

Study program: Mechanical engineering			
Type and level of studies: Master studies			
Course unit: Railway Vehicles			
Teacher in charge: prof. dr. Milan Bižić			
Language of instruction: English			
ECTS: 6			
Prerequisites: None			
Semester: Winter			
Course unit objective: Acquiring a higher level of knowledge in the field of railway engineering. Mastering general and specific abilities in the field of design and calculation of railway vehicles and their elements.			
Learning outcomes of the course unit: Ability to solve typical engineering problems in the field of design and calculation of railway vehicles and their elements.			
Course unit contents			
<i>Theoretical classes</i>			
Regulations in the field of railway vehicles. Phases in the life cycle of railway vehicles. Basic technical characteristics and basic dimensions of railway vehicles. Basic structural units of railway vehicles. Character and type of loads acting on railway vehicles. Safety against overturning of railway vehicles in a curve. Design and calculation of railway wheelset. Design of wheelset's axle-bearing. Calculation of railway axle. Calculation of railway wheel. Types and design of bogies. Calculation of bogie frame. Elements of the supporting structure of railway vehicles. Design of underframe. Design of car-body. Design and calculation of tank of tank-wagons. Calculation of the supporting structure of railway vehicles. Design and types of coupling elements and buffers. Basic principles of braking of railway vehicles.			
<i>Practical classes</i>			
Review of the specifics of regulations in the field of design and calculation of railway vehicles. Fundamentals of modelling and calculation of structural units of railway vehicles using commercial software packages. Review of concrete examples of modelling and calculation of characteristic structural units of railway vehicles using commercial software packages.			
Laboratory and practical training in the Laboratory for Railway engineering and structural testing.			
Task of calculation of a specific sub-assembly or assembly of a railway vehicle.			
Literature			
M. Spiryagin, V. Autores, C.R. Cole, Y.Q. Sun, M.J. Mcclanachan, V. Spiryagin, Design and Simulation of Rail Vehicles, Taylor & Francis Group, 2014.			
E. Andersson, M. Berg, S. Stichel, Rail Vehicle Dynamics, Railway Group KTH, Stockholm, 2007.			
S.D. Iwnicki, Handbook of Railway Vehicle Dynamics, CRC Press, Taylor & Francis Group, Boca Raton, 2006.			
Number of active teaching hours			Other classes
Lectures: 3	Practice: 1	Other forms of classes: 1	
Teaching methods: Theoretical classes in the form of lectures. Practical teaching. Classroom exercises. Laboratory exercises in the Laboratory for Railway engineering and structural testing. Project task.			
Examination methods (maximum 100 points)			
Exam prerequisites	No. of points:	Final exam	No. of points:
Student's activity during lectures	10	oral examination	50
practical classes/tests	30	written examination	
Seminars/homework		
Project	10		
Other			
Grading system			
Grade	No. of points	Description	
10	95-100	Excellent	
9	85-94	Exceptionally good	
8	75-84	Very good	
7	65-74	Good	
6	55-64	Passing	
5	Less than 55	Failing	