

1. Subject name	Measurement techniques and signal processing in vehicles				
2. Subject name in Hungarian	Jármű méréstechnika és jelanalízis				
3. Code	BMEKOKAM635	4. Evaluation type	exam grade	5. Credits	8
6. Weekly contact hours	4 (19) Lecture	0 (0) Practice	2 (9) Lab		
7. Curriculum	Vehicle Engineering MSc (J)	8. Role	Specialization (sp) at Vehicle Engineering MSc (J)		
9. Working hours for fulfilling the requirements of the subject 240					240
Contact hours	84	Preparation for seminars	22	Homework	60
Reading written materials	42	Midterm preparation	12	Exam preparation	20
10. Department	Department of Control for Transportation and Vehicle Systems				
11. Responsible lecturer	Dr. Soumelidis Alexandros				
12. Lecturers	Dr. Soumelidis Alexandros				
13. Prerequisites					
14. Description of	lectures				

Instrumental sensing, measurement as a means of obtaining information and cognition. The role of measurements in the design and operation of vehicle systems. The measurement process. Simple and complex sensors, smart sensors. The concept of sensory fusion. Sensor systems, sensor networks Measuring tools, signal transducers, samplers, quantizers, processing devices. Measuring basic physical quantities. Characteristics of measurement, reduction of errors. Measuring the dynamic energy and thermal characteristics of vehicles. Specificity of instruments used for measurement. Construction of measuring systems for laboratory and operational measurements. Treatment of measuring the status of systems. Status estimation and parameter estimation based on system model. The Principle of Kalman Filtering. System parameter estimation, system identification. Methods to increase the reliability of measurement, redundancy, diversity. Classification of signals. Signal representations, time and frequency domain, parametric and nonparametric descriptions. The basic methods of signal analysis. Signal Processing Algorithms. Digital signal processing. Hardware and software tools for embedded computing. Devices for distributed task solving. Communication tools, wired and wireless networks. Communication networks, sensor networks. Application of signal processing in vehicle systems. Object and Event Detection. Application in vehicle control systems.

## **15. Description of practices**

## **16. Description of labortory practices**

The course is complemented by laboratory measurements that demonstrate the microcomputer realization of basic measurement and signal processing systems.

## **17. Learning outcomes**

- A. Knowledge
  - Understands and applies circuit analysis techniques for electronic circuits; has knowledge of measurement and measurement theory related to transport, engineering and transport.
- B. Skills
  - Is capable of analyzing or specifying electronic sub-systems (eg motor control or safety control devices) in the field of transport and vehicles.
- C. Attitudes
  - Participates in solving electrical problems in the field of transport or vehicles, works efficiently and willingly to work with specialists in other fields (especially electrical engineering).
- D. Autonomy and Responsibility
  - Is aware of, and manages the responsibilities associated with, the task solution during electronic system analysis

and specification.

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

Two midterm exams and an individual home work which are the prerequisite of the final exam

19. Opportunity for repeat/retake and delayed completion

The midterm exam can be retried

20. Learning materials

Lecture Notes

 Effective date
 10 October 2019
 This Subject Datasheet is valid for
 Inactive courses