SD2225 Ground Vehicle Dynamics, Basic Course 11.0 credits

Fordonsdynamik, allmän kurs

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for SD2225 valid from Autumn 2013

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Mechanical Engineering

Specific prerequisites

Documented knowledge in english corresponding to English B/ English 6, 23 university credits (hp) in the field of mechanics, 33 university credits (hp) in the filed of mathematics

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

The over all goal of the course is to give the student a deeper knowledge about modelling, simulation, measurement and analysis of ground vehicles dynamic behaviour

Students graduating from the course should be able to:

- describe the basic terms within vehicle dynamics
- describe and use the coordinate transformations necessary for vehicle dynamic analysis
- create simple models of vehicles for dynamic analysis
- explain the assumptions/limitations of the created models
- derive the equations of motion for vehicles in order to perform an analysis of the bounce and pitch motions that arise due to for example acceleration, braking and uneven road surfaces
- derive the equations of motion for a vehicle during stationary and non-stationary cornering and to analyse the vehicle directional stability and roll behaviour
- derive the effective cornering stiffness when considering the elastic elements in the wheel suspension and be able to analyse it's effect on the dynamic characteristics of the vehicle
- derive the equations of motion for a vehicle combinations and analyse it's stability in the yaw direction
- create handling diagrams and draw conclusions from them
- create, performe and analyse a simple test plan for vehicle dynamic analysis by using statistical methods
- explain how different changes of the construction of the vehicle affects the dynamical characteristics of a vehicle.
- plan, carry out, evaluate and present a simple field test for vehicle dynamic analysis.
- apply the gained knowledge on practical problems.

Course contents

Vehicle dynamic characteristics. Coordinate systems and coordinate transformations. Comfort, handling, rollover. Modelling and derivation of equations of motion for vehicles driving straight ahead and during cornering. Force and road excitation. Stationary and non stationary driving. Frequency responses. Elastic elements of the wheel suspension, effective cornering stiffness, roll steer. Handling diagram. Nonlinear components and non dimensional equations of motion. Vehicle combinations and stability. Statistical methods.

Course literature

Kompendium Fordonsdynamik.

Examination

- ÖVN1 - Assignments, 4.0 credits, grading scale: P, F
- TEN1 - Examination, 7.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Other requirements for final grade

Written examination (TEN1; 7 university credits).

Approved exercises (ÖVN1; 4 university credits).

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.