



1. Subject name	Nonlinear mechanical oscillations				
2. Subject name in Hungarian	Nemlineáris mechanikai lengések				
3. Code	BMEKOJSD003	4. Evaluation type	exam grade	5. Credits	4
6. Weekly contact hours	2 (0) Lecture	1 (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	42	Preparation for seminars	12	Homework	28
Reading written materials	14	Midterm preparation	0	Exam preparation	24
10. Department	Department of Railway Vehicles and Vehicle System Analysis				
11. Responsible lecturer	Dr. Béda Péter				
12. Lecturers	Dr. Béda Péter				
13. Prerequisites					
14. Description of lectures					
Equilibrium of a mechanical system, stability of the equilibrium (definitions, stability and instability conditions). Stability of motions. Notion and construction of the Lyapunov function. Lyapunov's direct and indirect method, the Routh-Hurwitz criterion. Nonlinear stability theory, notion of the bifurcation, soft and hard loss of stability. Reduction methods: central multitude method, Lyapunov-Schmidt reduction. Bifurcation equations, numerical methods of the bifurcation theory.					
15. Description of practices					
Examples from the topics of the lessons.					
16. Description of laboratory practices					
17. Learning outcomes					
A. Knowledge					
<ul style="list-style-type: none">• Methods of the nonlinear mechanics.					
B. Skills					
<ul style="list-style-type: none">• Description of a nonlinear mechanical system behaviour, model building.					
C. Attitudes					
<ul style="list-style-type: none">• Being open to understand and learn novelties on that given domain.					
D. Autonomy and Responsibility					
<ul style="list-style-type: none">• Evaluation and choice of optimal model element.					
18. Requirements, way to determine a grade (obtain a signature)					
Semester note upon succesful realisation of the homework and an oral exam.					
19. Opportunity for repeat/retake and delayed completion					
Essay secondary deadlines precised in the lessons requirements.					
20. Learning materials					
Effective date	27 November 2019	This Subject Datasheet is valid for		Inactive courses	