The Course Catalogue

Module Code	Semester	Total SWS	Total ECTS	Lecture	Tutorial	Laboratory
ROB	2	3	5	1	0	0

Course Name	Robotics		
Study Programme	M.Sc. Smart Technologies		
Course Type	Compulsory	**Course Language**	English
Lecture Prerequisites	The students should have a good grasp on the C/C++ and/org Python Programming languages and have preliminary working knowledge with kinematics.		
Course Objectives	The goal of this lecture is to give you a better view of how to control robots using different programming methods. This lecture will introduce ROS, a versatile software capable of doing pathfinding and localisation, a perfect fit for use in mobile robotics.		
Primary Course Content	Lecture Book (GitHub)		
Secondary Course Content(s)	M. M. Bassa, *A very informal journey through ROS 2*, Self-Published. F. M. Rico, *A Concise Introduction to Robot Programming with ROS2*, Taylor Francis (2022). B. Stroustrup, *Programming Principles and Practice using C++*, Addison Wesley (2014).		
Homework(s) and Project(s)	Personal Assignment (100)		
Laboratory Sessions	None		

	Activity	Quantity	Grade Effect
Assessment Criteria	Midterm Exam		
	Quizzes		
	Homework	1	100
	Projects		
	Term Paper/Project		
	Laboratory Work		
	Other Activities		
	Final Exam		
	Sum		100

Lecture Structure

Order	Topic	Units	Self Study
1	Mobile Robot Navigation Methods	3	6
	Introduction | The Problems of Noise and Aliasing | Localisation v. Hard-Coded Navigation | Representing Belief | Representing Maps | Probabilistic Map-Based Localisation | Other Examples of Localisation Methods | Building Maps		
1	The GNU/Linux Operating System	3	6
	Learning the Linux Command Line | Installation | Introduction | The Structure of Commands | Helpful Keyboard Shortcuts for the Terminal | When you need help with Commands | Additional Information		
2	ROS 2 Introduction and Concepts	3	6
	Introduction | Nodes-The Building Blocks | The Discovery Process | Communication Between Nodes | Topics | Services | Actions | Parameters | Working with Command Line | Launch File		
3	Programming with Client Libraries	6	12
	Using turtlesim, ros2, and rqt | Understanding nodes | Understanding topics | Understanding services | Understanding parameters | Understanding actions | Using graphs to view logs | Using colcon to build packages | Creating a workspace | Creating a package | Writing a simple publisher and subscriber | Writing a simple service and client | Creating custom msg and srv files | Implementing custom interfaces | Using parameters in a class | Using ros2doctor to identify issues		
4	Simulations and TF Trees	3	6
	Introduction to tf2 | Writing a static broadcaster | Writing a broadcaster | Writing a listener | Adding a Frame		
5	**Sum**	15	30

- Any major announcements shall be made in SAKAI regarding any possible date changes for the assignment and/or exam.
- Any lecture material shall be posted at the lectures GitHub webpage.