DD2410 Introduction to Robotics 7.5 credits

Introduktion till robotik

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

The official course syllabus is valid from the autumn semester 2024 in accordance with the decision from the director of first and second cycle education: J-2024-0713.Decision date: 2024-04-15

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Computer Science and Engineering

Specific prerequisites

- Knowledge in linear algebra, 7,5 credits, equivalent to completed course SF1624/SF1672/SF1684.
- Knowledge in multivariable calculus, 7,5 credits, equivalent to completed course SF1626/SF1674.

- Knowledge and skills in programming, 6 credits, equivalent to completed course DD1337/DD1310-DD1319/DD1321/DD1331/DD100N/ID1018.
- Knowledge in basic computer science, 6 credits, equivalent to completed course DD1338/DD1320-DD1328/DD2325/ID1020/ID1021.

and at least one of the following:

- knowledge in automatic control, 6 credits, equivalent to completed course EL1000/EL1010/EL1110/EL1120

or

- knowledge of mechanics, 6 credits, equivalent to completed course SG1120/SG1130/SG1132

or

- additional skills in independent software development, 12 credits, from completed courses in computer science, computer technology or numerical methods with laboratory elements that are not carried out in groups larger than two people. These courses are in addition to the above mentioned courses.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After completing the course with a passing grade the student should be able to:

- use basic theoretical tools from robotics to describe and calculate kinematics and dynamics for robot systems with several degrees of freedom
- account for and apply algorithms to generate path plans
- account for and apply algorithms for high level task switching,
- account for and apply algorithms for mapping
- account for different methods for exteroceptive sensors as well as navigation and localisation
- use modern software architectures for development of robot applications
- summarise the included subject areas in robotics
- account for different types of hardware and software that are used in robot systems

In order to:

- be able to participate in development and implementation of simple robot systems
- obtain a good basis for continued studies in robotics and related subjects.

Course contents

Kinematics and dynamics for mobile and articulated robots. Description models applicable for robot system, such as Denavit-Hartenberg notation, homogeneous transforms etc
Sensors, actuators and other robot hardware
Algorithms for calculation of inverse kinematics, robot dynamics, trajectories and planning.
Software architectures for robot systems and simulators

Examination

- LAB1 - Laboratory assignments, 5.0 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Written examination, 2.5 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

TEN1 is conducted as a written exam.

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.