inf307 - Robotics

<table>
<thead>
<tr>
<th>Module name</th>
<th>Robotics</th>
</tr>
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<tbody>
<tr>
<td>Module code</td>
<td>inf307</td>
</tr>
<tr>
<td>ECTS credit points</td>
<td>6.0 KP</td>
</tr>
<tr>
<td>Workload</td>
<td>180 h</td>
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**Used in degree programmes**
- Master's Programme Computing Science > Mastermodule
- Master's Programme Embedded Systems and Microrobotics > Akzentsetzungsmodule
- Master's Programme Engineering of Socio-Technical Systems > Embedded Brain Computer Interaction
- Master's Programme Engineering of Socio-Technical Systems > Human-Computer Interaction
- Master's Programme Engineering of Socio-Technical Systems > Systems Engineering

**Contact person**

- module responsibility
  - Andreas Hein
  - Die im Modul Lehrenden
- authorized examiners
  - Die im Modul Lehrenden
  - Andreas Hein

**Prerequisites**

**Skills to be acquired in this module**

**Professional competence**

The students:
- Name and know the functions and applications of robot systems
- Characterise the basic concepts to program robot systems
- Differentiate between the interaction of mechanical, electrical and software components

**Methodological competence**

The students:
- Define characteristics and components of robot systems for a specific application
- Design and implement robot system sub-components
- Design and parameterise simple control structures
- Plan the application of robot systems and derive the requirements
- Model electrical and mechanical systems
- Develop and realise simple robot systems

**Social competence**

The students:
- Solve robot systems problems in team work

**Self-competence**

The students:
- Reflect their solutions in reference to robot system methods
Module contents

- Integration in production plants / aims / subsystems
- Architectures / classifications (classification of robots)
- Robot components + Computer systems for programming
  - PA-10
  - Lego Mindstorms
- Basics of kinematics
  - Coordinate transformation, homogeneous coordinates, Coordinate transitions
  - Kinematic equation systems, transformation of vectors
- Kinematic
  - Joint types (manipulators) / Wheels, TCP
  - Denavit-Hartenberg-Transformation
  - Forward calculation
  - Backward calculation
- Sensors
  - General properties of sensors, parameter
  - Simple optical position sensors
  - Inductive-, capacitive- und ultrasonic-sensors
  - Distance sensors (laser scanner, triangulation sensors)
  - Force sensors
  - Sensor data preparation
- Planning / Regulation
  - Overall regulation approach, terms, process- and control functions, PID-controller
  - Planning concepts and approaches (On-Line, Off-Line), planning processes, construction and path planning
- Actuators

Recommended reading

**essential:**
lecture nodes

**recommended:**

**secondary literature:**

Links

<table>
<thead>
<tr>
<th>Languages of instruction</th>
<th>German, English</th>
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<tr>
<td>Duration (semesters)</td>
<td>1 semester</td>
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<tr>
<td>Module frequency</td>
<td>once a year</td>
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<tr>
<td>Module capacity</td>
<td>Unlimited</td>
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<tr>
<td>Modullevel</td>
<td>AS (Akzentsetzung / Accentuation)</td>
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<tr>
<td>Modulart</td>
<td>Pflicht o. Wahlpflicht / compulsory or optional</td>
</tr>
<tr>
<td>Lern-/Lehrform / Type of program</td>
<td>V+Ü</td>
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**Vorkenntnisse / Previous knowledge**

<table>
<thead>
<tr>
<th>Examination</th>
<th>Examination periods</th>
<th>Type of examination</th>
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<tbody>
<tr>
<td>Final exam of module</td>
<td>At the end of the lecture period</td>
<td>Portfolio: Hands-on exercises, report, and written or oral exam</td>
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<table>
<thead>
<tr>
<th>Course type</th>
<th>Comment</th>
<th>SWS</th>
<th>Course frequency</th>
<th>Workload attendance</th>
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<tbody>
<tr>
<td>Lecture</td>
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<td>3</td>
<td>SumSem</td>
<td>42 h</td>
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<tr>
<td>Exercises</td>
<td></td>
<td>1</td>
<td>SumSem</td>
<td>14 h</td>
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**Total attendance time for module** 56 h