



Universitat de Lleida

DEGREE CURRICULUM
**CALCULUS AND MACHINE
DESIGN**

Coordination: ROCA ENRICH, JOAN

Academic year 2016-17

Subject's general information

Subject name	CALCULUS AND MACHINE DESIGN			
Code	102304			
Semester	2nd Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Typology	Modality
	Bachelor's Degree in Mechanical Engineering	3	COMPULSORY	Attendance-based
ECTS credits	6			
Groups	1GG,2GM,5GP			
Theoretical credits	3			
Practical credits	3			
Coordination	ROCA ENRICH, JOAN			
Department	INFORMATICA I ENGINYERIA INDUSTRIAL			
Teaching load distribution between lectures and independent student work	Attendance work: 40 % Autonomous work: 60 %			
Important information on data processing	Consult this link for more information.			
Language	Catalan. Also some material in spanish or in english			
Office and hour of attention	Joan Roca Enrich. Tuesday, 12:00 to 13:00; Wednesday 17:00 to 18:00			

Professor/a (s/es)	Adreça electrònica professor/a (s/es)	Crèdits	Horari de tutoria/lloc
ROCA ENRICH, JOAN	jroca@diei.udl.cat	10,2	Office 0.07 in building CREA Tuesday, from 12:00 to 13:00 Wednesday, from 17:00 to 18:00

Subject's extra information

The main background needed to take advantage of the subject are: graphic expression, materials science, kinematics and dynamics of mechanisms.

It is essential to have studied previously, and it is advisable to have passed the following subjects:

- Graphics Expression I
- Theory of Mechanisms
- Theory of Machines
- Materials for mechanical manufacturing

It is also advisable to be taking at the same time the subjects:

- Manufacturing technologies
- Graphic Expression II

Learning objectives

- Know and understand the different steps in the design process of a machine
- To introduce the basic principles of fatigue in machine design
- Acquire the basic knowledge for the calculation, selection or dimensioning of threaded elements
- Acquire the basic knowledge for the calculation, selection or dimensioning of flexible transmission systems
- Acquire the basic knowledge for the calculation, selection or dimensioning of gear transmissions
- Acquire the basic knowledge for the calculation, selection or dimensioning of rolling and sliding bearings
- Acquire the basic knowledge for the calculation, design and dimensioning of transmission shafts
- Acquire the basic knowledge for the analysis and design of clutches and brakes

Competences

Cross-disciplinary competences

- **EPS1.** Capacity to solve problems and prepare and defence arguments inside the area of studies.
- **EPS6.** Capacity of analysis and synthesis.

Specific competences

- **GEM20.** Knowledge and capacity for the calculation, design and testing of machines.

Subject contents

1. SPECIFICATIONS AND REQUIREMENTS OF A MACHINE
2. BOLTS AND THREADED ELEMENTS
3. STRUCTURAL FATIGUE OF MACHINE ELEMENTS
4. FLEXIBLE TRANSMISSION SYSTEMS
5. CALCULATION OF GEAR TRANSMISSIONS
6. BEARINGS AND GUIDANCE SYSTEMS
7. CALCULATION OF TRANSMISSION SHAFTS
8. CLUTCHES AND BRAKES

Methodology

Lectures: They will take place during the Full Group sessions. Explanation of theoretical content and proposal and/or resolution of some practical examples.

Problems: They will take place during the Half Group sessions. Approach and discussion of some problems that the students will solve individually or in groups.

Practices: They will take place during the Half Group sessions. 2 Practices at the Mechanics laboratory, analysing and measuring design parameters of mechanical systems, 1 practice about design of machinery using CAD.

Work in group: Development of 2 works about the design and calculations of a subassembly of a machine.

Development plan

Week	Methodology	Unit	Attendance hours	Autonomous work hours
1	Lectures	Unit 1: Theory	2	0
2	Lectures Problems	Unit 2: Theory Unit 2: Problems	2 2	4
3	Lectures Problems	Unit 2-3: Theory Work in group 1	2 2	4
4	Lectures Problems	Unit 3: Theory Practice 1	2 2	4
5	Lectures Practice	Unit 4: Theory Work in group 1	2 1	6
6	Lectures Problems	Unit 4: Theory Practice 2	2 2	4
7	Lectures Problems	Unit 5: Theory Unit 4: Problems	2 2	4
8	Lectures Practice	Unit 5: Theory Work in group 1	2 1	6
9	Evaluation	Exam 1	2	5
10	Lectures Problems	Unit 5: Theory Unit 5: Problems	2 2	6
11	Lectures Practice	Unit 6: Theory Work in group 2	2 2	8
12	Lectures Problems	Unit 6: Theory Unit 6: Problems	2 2	6
13	Lectures Problems	Unit 7: Theory Work in group 2	2 2	6
14	Lectures Problems	Unit 7: Theory Unit 7: Problems	2 2	6
15	Lectures Problems	Unit 8: Theory Unit 8: Problems	2 2	6

16-17	Evaluation	Exam 2	2	7
18	Tutoring	Tutoring	2	4
19	Evaluation	Recovery exam	2	4

Evaluation

There will be several evaluation activities:

- 1st individual written exam (week 9). The content to be evaluated is the one exposed and worked in class up to the date of this exam.
- Reports from the practice sessions, to be held in groups of 3-4 students. Practice sessions are mandatory
- 2 works about the design and calculations of a subassembly of a machine
- 2on individual written exam (week 16 or 17). The content to be evaluated is mainly the one exposed and worked in class between written exam 1 and written exam 2. A minimum mark of 3,5 out of 10 must be reached to pass the subject.
- Recovery exam of the 2nd individual one, with the same minimum mark

The weight assigned to each evaluation activity, out of 100, is as follows:

Activity	Weight
1st individual exam	20
Practice sessions and reports	10
Works in group	15+15
2nd individual exam	40
Recovery exam of the 2nd individual one	40

Note: if the minimum mark of 3,5 is not reached on the 2nd individual exam or on the recovery one, the subject mark will be the minimum between the result of the percentages of the table above and 3,5.

Bibliography

- DECKER, K.H. "Elementos de máquinas". Ediciones URMO. 1980
- RIBA, C. "Disseny de Màquines I. Mecanismes". Edicions UPC.Barcelona. 1995
- RIBA, C. "Disseny de Màquines II. Estructura constructiva".Edicions UPC. Barcelona. 1995
- RIBA, C. "Disseny de Màquines IV. Selecció de materials 1". Edicions UPC. Barcelona.1998
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- RIBA, C. "Disseny de Màquines V. Metodologia". Edicions UPC.Barcelona. 1998
- FENOLLOSA, J. "Unions cargolades". Edicions UPC. Barcelona.1997
- NORTON, R.L. "Diseño de máquinas". Editorial Prentice Hall.1999
- SHIGLEY & MISCHKE. "Diseño en Ingeniería Mecánica". Ed. McGraw Hill. España 1998

