Last update: 24-05-2016

340636 - FOME-R1P12 - Mechanical Fundamentals

Coordinating unit: 340 - EPSEVG - Vilanova i la Geltrú School of Engineering

Teaching unit: 712 - EM - Department of Mechanical Engineering

Academic year: 2016

Degree: MASTER'S DEGREE IN AUTOMATIC SYSTEMS AND INDUSTRIAL ELECTRONICS (Syllabus 2012). (Teaching unit Optional)

ECTS credits: 5 Teaching languages: Catalan

Teaching staff

Coordinator: Maurici Sivatte

Others: Maurici Sivatte

Degree competences to which the subject contributes

Specific:

2. CC09 - Identify the symbols of mechanical systems and obtain the knowledge to determine the number of drives that will allow the desired movement of the system.

Transversal:

1. EFFECTIVE USE OF INFORMATI0N RESOURCES. Managing the acquisition, structure, analysis and display of information from the own field of specialization. Taking a critical stance with regard to the results obtained.

Teaching methodology

Classes of theory and problems
Lab.

Learning objectives of the subject

Mechanical systems are the material basis of automation, per therefore an Automàtica i ingieniero in industrial electronics, must understand their movimento, transmission and causes that generate it. The objective of this course is to convey to students these skills.

Study load

Total learning time: 45h	Hours large group:	30h	66.67%
	Hours small group:	15h	33.33%

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Content

Introduction to Mechanical Systems

Learning time: 13h

Theory classes: 8h
Laboratory classes: 2h
Self study : 3h

Description:
Definition of System Mechanic. Kinematic scheme.
Types of Mechanisms. Articular quadrangle. Motor Mechanism.
Powertrain. Investment kinematic mechanisms.
Degrees of Freedom. Kinematic pairs. Grübler criteria.
Outlining

Related activities:
CLASS THEORY AND PROBLEMS
LABORATORY PRACTICE
LEARNING ASSESSMENT

Specific objectives:
Introduce students to the symbolism of the mechanical systems and gain the knowledge to determine the number of drives that will allow the desired motion of the system:
Acquire the concepts of machine, mechanism, kinematic chain element and kinematic pair.
Identify and classify the pairs of a mechanism.
Calculate and analyze the degrees of freedom and mobility of a mechanism.
Understand the meaning of the reference system.
Training for outlining kinematic mechanisms.
Mastering the concept of kinematic equivalence.

Kinematics. The movement in mechanical systems.

Learning time: 19h 30m

Theory classes: 7h
Laboratory classes: 2h
Self study : 10h 30m

Description:
Fundamental movements. Composition of movement.
Calculating velocities planar mechanisms. Cinema of speeds.
Calculating accelerations planar mechanisms. Cinema of accelerations.

Related activities:
CLASS THEORY AND PROBLEMS
LABORATORY PRACTICE
LEARNING ASSESSMENT

Specific objectives:
Understand and calculate the overall motion of mechanisms, from a cinematic point of view:
Calculating the angular and linear velocities of mechanisms.
Calculate the angular and linear accelerations mechanisms
Of solving relative motion mechanisms

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Static and dynamic. Causes of motion in mechanical systems	Learning time: 19h 30m Theory classes: 7h Laboratory classes: 2h Self study : 10h 30m

Description:
Newton's Laws. Free body diagram.
Troubleshooting static theorems using vector (Newton) and principle of virtual powers.
Troubleshooting dynamics through fictitious inertial forces (d'Alembert).
Troubleshooting using the dynamic principle of virtual powers
Troubleshooting by Dynamic Energy Theorem

Related activities:
CLASS THEORY AND PROBLEMS
LABORATORY PRACTICE
LEARNING ASSESSMENT

Specific objectives:
Understand and calculate the forces that cause movement in mechanical systems:
Identify the causes of motion.
Vectorially represent and interpret the state of external stresses in a mechanical system.
Calculating solve stresses which cause movement in the mechanical systems.

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Planning of activities

(ENG) CLASSES TEORIA I PROBLEMES	Hours: 33h Theory classes: 33h

Description:
Classroom work

Support materials:
Notes from the Digital Campus
Transparencies

Specific objectives:
Meet the symbolism of mechanical systems and get the knowledge to determine the number of drives that will allow the desired motion of the system
Acquiring the ability to generate and solve the equations of motion for mechanical systems multi body

LABORATORY PRACTICE	Hours: 10h Laboratory classes: 10h

Description:
Conduct by the student of practical work and mechanical computer simulations

Support materials:
Computer and software simulation
Mechanical models

LEARNING ASSESSMENT	Hours: 2h Guided activities: 2h

Description:
Individual written tests

Specific objectives:
Certify the level of achievement of learning

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Qualification system

The final grade (QF) of the subject is obtained from the Expressió:
QF = 0.25 x + 0.75 x Rated Practice Final Exam.
Evaluation acts and weight are:
1st act of evaluation (weight 0.25):
Practices (realitzadas in mechanical laboratoroi in groups of two students with teacher support. Subsequently a report that will help you deliver the QUALIFICATION is.)
2on act of evaluation (weight 0.75):
Final Exam. (includes tota matter)

The final grade (QF) of the subject is obtained from the Expressió:
QF = 0.25 x Rated Practice + 0.75 x Rated Final Exam.
Evaluation acts and weight are:
1st act of evaluation (weight 0.25):
Practices (realitzadas in mechanical laboratoroi in groups of two students with teacher support. Subsequently a report that will help you deliver the QUALIFICATION is.)
2on act of evaluation (weight 0.75):
Final Exam. (includes tota matter)

Regulations for carrying out activities

Without documentation
No calculator

Bibliography

Basic:

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Cardona i Foix, Salvador. Teoria de màquines [Recurs electrònic] [on line]. 2a ed. Barcelona: Edicions UPC, 2008 [Consultation: 27/01/2015]. Available on: <http://hdl.handle.net/2099.3/36644>. ISBN 9788483019634.

Beer, Ferdinand Pierre [et al.]. Mecánica Vectorial para Ingenieros. Estática. 9a ed. México [etc.]: McGraw-Hill, 2010. ISBN 9786071502773.

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