



1. Subject name	Railway vehicle system dynamics				
2. Subject name in Hungarian	Vasúti járműrendszer-dinamika				
3. Code	BMEKOVRM608	4. Evaluation type	exam grade	5. Credits	5
6. Weekly contact hours	3 (16) Lecture	1 (5) Practice	0 (0) 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					150
Contact hours	56	Preparation for seminars	10	Homework	15
Reading written materials	37	Midterm preparation	12	Exam preparation	20
10. Department	Department of Aeronautics and Naval Architectures				
11. Responsible lecturer	Dr. Zábori Zoltán				
12. Lecturers	Dr. Zábori Zoltán				
13. Prerequisites					
14. Description of lectures					
The railway vehicle as a dynamical system. Main motion and parasitic motions. Railway vehicle vibration analysis. Analysis of the spring and damper elements using the characteristic surface above the state space. The wheel-rail rolling contact. Eigen-frequencies and stability reserves, limit cycles and chaotic motions. The non-linear models. The wheel-rail wear process. The track-vehicle system dynamics. Definition and measurement of track irregularities. Spectral characteristics of the track irregularities. Parameter sensitivity of the track-vehicle system. Parameter optimization. Measurement procedures for examining the vehicle-track system processes.					
15. Description of practices					
Solving computation tasks connected with the themes of the lectures.					
16. Description of laboratory practices					
17. Learning outcomes					

**A. Knowledge**

- Understands and applies the mathematical and scientific principles, relations and procedures necessary to cultivate professional area of the railway vehicle-dynamic.
- Understands and can apply in a wide circle the theories and terminologies elaborated for professional area of railway vehicle-dynamics.
- In details knows and understands the data collection methods and problem solving techniques of the railway vehicle-dynamics.
- Knows and understands the methods of the computer modelling and simulation which are connected with the railway vehicle-dynamics.
- Knows the problem solving techniques which are applicable in the research or scientific work.

**B. Skills**

- Able to apply the required mathematical and scientific principles and procedures for solving the problems coming up in the railway vehicle-dynamics.
- Able to apply in innovative way the principles and terminologies of the railway vehicle-dynamics.
- Able to identify, to evaluate and manage by system-approach the effect mechanism of the dynamical processes coming up in the railway vehicles.

**C. Attitudes**

- Open and receptive to know and to accept the developments and innovations which are taken place on the field of the speciality of railway vehicle dynamics.
- Accepts the professional and ethical values-system connected with the professional area of the railway.
- Pursuing to develop of the new methods and tools connected with the railway vehicles.
- Pursuing to use complex and on system-oriented mentality based approach to the processes.

#### D. Autonomy and Responsibility

- Pro-activity in the solution of professional tasks, the self-standing selection of the solution methods.

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

The criterion of signature is both the active participation at the class (attitude), and the complete solving of the semester's tasks (knowledge, ability, autonomy). During the semester there is necessary to successfully write two midterm tests (knowledge, ability, autonomy). In the fields of attitudes and autonomy the results achieved in the semesters are included in the final classification by weight 50%. At the end of semester there is an examination (knowledge, ability, attitude).

#### 19. Opportunity for repeat/retake and delayed completion

Possibility to refit the control works and the homeworks, to repeat the examination, properly to the Study and Exam Regulations.

#### 20. Learning materials

Simonyi A.: Vasúti járművek dinamikája, Közlekedési dokumentációs Kft., Bp. 199-  
Department's publications.

<b>Effective date</b>	10 October 2019	<b>This Subject Datasheet is valid for</b>	Inactive courses
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