Universitat de Lleida

DEGREE CURRICULUM

MACHINE DESIGN AND TESTING I

Academic year 2015-16

2015-16

Subject's general information

Subject name	MACHINE DESIGN AND TESTING I
Code	14522
Semester	2nd
Typology	Mandatory
ECTS credits	6
Groups	1
Theoretical credits	3
Practical credits	3
Office and hour of attention	Miquel Nogués, Tuesday from 19:00 to 21:30, Thursday from 10:00 to 11:30
Department	Informàtica i Enginyeria Industrial
Teaching load distribution between lectures and independent student work	40% lectures in class 60% independent student work
Modality	Presencial
Important information on data processing	Consult this link for more information.
Language	catalan
Degree	MASTER in Industrial Engineering
Office and hour of attention	Miquel Nogués, Tuesday from 19:00 to 21:30, Thursday from 10:00 to 11:30
E-mail addresses	mnogues@diei.udl.cat

2015-16

Miquel Nogués Aymamí

Subject's extra information

Good skills using a 3D computer aided design software

Learning objectives

To present tridimensional kinematics and dynamics, in order to achieve an accurate evaluation of the loads that will be submitted the elements of a machine. In addition, the vibratory motion is introduced, and the basis of balancing rotors and multicylinder engines are stablished. Finally, fundamental machinery malfunction diagnosis and correction based on vibrations are set up.

Competences

University of Lleida strategic competences

- Master Information and Communication Technologies.

Degree-specific competences

- Ability to design and test machines.

Degree-transversal competences

- Ability to conceive, design and deploy projects and/ or contribute new solutions, using engineering tools.

Subject contents

Topic 1. 3D Rigid Body Kinematics

Topic 2. 3D Rigid Body Dynamics

Topic 3. Introduction to a Linear Vibration

Topic 4. Balancing rotors and engine cylinder

Topic 5. Vibration analysis

Methodology

Theory class: Presentacions are available in SAKAI before class starts.

Problems class: Solving problems, questions and exercises. Solved exercises are available in SAKAI

Lab Practices: Assistance and adequate attendence in all the lab exercecis is mandatory to pass the course

Development plan

Week 1, 2, 3, 4 and 5 - 3D RIGID BODY KINEMATICS

Week 5, 6, and 8 - 3D RIGID BODY DYNAMICS

Week 9, 10 and 11 - INTRODUCTION TO A LINEAR VIBRATION.

Week 12 and 13 - BALANCING ROTORS AND MULTICYLINDER ENGINES

Week 14 and 15 - VIBRATION ANALYSIS

LAB EXCERCISES

KINEMATIC SIMULATION using CREO/PTC

GYROSCOP ANALYSIS

DYNAMIC SIMULATION using CREO/PTC

BALANCING A ROTOR

MULTICYLINDER ENGINES VIBRATION ANALYSIS

Evaluation

The evaluation will consist of one theoretical part and one practical part.

The theoretical part will by divided in two exams which are indicated in the academic calendar, and each exam will have two parts: a multiple test and exercises. The theory grade (NT) obtained will be calculated by:

NT = + 0,5xE1 0,5xE2

In the practical part (NP) must be remarked that assistance and adequate attendence in all the lab exercecis is mandatory to pass the course

The mark of the practical part will be obtained by:

NP = + 0,4xPR 0,6xTR

where:

PR: Reports delivered in lab and practical problems in class

TR: Exercices done in a teamwork

Final course grade (NF)

NF = + 0,7xNT 0,3xNP

If the final score is not greater than or equal to 5, students can do the extraordinary exam which will contain all the extraordinary syllabus of the course to rise his mark. The practice mark is not recoverable.

Bibliography

"Diseño de maquinaria", Robert L. Norton, Edicions Mc Graw Hill

"MECÀNICA de la partícula i del sòlid rígid", Joaquim Agulló i Batlle, Publicacions OK punt

"Disseny de màquines I. Mecanismes", Carles Riba Romeva, Edicions UPC.

"Mecanismes i màquines I. El frec en les màquines", Carles Riba Romeva, Edicions UPC.

"Mecanismes i màquines II. Transmissions d'engranatges", Carles Riba Romeva, Edicions UPC.

"Mecanismes i màquines III. Dinàmica de màquines", Carles Riba Romeva, Edicions UPC.

"Teoria de màquines" Salvador Cardona Foix i Daniel Clos Costa, Edicions UPC

"Mechanical design", Peter R.N. Childs, Arnold Publishers

"Machinery malfunction diagnosis and correction", Robert C. Eisenmann, Published by Prentice Hall PTR