Study program: Road Traffic Engineering

Course title: Vehicle Dynamics

Professor/assistant: Branislav B. Aleksandrović

Type of course: Elective

ECTS credits: 6

Prerequisites: Course *Mechanics 1* – passed. Course *Mechanics 2* – attended.

Aims of the course:

Vehicle as a complex dynamic system. Application of principles and laws of dynamic motion of discrete masses and determining dynamic reactions of different models (vertical dynamics, longitudinal dynamics, turning). Students study about free oscillations (pitching, roling, yowing) and their importance for the stability and comfort. Interaction between a vehicle and a road (pneumatics) and between a vehicle and a driver (comfort). Forces acting on a vehicle (unevenness of the road, turning) with a special emphasis on the vehicle's aerodynamics.

Learning outcomes:

Students understand the causes of vehicle oscillation and understand interactions between the systems. They have the necessary knowledge to determine the dominant degrees of freedom and know how to set the equations for different models of vehicles, as well as to see what forces affect the vehicle. Students have the basic knowledge in the field of vehicle stability.

Syllabus:

Theoretical part:

The basics of discrete masses oscillations. Causes of vehicle oscillations. The road as the cause of vehicle oscillation. Vehicle oscillations in the longitudinal plane. Models. Dynamic reaction of the wheel. Vehicle comfort. Longitudinal stability. Braking dynamics, dynamic ground reactions, conditions of vehicle stability during braking. The behavior of tires (pneumatics) during different regimes of motion, transfer of dynamic reactions of the ground. Management, lateral stability (conditions, dynamic reactions, steering criteria).

Practical part:

Auditory exercises

Literature:

1. A. Janković: "Dinamika automobila", Mašinski fakultet u Kragujevcu, 2008.

Total number of active classes: 90	**Lectures:** 45	**Practical classes:** 45

Teaching methods: Lectures, auditory exercises, instructions for making term papers

Grading system (maximum 100 points)

grading scale from 5 to 10: below 51 points grade 5, grade 6 from 51- 60 points, grade 7 from 61-70 points, grade 8 from 71-80 points, grade 9 from 81-90 points, grade 10 from 91- 100 points.

Pre-exam obligations:	**Points:**	**Final exam:**	**Points:**
Activity during theoretical lectures	max 5	Oral exam	50
Practical training	max 5		
Written test(s)	max 20		
Term papers/essays	max 20		
Minimum requirement for the final exam	30		