  
Cameras  
Locomotion  
Wheeled mobile robots  
Legged mobile robots  
Data processing and feature extraction  
Edge detection  
Line extraction  
Point detection and description  
Recognition and Modelling  
Object detection  
Place recognition  
3D motion and structure estimation  
Navigation  
Localization  
Mapping  
Path planning

### Expenditure classroom teaching

Type	Attendance (h/Wk.)
Lecture	2
Tutorial (voluntary)	0

### Separate exam

none

## ^ Practical training

### Learning goals

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#### Skills

Teamwork: Development of systems with intelligent behaviours for autonomous interpretation of sensor data and real-time robot control. The goal is to realize prototypes with the required functions.

### Expenditure classroom teaching

Type	Attendance (h/Wk.)
Practical training	0.5
Tutorial (voluntary)	0

### Separate exam

#### Exam Type

working on projects assignment with your team e.g. in a lab)

#### Details

Evaluation of the achieved results based on presentations, live demonstrations, discussions as well as documentations in form of texts, source codes, graphic illustrations and video clips

#### Minimum standard

On-schedule delivery, presentation and demonstration of the realized systems according to task descriptions.

## ^ Exercises

### Learning goals

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#### Skills

Sensor characterization

Feature extraction

Image matching and clustering

Image based place recognition

Motion analysis

Programming of robot behaviour

## Expenditure classroom teaching

Type	Attendance (h/Wk.)
Exercises (whole course)	1
Exercises (shared course)	1
Tutorial (voluntary)	0

## Separate exam

none