

340600 - DIAP-R1012 - Applied Dynamics

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 Compulsory)
 ECTS credits: 5 Teaching languages: Catalan

Teaching staff

Coordinator: Ingrid Magnusson
 Others: Ingrid Magnusson

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 INFORMATION 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

Theoretical explanations and practical examples.
 Completion of a project.

Learning objectives of the subject

The main objective of the course is to acquire basic tools to carry on a constructive design of a machine, and tools to model a machine (motor - transmission - receptor) to estimate its dynamic behaviour, optimize it and to preview possible problematics.

Study load

Total learning time: 125h	Hours large group:	30h	24.00%
	Hours medium group:	0h	0.00%
	Hours small group:	15h	12.00%
	Guided activities:	0h	0.00%
	Self study:	80h	64.00%

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Content

<p>Constructive structure of a machine</p>	<p>Learning time: 26h Theory classes: 10h Guided activities: 1h Self study : 15h</p>
<p>Description: Structural functions of machines Angular and lineal joints Chassis</p> <p>Related activities: A1 A2 A3</p> <p>Specific objectives: To make a constructive design of a revolute joint or a slide joint, according to the Project specifications.</p>	
<p>Machine drive</p>	<p>Learning time: 26h Theory classes: 10h Guided activities: 1h Self study : 15h</p>
<p>Description: Motors. Curves Torque - Angular velocity and Power - Angular velocity Mechanical transmissions. Gear, belts, chains, cams, couplings. Receivers. Curves Torque - Angular velocity and Power - Angular velocity</p> <p>Related activities: A1 A2 A3</p> <p>Specific objectives: To know the Torque - angular velocity curve of different mechanical systems. To define the functions of the mechanical transmission systems, and to know the main transmission elements including constructive details. To be able to perform a constructive design of a transmission system integrated in a machine and to choose the motor according to the project specifications.</p>	



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Mechanical systems modeling	Learning time: 26h Theory classes: 10h Guided activities: 1h Self study : 15h
<p>Description: Theory and practice about different tools to model the dynamic behaviour of a mechanical system.</p> <p>Related activities: A1 A2 A3</p> <p>Specific objectives: To model the elements in a mechanical system (drive - transmission - receiver) as tool to aid in choosing components, optimizing the design and to explore the influence of the different items in the behaviour of the system.</p>	

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Planning of activities

(A1) CLASS THEORY AND PROBLEMES	Hours: 67h 30m Self study: 37h 30m Theory classes: 30h
<p>Description: Work in the classroom</p> <p>Support materials: Digital Campus Notes</p>	
(A2) Laboratory Practices	Hours: 45h Laboratory classes: 18h Self study: 27h
<p>Description: Conduct by the student of a proposed mechanical design of practical application. Calculation and design of mechanical systems and transmission needed to solve a specific problem. Selection and sizing of drives required.</p> <p>Support materials: Computer simulation software and mechanical design (CAD-CAE)</p> <p>Descriptions of the assignments due and their relation to the assessment: Design 3D mechanical design Project specification and calculations Rules used</p> <p>Specific objectives: Apply knowledge of the student in the calculation and mechanical design for the realization of a mechanical draft practical application. It includes the design of the motion transmitting mechanism and the choice of the drives.</p>	
(A3) Assessment of Learning	Hours: 12h 30m Self study: 9h 30m Guided activities: 3h
<p>Description: Individual Exams. Performing a mechanical project.</p> <p>Specific objectives: Certify the degree of achievement of aprenetatge</p>	

Qualification system

The final grade (QF) takes into account all the work done over the course. It is obtained from the expression:

$$QF = 0.5 \times \text{Project Qualification} + 0.25 \times \text{Continuous Avaluation Activities} + 0.25 \text{ Final Exam}$$

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Bibliography

Basic:

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Khamashta Shahin, Munir; Álvarez Martínez, Lorenzo; Capdevila Pagés, Ramón. Problemas de cinemática y dinámica de máquinas. 2ª ed. corregida. Terrassa: Departament d'Enginyeria Mecànica, 1993-1994. ISBN 847653003X.

Complementary:

Calero Pérez, Roque ; Carta González, José Antonio. Fundamentos de mecanismos y máquinas para ingenieros. Madrid [etc.]: McGraw-Hill, 1999. ISBN 844842099X.

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

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Riba i Romeva, Carles. Selecció de motors i transmissions en el projecte mecànic. Barcelona: ETSEIB. CPDA, 1988.

Riba i Romeva, Carles. Disseny de màquines [Recurs electrònic] [on line]. 3a ed. Barcelona: Edicions UPC, Universitat Politècnica de Catalunya, 2001 [Consultation: 04/03/2016]. Available on: <<http://hdl.handle.net/2099.3/36688>>. ISBN 9788498800807.

Riba i Romeva, Carles. Mecanismes i màquines. Volum III. Dinàmica de màquines. Barcelona: Edicions UPC, 1999-2000. ISBN 8483013479.