



Universitat de Lleida

## DEGREE CURRICULUM

# THEORY OF MECHANISMS

Coordination: BAQUERO ARMANS, GRAU

Academic year 2023-24

## Subject's general information

Subject name	THEORY OF MECHANISMS			
Code	102330			
Semester	1st Q(SEMESTER) CONTINUED EVALUATION			
Typology	Degree	Course	Character	Modality
	Bachelor's degree in Industrial Organization and Logistics Engineering	2	COMPULSORY	Attendance-based
	Common branch in industrial engineering programs - Igualada	2	COMPULSORY	Attendance-based
	Doble titulació: Grau en Enginyeria en Organització Industrial i Logística i Grau en Administració i Direcció d'Empreses	3	COMPULSORY	Attendance-based
	Not informed	2	COMPULSORY	Attendance-based
Course number of credits (ECTS)	6			
Type of activity, credits, and groups	Activity type	PRALAB	PRAULA	TEORIA
	Number of credits	1	2	3
	Number of groups	3	1	1
Coordination	BAQUERO ARMANS, GRAU			
Department	INDUSTRIAL AND BUILDING ENGINEERING			
Teaching load distribution between lectures and independent student work	Lectures: 40% Independent work: 60%			
Important information on data processing	Consult <a href="#">this link</a> for more information.			
Language	Catalan Some resources in Spanish and English			
Distribution of credits	Theoretical credits: 3 ECTS Room practices credits: 2 ECTS Lab practices credits: 1 ECTS			

Teaching staff	E-mail addresses	Credits taught by teacher	Office and hour of attention
BAQUERO ARMANS, GRAU	grau.baquero@udl.cat	5	
ESTEBAN DALMAU, BERNAT	bernatesteban@udl.cat	3	

## Subject's extra information

It is considered essential to have taken before, and it is advisable to have passed the following subjects:

- Linear algebra
- Calculation
- Physics I
- Graphic Expression

You can find educational materials on the Virtual Campus: <http://cv.udl.cat>

The use of the Virtual Campus is fundamental to access resources of the subject, exercises deadline notifications, practices delivery and evaluation tests.

It is **COMPULSORY** that the students bring the following elements of individual protection (EPI) to the practices at the laboratory.

- Laboratory gown from UdL
- Protection glasses

They can be purchased through the shop Údels of the UdL:

C/ Jaume II, 67 baixos  
Centre the Cultures i Cooperació Transfronterera

<http://www.publicacions.udl.cat/>

There will be a specific service for the *Campus Universitari d'Igualada*.

The use of other elements of protection (for example caps, masks, gloves of chemical or electrical risk, etc.) will depend on the type of practice to be done. In that case, the teacher will inform of the necessity of specific EPI.

Not bringing the EPI's described or not fulfilling the norms of general security that are detailed below imply that the student can not access to the laboratories or have to go out of them. The no realisation of the practices for this reason imply the **consequences in the evaluation** of the subject that are described in this course guide.

## GENERAL NORMS OF SECURITY IN LABORATORY PRACTICES

- Keep the place of realisation of the practices clean and tidy. The table of work has to be free from backpacks, folders, coats...
- No short trousers or short skirts are allowed in the laboratory.
- Closed and covered footwear is compulsory in the laboratory.
- Long hair needs to be tied.
- Keep the laboratory gown laced in order to be protected from spills of chemicals.
- Bangles, pendants or wide sleeves are not allowed as they can be trapped.
- Avoid the use of contact lenses, since the effect of the chemical products is much bigger if they enter between the contact lense and the cornea. Protection over-glasses can be purchased.
- No food or drink is allowed in the laboratory.
- It is forbidden to smoke in the laboratories.
- Wash your hands whenever you have contact with a chemical product and before going out of the laboratory.
- Follow the instructions of the teacher and of the laboratory technicians and ask for any doubt on security.

For further information, you can check the following document of the *Servei de Prevenció de Riscos Laborals de la UdL*: <http://www.sprl.udl.cat/alumnes/index.html>

## Learning objectives

- Knowing the principles of theory of mechanisms.
- Deepening general mechanical knowledge of the rigid solid
- Analyzing the typology and the constituent elements of a mechanism
- Studying the possibility of movement of a certain mechanism
- Analyzing the kinematics of a mechanism, at the level of positions, speeds and accelerations
- Analyzing the dynamics of a mechanism, both instantaneously and the evolution between two specific situations.
- Knowing the basic concepts of mechanics of the deformable solid.

## Competences

### Basic competences

B01 That students have demonstrated to possess and understand knowledge in an area of study that starts from the base of general secondary education, and is usually found at a level that, although supported by advanced textbooks, also includes some aspects that imply knowledge coming from the vanguard of his/her field of study.

B02 That students know how to apply their knowledge to their work or vocation in a professional manner and possess the skills that are usually demonstrated through the elaboration and defense of arguments and the resolution of problems within their area of study.

B04 That students can transmit information, ideas, problems and solutions to a specialized and non-specialized public.

### General competences

CG3. To synthesize basic and technological subjects, which enable them to learn new methods and theories, and provide them with versatility to adapt to new situations.

CG4. To Solve problems with initiative, make decisions, creativity, critical reasoning and to communicate and transmit knowledge, skills and abilities in the field of Industrial Chemical/Organization Engineering.

CG6. To implement specifications, regulations and mandatory rules.

CG10. To work in a multilingual and multidisciplinary environment.

### Specific competences

CE13. To implement the principles of machine theory and mechanisms.

CE14. To conceptualize the principles of strength of materials.

## Transversal competences

CT1. To develop a proper understanding and oral and written expression of Catalan and Spanish.

CT3. To implement new technologies and technologies of information and communication.

CT5. To apply essential notions of scientific thinking.

## Subject contents

- Topic 1. Introduction to mechanics
- Topic 2. Kinematics
- Topic 3. Static
- Topic 4. Dynamics
- Topic 5. Mechanical deformable solid
- Topic 6. Practices

## Methodology

This subject combines theoretical sessions and problems, practical exercises and work in the laboratory with specific software and machines.

Most practical activities will be developed in reduced work teams. If possible, external visits and / or seminars will also be made.

The methodology used in the topics envisaged is:

- Master classes where the basic concepts of the contents will be explained.
- Classes of problems where exercises related to master classes will be developed.
- Laboratory practices developing and expanding concepts of the different topics.
- Group project.

The follow-up of the subject will be done by means of the delivery of exercises through the Virtual Campus and the realization of questionnaires.

## Development plan

Semana	Metodología	Temario	Horas presenciales	Horas trabajo autónomo
1	Clase magistral Ejercicios	Tema 1	4	6
2	Práctica Clase magistral Ejercicios	Práctica 1 Tema 1	4	6
3	Clase magistral Ejercicios	Tema 2	4	6
4	Clase magistral Ejercicios	Tema 2	4	6

Semana	Metodología	Temario	Horas presenciales	Horas trabajo autónomo
5	Práctica Clase magistral Ejercicios	Práctica 2 Tema 2	4	6
6	Clase magistral Ejercicios	Tema 2	4	6
7	Práctica Clase magistral Ejercicios	Práctica 3 Tema 3	4	6
8	Clase magistral Ejercicios	Tema 3 -	2	6
9	Evaluación	Prova 1	2	3
10	Clase magistral Ejercicios	Tema 3 Tema 4	4	6
11	Clase magistral Ejercicios	Tema 4	4	6
12	Práctica Clase magistral Ejercicios	Práctica 4 Tema 4	4	6
13	Clase magistral Ejercicios	Tema 4 -	2	6
14	Clase magistral Ejercicios	Tema 5	4	6
15	Práctica Clase magistral Ejercicios	Práctica 5 Tema 5	4	6
16-17	Evaluación	Prova 2	2	3
18	Tutoría	Tutoría		
19	Evaluación	Recuperación	2	

## Evaluation

The final grade of the subject will be the sum of the following percentages:

- Test 1 (exam): 25%
- Test 2 (exam): 40%
- Exercises: 20%
- Practices (in laboratory) and group project: 15%

Retake activity allows re-evaluating the percentage corresponding to *Exams (Test 1 and Test 2, 65%)*.

*Students who have the approval to be assessed through alternative evaluation (see requirements and procedure in the Evaluation regulations) must carry out the following activities:*

- *Exam: 85%*
- *Practices (in laboratory) and group work: 15%*

*Retake activity in the alternative evaluation allows re-evaluating the Exam (85%).*

## Bibliography

- Mecánica Vectorial para Ingenieros. Estática. **Ferdinand P. Beer, E. Russell Johnston, Elliot R. Eisenberg**, Editorial McGraw-Hill, 2007. ISBN: 9701061039
- Mecánica Vectorial para Ingenieros. Dinámica. **Ferdinand P. Beer, E. Russell Johnston, William E. Clausen**. Editorial McGraw-Hill, 2007. ISBN: 9701061020
- Mecánica de Materiales. **Ferdinand P. Beer**. Editorial McGraw-Hill, 2007. ISBN: 9701061012
- Teoria de Màquines. **Salvador Cardona**. Edicions UPC, 1998. ISBN 9788498803808
- Mecánica para Ingeniería. Dinámica. **Anthony Bedford**. Addison-Wesley Iberoamericana.E.U.A., 1996. ISBN: 0201653680