1. Subject name	**Vehicle testing and validation**				
2. Subject name in Hungarian	Közúti járművek tesztelése és validációja				
3. Code	**BMEKOGGM406**	4. Evaluation type	**mid-term grade**	5. Credits	**3**
6. Weekly contact hours	**0 (0) Lecture**	**0 (0) Practice**	**3 (42) 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					**90**
Contact hours	42	Preparation for seminars	18	Homework	0
Reading written materials	20	Midterm preparation	10	Exam preparation	0
10. Department	**Department of Automotive Technologies**				
11. Responsible lecturer	Dr. Zöldy Máté				
12. Lecturers	Dr. Török Árpád				
13. Prerequisites					

14. Description of lectures

15. Description of practices

16. Description of labortory practices

Introduction into the modern instrumental vehicle measurements. Acquirement of the usage of instruments, testing methods, and application of vehicle testing processes. In the Autonomous Vehicle Control Enginees MSc tematics, the target of the subject is to present to the students the testing procedures and possibilities of vehicle and software testing. By the subject the students are able to coordinate tests in simulation, laboratory and open road environment.
Introduction of the basic measurement methods and instruments. Demonstration of different vehicle testing instruments. The subject goes through on the testing methods and tools different vehicle subsystem. Engine and driveline testing on modern engine test rigs demonstrates the dynamics, efficiency and emission of the powertrain. Brake system testing will be performed on both test benches and on a test track using a real vehicle according to the ECE directives. Suspension testing introduces both the passanger car suspension measurement methods, and the air spring system testing for heavy duty vehicles. Steering system testing is demontrated as well. This course also shows different levels of testing: like laboratory tests on a subsystem of a vehicle, laboratory tests in simulation environment (HIL), laboratory tests on a real vehicle, and testing on test track. In addition the testing as a part of the V-model based development is also explained during this course. This course consists of laboratory exercises only, and is held at companies with th eprofile of modern development and testing.

17. Learning outcomes

A. Knowledge

- is familiar with the operation of the dynamometer and the procedure for measuring it
- is familiar with the principles of measuring the performance, dynamics and emissions of internal combustion engines and the standardized process of measurements
- knows the methods of measuring the suspension of passenger cars and commercial vehicles
- knows the different levels of vehicle system testing, laboratory, simulation, and test track measurements
- is familiar with the V model-based development principles applied in the automotive industry

B. Skills

- is capable of performing individual test tasks after obtaining type knowledge
- can take into account different expectations while planning
- is able to evaluate diagnostic results
- is able to interpret the standards of international standards, to transpose them into practice

C. Attitudes

- is interested in different testing processes
- is able to work in a team, in relation to the different automotive design paradigms

D. Autonomy and Responsibility

- the choice of self-diagnosing diagnostic methods for their application
- the results obtained can be interpreted independently, responsibly, summarized and passed on
- is able to make repair and improvement decisions based on the interpreted result

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

The prerequisite for the completion of the subject is the successful completion of the midterm test and all laboratory requirements. Final mark reflects the result of the midterm test.

19. Opportunity for repeat/retake and delayed completion

The midterm test can be retried once, tasks must be given accurately.

20. Learning materials

Lecture Notes

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