1. Subject name	**Vehicle system dynamics II.**				
2. Subject name in Hungarian	Járműrendszerdinamika II.				
3. Code	**BMEKOVJD008**	4. Evaluation type	**exam grade**	5. Credits	**4**
6. Weekly contact hours	**2 (0) Lecture**	**0 (0) Practice**	**0 (0) Lab**		
7. Curriculum	**PhD Programme**	8. Role	**Basic course**		
9. Working hours for fulfilling the requirements of the subject					**120**
Contact hours	28	Preparation for seminars	30	Homework	0
Reading written materials	30	Midterm preparation	0	Exam preparation	32
10. Department	**Department of Aeronautics and Naval Architectures**				
11. Responsible lecturer	Dr. Zobory István				
12. Lecturers	Dr. Zobory István				
13. Prerequisites	**recommended: BMEKOVJD007 - Vehicle system dynamics I.**				

14. Description of lectures

Characterisation of the connection forces arising between structural components. Force processes emerging in a damped linear vibratory system. The vibratory system, as a closed effect-chain system with feed-back. Bivariate continuous characteristic connection force surface in linear and nonlinear cases. Discontinuous connection force characteristic surfaces. Dry friction dampers. Taking into consideration the local elasticity. The effect of the sliding speed dependent friction coefficient on the characteristic surface. Deduction of the description of the force connection having short distance memory, for numerical applications. Treatment of the antedecent-dependence by an assembly of local planes. Defining a path-band on the motion-state plane. Equilibrium state on the local plane. Connection with the catastrophe theory. Double path-band on the motion-state plane. Non smooth dynamics. Examples for systems with friction connection. Time dependent (controlled) frictional limit-force. Conditional force-connections. Only compressive force transfer. Only tensile force transfer. Connection with back.lash. Conditional connections working against each other. The effect of linear damping on the conformation of the conditional connection force. Introduction of the local elasticity. Conditional connection tightened against each other. Dynamics and tribology of rolling contacts. Tractions arising on the contact surface. Stationary rolling in the presence of creep-dependent connection force. The Kalker-theory for the linearized connection force transfer. The five parameter non-linear function of the force connection coefficient. The naiv stochastic model of the force connection coefficient. The force connection cefficient as a two parameter stochastic field. Semi-Markovian carrier process and a stationary fluctuation process as a function of the distance covered by rolling. Characterisation of the real contact conditions. Wear process of rolling connections. Relation between the dissipated energy-flow density and the debris mass-flow density. Wear simulation. Smoothing problems.

15. Description of practices

16. Description of labortory practices

17. Learning outcomes

A. Knowledge B. Skills

- Students must know comprehensively, interpret in a constructive way and apply in his research activities in an innovative way the following elements of analysis methods: the linear and non linear force connections of vehicle dynamical systems; description methods of the rolling connection; procedures describing the wear mechanism of the rolling connection.

C. Attitudes D. Autonomy and Responsibility

- Students must pursue to get knowledge of the new scientific results, the latter are applied with responsibility and initiates new resource activities in new fields of knowledge in an innovative way

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

Regular participation at the lectures and written exam.

19. Opportunity for repeat/retake and delayed completion

According to the TVSZ.

20. Learning materials

1. Zobory, I.: Járműrendszerdinamika I. Kézirat. BME Vasúti Járművek és Járműrendszeranalízis Tanszék. Budapest, 2011.
2. Brown, F.T.: Engineering System Dynamics. Taylor & Francis, Boca Raton, London, New-York, 2007

Effective date	27 November 2019	**This Subject Datasheet is valid for**	Inactive courses