1. Subject name	**Automotive environment sensors**				
2. Subject name in Hungarian	Járműipari környezetérzékelés				
3. Code	**BMEKOKAM708**	4. Evaluation type	**exam grade**	5. Credits	**5**
6. Weekly contact hours	**2 (28) Lecture**	**0 (0) Practice**	**2 (28) Lab**		
7. Curriculum	**Autonomous Vehicle Control Engineering MSc (A)**	8. Role	**Mandatory (mc) at Autonomous Vehicle Control Engineering MSc (A)**		
9. Working hours for fulfilling the requirements of the subject					**150**
Contact hours	56	Preparation for seminars	18	Homework	0
Reading written materials	20	Midterm preparation	20	Exam preparation	36
10. Department	**Department of Control for Transportation and Vehicle Systems**				
11. Responsible lecturer	Dr. Bécsi Tamás				
12. Lecturers	Dr. Bécsi Tamás, Dr. Aradi Szilárd				
13. Prerequisites					

14. Description of lectures

The perception of the environment and the understanding of the situation is of high importance for the development of modern driver assistance systems as well as for the development of autonomous vehicle systems. To do this, one has to know the physical background, possibilities and limitations of the existing environmental sensors.
The course aims the studying of the technologies developed for the tasks of environment sensing of an automated vehicle, the currently available technologies and the corresponding signal processing techniques.
First, the course introduces the inner sensors of the vehicles, such as position, velocity, translation or rotation, basics of their physical operation and their limitations. After this, the main principles of environment sensing, such as ultrasonic, radar, lidar and machine vision systems are introduced through application examples. To strengthen the robustness of the collected data, several typical sensor fusion techniques are also studied.

15. Description of practices

16. Description of labortory practices

The aim of the laboratory practice is to develop different measurements and software processing tasks.

17. Learning outcomes

A. Knowledge
- is familiar with the sensors for measuring vehicle status, their operating principles
- is familiar with the sensors and possibilities and limitations of environmental sensors used today (Radar, Lidar, Ultrasound, Camera Systems)
- is familiar with the sensory fusion techniques used in environmental sensing
- is familiar with the methods of processing the data of environmental sensors

B. Skills
- can interpret the data of different sensors
- is able to design an algorithm for simple determination of the environmental situation based on sensor data
- is able to select an appropriate sensor architecture for the implementation of a designated driving support / autonomous vehicle function

C. Attitudes
- is interested in the latest trends of automotive sensors
- is interested in the algorithmization aspect of the sensor information processing tasks

D. Autonomy and Responsibility
- being able to work in a team responsibly to design an autonomous vehicle function

18. Requirements, way to determine a grade (obtain a signature)

For signature: succesful fulfilment of two midterm exams. Final grade is the average of the two midterm tests (25-25%) and

the exam (50%).

19. Opportunity for repeat/retake and delayed completion

One Midterm exam can be retried

20. Learning materials

Lecture Notes

Effective date	10 October 2019	**This Subject Datasheet is valid for**	2024/2025 semester II