Module title | Abbreviation
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Robotics 1 | 10-I=RO1-152-m01

Module coordinator | Module offered by
holder of the Chair of Computer Science VII | Institute of Computer Science

<table>
<thead>
<tr>
<th>ECTS</th>
<th>Method of grading</th>
<th>Only after succ. compl. of module(s)</th>
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<tbody>
<tr>
<td>8</td>
<td>numerical grade</td>
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<tr>
<th>Duration</th>
<th>Module level</th>
<th>Other prerequisites</th>
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<tr>
<td>1 semester</td>
<td>graduate</td>
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**Contents**

History, applications and properties of robots, direct kinematics of manipulators: coordinate systems, rotations, homogenous coordinates, axis coordinates, arm equation. Inverse kinematics: solution properties, end effector configuration, numerical and analytical approaches, examples of different robots for analytical approaches. Workspace analysis and trajectory planning, dynamics of manipulators: Lagrange-Euler model, direct and inverse dynamics. Mobile robots: direct and inverse kinematics, propulsion system, tricycle, Ackermann steering, holonomes and non-holonomic restrictions, kinematic classification of mobile robots, posture kinematic model. Movement control and path planning: roadmap methods, cell decomposition methods, potential field methods. Sensors: position sensors, speed sensors, distance sensors.

**Intended learning outcomes**

The students master the fundamentals of robot manipulators and vehicles and are, in particular, familiar with their kinematics and dynamics as well as the planning of paths and task execution.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (4) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

written examination (approx. 60 to 90 minutes)
creditable for bonus

**Allocation of places**

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**Additional information**

Focuses available for students of the Master’s programme Informatik (Computer Science, 120 ECTS credits): IS, ES, LR, HCI

**Workload**

240 h

**Teaching cycle**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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**Module appears in**

- Master’s degree (1 major) Space Science and Technology (2015)
- First state examination for the teaching degree Gymnasium Computer Science (2015)
- Master’s degree (1 major) Computer Science (2016)
- Master’s degree (1 major) Mathematics (2016)
- Master’s degree (1 major) Computational Mathematics (2016)
- Master’s teaching degree Gymnasium MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
- Supplementary course MINT Teacher Education PLUS, Elite Network Bavaria (ENB) (2016)
- Master’s degree (1 major) Computer Science (2017)
- Master’s degree (1 major) Satellite Technology (2018)
<table>
<thead>
<tr>
<th>Master's degree (1 major) Computational Mathematics (2019)</th>
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<tr>
<td>Master’s degree (1 major) Mathematics (2019)</td>
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