

Study program / course: <b>Mechanical Engineering</b>				
Type and level of study: <b>Master academic studies</b>				
Course: <b>Vehicle dynamics</b>				
Lecturers: <b>Aleksandra S. Jankovic, Ph.D., full prof., Miroslav D. Demic, Ph.D., full prof.</b>				
Status of course: <b>Obligatory, joint for module M<sub>3</sub> and module M<sub>8</sub>, I semester</b>				
Number of ECTS: <b>6</b>				
Precondition: <b>passed Mechanics 1 exam, attended Mechanics 2 and Mechanics 3 classes</b>				
<b>The objective of course</b>				
Getting to see vehicle as a complex dynamic system, getting to see vehicle regimes of motion and dominant degrees of freedom. Analyze vehicle motion with emphasis on dominant vibration in each regime. Analyze vehicle vibration (pitch, roll, yaw), vehicle stability (vehicle turning, braking on the straight road, braking during turn). Acquire clear and integral impression on interactions between vehicle and road (tire, suspension, steering), as well as between the vehicle and human (comfort).				
<b>The outcome of course</b>				
Student knows the causes of vehicle vibration and has a clear view at interaction between systems. He knows to set dynamic equations in vibration planes for dominant degrees of freedom. He knows to determine frequency functions for simple vibration models (one and two degrees of freedom), knows to set equations of motion during braking of vehicle and to analyze the stability during braking from the aspect of adhesion, load, on level road and inclined road. He understands tire behavior in different motion regimes and on different road surfaces. He acquires knowledge from the area of control and modern systems for longitudinal and lateral stability of vehicle. He acquires basic knowledge from the area of vehicle aerodynamics.				
<b>Syllabus</b>				
<b>Theoretical study</b>				
Basics of discrete masses vibration. Road as a vehicle vibration cause. Vehicle vibration in longitudinal plane (frequency functions, analysis of eigenmodes of vibrations, concept of comfort). Dynamics of a braking vehicle, longitudinal stability. Wheel (tire behavior in different regimens of motion, transfer of dynamic reactions, etc.). Vehicle handling, lateral stability (concepts, definitions of handling, handling criteria, interaction between suspension and steering). Fundamentals of vehicle vibration regulation, ASR systems, stability. Vehicle aerodynamics. Within the framework of study's research activities, the students will be qualified for fundamental research in the area of the course.				
<b>Recommended reading</b>				
1. Janković, A. "Vehicle dynamics", (in Serbian), Kragujevac, 2008				
The number of hours of active teaching:				Other classes: <b>1</b>
Theory: <b>2</b>	Practical classes: <b>1.6</b>	Other forms of teaching: <b>0.4</b>	Research study: <b>0</b>	
<b>Methods of teaching</b>				
A) lectures; B) verbal exercises, instructions for doing the seminary papers				
<b>Evaluation of knowledge</b>				
<b>Pre-final exam obligations</b>	<b>points</b>	<b>Final exam</b>	<b>points</b>	
Activities during the classes:	<b>5</b>	written exam	<b>35</b>	
Practical classes:		verbal exam	<b>15</b>	
Colloquiums(s) :	<b>30</b>			
Seminar(s) :	<b>15</b>			