

2174. Theory of Ground Vehicles

Vehicle definition and classification. European Directives and International Regulations. Analysis of the subsystems of a vehicle (chassis, transmission, braking systems, suspension, steering, etc.). Introduction to tire mechanics (basic equations). Equations of planar motion of the vehicle motion, calculation of required torque / power on the axles. Vehicle performance (calculation of maximum speed values, acceleration, inclination, traction, etc.). Calculation - Selection of vehicle transmission system (gearbox - differential ratios). Optimization of vehicle transmission system (drive axles: Calculation of maximum braking force and deceleration. Critical braking speed. Optimal braking - Distribution of total braking force on the axles of the vehicle. Use of specialized software for calculation /selection of vehicle subsystems. Introduction to hybrid vehicles (Architecture & Basic subsystems) - new driving technologies. Heavy vehicle superstructures (examples from the automotive industry - case studies). The course is complemented with three (3) laboratory exercises concerning the determination of the centre of gravity of a vehicle, the stress analysis of a vehicle superstructure using strain gauges and the determination of the tire stiffness.

Lab exercises (3): C 20% of the final Grade Project (1): C 30% of the final Grade

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