

Course guide

300120 - ROBOTOS - Robot Operating Systems

Last modified: 04/07/2026

Unit in charge: Castelldefels School of Telecommunications and Aerospace Engineering
Teaching unit: **Degree:** MASTER'S DEGREE IN ARTIFICIAL INTELLIGENCE FOR CONNECTED INDUSTRIES (AI4CI) (Syllabus 2025). (Optional subject).

Academic year: 2026 **ECTS Credits:** 3.0 **Languages:** English

LECTURER

Coordinating lecturer: Óscar Casas
Others: Óscar Casas (UPC), Birte Glimm (Univ. Ulm)

PRIOR SKILLS

Linear algebra and analysis, programming in Python or C++

REQUIREMENTS

Linear algebra and analysis, programming in Python or C++

TEACHING METHODOLOGY

Lectures, assignments, lab

LEARNING OBJECTIVES OF THE SUBJECT

Students will understand the fundamental theoretical and algorithmic principles behind robotic systems. Students are able to solve robot specific learning problems involving, for example, navigation and mapping, grasping and manipulation, and interaction with humans. They understand the ROS Ecosystem (topics, nodes, messages, services, actionlib) and are able to develop simple applications to control robot motion.

STUDY LOAD

Type	Hours	Percentage
Hours large group	27,0	36.00
Self study	48,0	64.00

Total learning time: 75 h



CONTENTS

Robot Operating Systems

Description:

This course gives an introduction to the Robot Operating System (ROS) including available tools that are commonly used in robotics. With the help of examples, the course provides a starting point for working with robots. The course covers how to create software including simulation, to interface sensors and actuators, and to integrate control algorithms.

ROS architecture: Master, nodes, topics, messages, services, parameters and actions.

Console commands: Navigating and analyzing the ROS system and the catkin workspace.

Creating ROS packages: Structure, launch-âfiles, and best practices.

Simulating with ROS: robot models (URDF) and simulation environments.

Working with visualizations and user interface tools.

Introduction to ROS2.

Full-or-part-time: 75h

Theory classes: 27h

Self study : 48h

GRADING SYSTEM

Continuous monitoring (portfolio).