1. Subject name	**Dynamics of vehicle, active- and passive safety**				
2. Subject name in Hungarian	Járműdinamika, aktív- és passzív járműbiztonság				
3. Code	**BMEKOGJM641**	4. Evaluation type	**exam grade**	5. Credits	**4**
6. Weekly contact hours	**2 (10) Lecture**	**0 (0) Practice**	**2 (11) 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					**120**
Contact hours	56	Preparation for seminars	18	Homework	0
Reading written materials	28	Midterm preparation	8	Exam preparation	10
10. Department	**Department of Automotive Technologies**				
11. Responsible lecturer	Dr. Török Árpád				
12. Lecturers	Dr. Melegh Gábor, Dr. Török Árpád, Vida Gábor				
13. Prerequisites					

14. Description of lectures

Force on the wheel of the vehicle, modern wheel models, static and dynamic geometric characteristics of the wheel from the point of view of road safety. Analyzing the torque and force ratios of the power transmission system, examining its dynamic characteristics. Geometric design of wheel suspension, use of individual suspension elements.
The vibration analysis of the vehicle is the element of the suspension. Dynamic testing of the braking of the vehicle, methods of dividing the braking force per axle, the basic schemes of the braking system, the characteristic use of each element. Dynamic analysis of steering, typical use of individual elements (trapezoidal arm, track bar, steering wheel, steering wheel and shaft, ball joints).
Presentation of software suitable for the development of vehicle dynamics models, longitudinal and transverse vehicle dynamics, tools of regulation. Dynamic analysis and modeling of rollover processes.
The elements of active and passive vehicle safety are: the presentation of vehicle dynamical control systems, systems for mitigating the consequences of accidents, and familiarizing them with their operational characteristics. A detailed description of the sensors and actuators required for the operation of the above systems, the possibilities of using the data stored in these and their control units in the investigation of accidents, during the reconstruction of the vehicle's movement.

15. Description of practices

16. Description of labortory practices

Creating dynamic models using theoretical knowledge, critical analysis of selected vehicle or vehicle unit, subsystem based on traffic safety considerations.

17. Learning outcomes

A. Knowledge

- The student has to know the basic system components defining the dynamic properties of the vehicle;
- The student has to know the basic relationships of vehicle dynamics;
- The student has to know the most important methods of vehicle dynamics models;
- The student has to know the road safety effects of vehicle dynamics;
- The student has to be familiar with the operation of the related passive road safety systems;
- The student has to be familiar with the operation of related active traffic safety systems.

B. Skills

- The student is able to build a simplified dynamic vehicle model;
- The student is capable of describing and using vehicle dynamic equations;
- The student is capable of employing applications to determine vehicle dynamic characteristics.

C. Attitudes

- The student aims to maximize their abilities by making their studies at the highest possible level, proficient and independent;
- The student aims to cooperate with the instructor and the other students to improve knowledge;
- The student aims to continue to imrpove the knowledge of the material parts of the lessons through continuous independent learning;
- The student aims to use the information technology and computing tools (word processing computer software, mathematical software, image editing software, etc.), but also seeks to use classical devices (paper, ruler, pencil, hand-held calculator, editing, etc.);
- The student aims to get to know and routinely use the tools needed to solve the tasks;
- The student aims to provide accurate, error-free and precise work.

D. Autonomy and Responsibility

- The student is responsible for setting an example forthe other students rgarding the quality of its work and ethical standards;
- The student applies the knowledge acquired during the course in a responsible manner with regard to their validity limits;
- The student accepts openly the grounded critical remarks;
- The student accepts the framework for cooperation, can do its job independently or as part of a team, depending on the situation.

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

During the semester 1 midterm test has to be completed with more the 50 % of the maximal points.
The conditions for obtaining the signature are the completing the midterm test, attending all labs and submitting the homework on accepted level.
Final outcome of the subject is defined by the result of the mid-term exam in 30% proportion, the homework in 20% proportion, and the final exam in 50% proportion. All requirements have to be fulfilled to successfully finish the subject.

19. Opportunity for repeat/retake and delayed completion

The midterm test can be retaken once. The homework can be delivered once additionally. One lab can be done once additionally.

20. Learning materials

Slides and presentation notes

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