ELEC3210 Machine Learning and Information Processing for Robotics   Fall 2023

■ Course Description

The real course title should be "**Introduction to Mobile Robotics**" in Fall 2023. This course gives a comprehensive introduction to mobile robot and autonomous navigation. The goal of this course is to expose students to relevant conceptual knowledges, mathematical foundations and algorithms, and help them to develop real-time software modules for autonomous navigation. Topics to be covered include ROS, locomotion, sensors, SLAM, motion planning and advanced robotics.

■ Platform

All on Convas

■ Team

Instructor

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Teaching Assistant

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■ Timetable (Tentative)

Lecture	Date	Contents	Projects
L1	04/09	Robotics, Autonomous Mobile Robot	**(Install Ubuntu & ROS)**
L2	06/09	Pose, ROS	
L3	11/09	Localization, Wheeled Locomotion	
L4	13/09	Sensors	
L5	18/09	Iterative Closeset Point	**P1 - ICP odometry**
L6	20/09	Map Representations	
L7	25/09	Bayes Theorem, Gaussian Distribution	
L8	27/09	Particle Filter and MCL	
	2/10, 4/10	National Day / IROS 2023 Conference	
L9	09/10	Kalman Filter, EKF	**P1 Out**
L10	11/10	SLAM and EKF SLAM	**P2 - EKF SLAM**

L11	16/10	Fast SLAM with Particle Filter	
L12	18/10	Graph SLAM	
L13	25/10	Place Recognition	
L14	30/10	Advanced Topic – Visual SLAM 1 (TBD)	
L15	01/11	Advanced Topic - Visual SLAM 2	**P2 Out**
L16	06/11	Path Planning 1	**P3 - Planning**
L17	08/11	Path Planning 2	
L18	13/11	Trajectory Planning – Guest Lecturer by Haokun	
L19	15/11	Advanced Topic – Drones (TBD)	
L20	20/11	Summary and Future Mobile Robots	
L21	22,27/11	Project 3 Time	**P3 Out**
	29/11	Study Break	

- ■ **TextBooks (Non Compulsory)**

- Siegwart, Roland, Illah Reza Nourbakhsh, and Davide Scaramuzza. **Introduction to autonomous mobile robots**. MIT press, 2011.

- Thrun, Sebastian. "**Probabilistic robotics**." Communications of the ACM 45.3 (2002): 52-57.

- ■ **Grading Scheme, No midterm or final exams**

		Note
Quizz	20%	**Randomly conducted in lectures**
Homework	30%	**Submit after lectures**
Project	P1 10% P2 20% P3 20%	• **Online projects** • **Linux/C++ Required** • **Submit Video & Code & Report**