General Information:

Name of Course: # PROGRAMMING AUTONOMOUS SYSTEMS

Course Code: IVB270AN
Semester: **4th**
Number of Credits: 4
Allotment of Hours per Week: 2 lectures, 2 practices
Evaluation: Mid-semester grade
Prerequisites: Programming I, Digital logic design
Instructors: **Dr. Tukora Balázs, associate professor**
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Introduction, Learning Outcomes
The subject introduces the students to some of the fundamental algorithms used in autonomous systems in a hands-on way. The lectures help the students to understand the algorithms, then they code simple examples applying the obtained knowledge. The topics include localization, motion planning and control of autonomous robots and vehicles. The course, however, is not about robotics, it focuses on improving programming skills by means of practical examples.

General Course Description and Main Content:
Localization problems of autonomous robots and vehicles and their solution. Markov localization, Kalman filter, particle filter localization. Motion planning with Dijkstra's algorithm and the A* algorithm. Hybrid A*. Robot motion: Path smoothing, steering and acceleration PID control. GraphSLAM

Methodology:
Presentation and practice

Programming autonomous systems **Course Syllabus**

Course Code: IVB270AN Time: L Thursday 13:15-14:45

Semester: Autumn 2018/2019 2. P Thursday 15:00-16:30

Location: PTE MIK,L B-0006, P B-0006

Schedule:

1.	Mobile robotics introduction – history, hardware
2.	Mobile robotics introduction – software, tasks
3.	Markov localization – theory and programming
4.	Markov localization – programming
5.	Kalman filter – theory, examples
6.	Kalman filter – programming, visualization
7.	Particle filter localization – theory, programming
8.	Particle filter localization – implementation
9.	Motion planning algorithms
10.	Spring break
11.	Dijkstra's algorithm - implementation
12.	A* algorithm – theory and coding, Hybrid A*.
13.	Path planning – theory and implementation
14.	PID control implementation
15.	GraphSLAM

Attendance:

In case of absence from more than 30% of the total number of lesson will be grounds for failing the class. To be in class at the beginning time and stay until the scheduled end of the lesson is required, tardiness of more than 20 minutes will be counted as an absence. In the case of an illness or family emergency, the student must present a valid excuse, such as a doctor's note.

Evaluation + Grading

Fulfilling the programming exercises is required to get the final grade. The grade is upon the quality of coding and individual problem solving. The final grade is settled after all the exercises are done.

Students with special needs:

Students with special physical needs and requiring special assistance must first register with the Dean of the Students Office. All reasonable requests to provide an equal learning environment for all students is to be assured.

Required Reading and other Materials will be equivalent to:

Lecture notes on Neptun Meet Street