Vehicle Theory

Academic Year: (2019 / 2020) **Review date: 31-10-2019**

Department assigned to the subject: Mechanical Engineering Department

Coordinating teacher: GARCIA-POZUELO RAMOS, DANIEL

Type: Compulsory ECTS Credits : 6.0

Year : Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Knowledge of calculus, algebra and solving of differential equations. Machine Theory, Mechanics of Structures and Machine Mechanics.

OBJECTIVES

By the end of this subject, students will be able to have:
1. A systematic understanding of the key aspects and concepts of vehicle dynamics and automobile systems.
2. The ability to apply their knowledge and understanding to identify, formulate and solve automobile engineering problems using established methods.
3. The ability to select and apply relevant analytic and modelling methods in automobile engineering.
4. The ability to apply their knowledge and understanding to develop and realise designs to meet defined and specified requirements in automobile engineering.
5. The ability to design and conduct appropriate experiments, interpret the data and draw conclusions.
6. The ability to combine theory and practice to solve problems in automobile engineering.
7. Function effectively as an individual and as a member of a team.

DESCRIPTION OF CONTENTS: PROGRAMME

Lecture 1: Types of vehicle. Vehicle chassis. Centre of gravity calculation.
Lecture 2: Mechanical features of tires.
Lecture 3: Aerodynamics.
Lecture 4: Longitudinal dynamics. Traction.
Lecture 5: Transmission system.
Lecture 6: Longitudinal dynamics. Braking.
Lecture 7: Longitudinal dynamics. Braking systems.
Lecture 8: Lateral dynamics. Cornering
Lecture 9: Vertical dynamics. Suspension systems.
Lecture 10: Lateral dynamics: Rollover.
Lecture 11: Hybrid Electric Vehicles.

LEARNING ACTIVITIES AND METHODOLOGY

Lectures will be explained in big groups, exercises for understanding the lectures will be solved and labs will be carried out. In addition, four labs will be carried out:

Lab 1: Design and testing of a tubular chassis of a vehicle (I).
Lab 2: Tires and vehicle components.
Lab 3: Periodic Motor Vehicle Inspection (PMVI).
Lab 4: Design and testing of a tubular chassis of a vehicle (II).

ASSESSMENT SYSTEM

The work done by the student will be evaluated by following the Bologna criteria. The work carried out by each student during the term will be evaluated separately as well as the final exam. Labs are also part of the evaluation of the subject.

A minimum mark of 4,5 over 10 will be required in the final exam in order to take into account the continuous evaluation.

% end-of-term-examination:	60
% of continuous assessment (assigments, laboratory, practicals…):	40

BASIC BIBLIOGRAPHY

- A. Gauchia, D. García-Pozuelo, B. L. Boada, Mª J. L. Boada, E. Olmeda, V. Díaz, J. Fuentes Automóviles y Ferrocarriles: Problemas Resueltos, UNED, 2014
- M.J. Nunney. Light and heavy vehicle technology., Published by Elsevier..
- Thomas D. Gillespie. Fundamentals of vehicle dynamics., Published by the Society of Automotive Engineers..
- V. Díaz, E. Olmeda, A. Gauchia, D. García-Pozuelo, B. L. Boada, Mª J. L. Boada, J. Fuentes Automóviles y Ferrocarriles, UNED, 2013

ADDITIONAL BIBLIOGRAPHY

- Arias Paz Manual de Automóviles, CIE INVERSIONES EDITORIALES DOSSAT-2000, S.L., 2006
- William F. Milliken and Douglas L. Milliken Race Car Vehicle Dynamics, SAE, 1995