



1. Subject name	Structural vibrations				
2. Subject name in Hungarian	Szerkezetek lengései				
3. Code	BMEKOJSM665	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	20
Reading written materials	12	Midterm preparation	4	Exam preparation	10
10. Department	Department of Railway Vehicles and Vehicle System Analysis				
11. Responsible lecturer	Dr. Béda Péter				
12. Lecturers	Dr. Béda Péter, Dr. Pápai Ferenc				
13. Prerequisites	strong: KOJSM663 - Mechanics of superstructure materials				
14. Description of lectures					
Application of the Lagrange equation of second kind for holonomic and scleronomic conservative systems. Study and conditions of existence of stable equilibrium. Small vibrations, approximative determination of natural frequencies. Oscillation of bars, axles, strings and membranes. Basics of modal analysis. Criterion of motion stability. Study methods for nonlinear problems. Bifurcation, post-critical states, soft and hard loss of stability					
15. Description of practices					
16. Description of laboratory practices					
Individual and guided practice lessons					
17. Learning outcomes					
A. Knowledge					
• the student knows the Lagrange equations of the second kind describing holonomic and scleronomic systems					
• knows the existence criteria of the stable equilibrium					
• knows the equations describing longitudinal, torsional and bending vibrations of rods					
• knows the vibration theory of shafts, cords and membranes					
• knows the basics of modal analysis					
• knows the motion stability criterium for both linear and nonlinear cases					
• knows the notions of bifurcation and postcritic state, as well as the theory of stability loss					
B. Skills					
• the student is able to check the stability of a structure					
• is able to analyze the possible vibrations					
• is able to build linear and non-linear models					
• is able to study models and to discuss results					
C. Attitudes					
• the student makes an effort to gather all the available informations in a given domain					
• cooperates with his fellow students and the teacher					
• is open minded towards new and innovative ideas and researches					
• uses informatical and computational devices for his work					
D. Autonomy and Responsibility					
• the student is conscient about his responsibility towards the society and his company					
• asks for the colleagues' expertise and judgement when working					
• considers challenges with responsibility					
18. Requirements, way to determine a grade (obtain a signature)					

19. Opportunity for repeat/retake and delayed completion

Second test possibility for those not present on the test, possibility of delayed deadline for homework

20. Learning materials

Lecture notes

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