DEGREE CURRICULUM

THEORY OF MECHANISMS

Coordination: BAQUERO ARMANS, GRAU

Academic year 2021-22

THEORY OF MECHANISMS 2021-22

Subject's general information

<table>
<tr><td>Subject name</td><td>THEORY OF MECHANISMS</td></tr>
<tr><td>Code</td><td>102330</td></tr>
<tr><td>Semester</td><td>1st Q(SEMESTER) CONTINUED EVALUATION</td></tr>
<tr><td>Typology</td><td>
<table>
<tr><th>Degree</th><th>Course</th><th>Character</th><th>Modality</th></tr>
<tr><td>Bachelor's degree in Industrial Organization and Logistics Engineering</td><td>2</td><td>COMPULSORY</td><td>Attendance-based</td></tr>
<tr><td>Not informed</td><td>2</td><td>COMPULSORY</td><td>Attendance-based</td></tr>
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<tr><td>Course number of credits (ECTS)</td><td>6</td></tr>
<tr><td>Type of activity, credits, and groups</td><td>
<table>
<tr><th>Activity type</th><th>PRALAB</th><th>PRAULA</th><th>TEORIA</th></tr>
<tr><td>Number of credits</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>Number of groups</td><td>3</td><td>2</td><td>1</td></tr>
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<tr><td>Coordination</td><td>BAQUERO ARMANS, GRAU</td></tr>
<tr><td>Department</td><td>COMPUTER SCIENCE AND INDUSTRIAL ENGINEERING</td></tr>
<tr><td>Teaching load distribution between lectures and independent student work</td><td>Lectures: 40%
Independent work: 60%</td></tr>
<tr><td>Important information on data processing</td><td>Consult this link for more information.</td></tr>
<tr><td>Language</td><td>Catalan
Some resources in Spanish and English</td></tr>
<tr><td>Distribution of credits</td><td>Theoretical credits: 3 ECTS
Room practices credits: 2 ECTS
Lab practices credits: 1 ECTS</td></tr>
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THEORY OF MECHANISMS 2021-22

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	bernat.esteban@udl.cat	5	

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
- Mechanical protection gloves

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 laboratoy 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 iImplement 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.

In order to develop the theoretical classes in virtual format, the following will be taken into account:

- Theoretical classes using the virtual campus videoconferencing tool with its recording in case of explanations of theory, problems or presentation of practical lessons (not all doubt sessions will be recorded due to their variety of content).
- Use of the test / query / ... tools to develop the following-up of more theoretical parts.
- Use of individual exercise deliveries and also through forums to facilitate interaction between students.

Development plan

Week	Metodology	Content	Class hours	Virtual class hours	Autonomous work

1	Master class Exercices	Topic 1	2	2	6
2	Practices Master class Exercices	Practice 1 Topic 1	2	2	6
3	Master class Exercices	Topic 2		2	3
4	Master class Exercices	Topic 2	2	2	6
5	Master class Exercices	Topic 2		2	3
6	Master class Exercices	Practice 2 Topic 2	2	2	6
7	Master class Exercices	Topic 2 / 3 Topic 3	2	2	6
8	Practices Master class Exercices	Practice 3 Topic 3	2	2	6
9	Evaluation	Exam 1	2		3
10	Master class Exercices	Topic 3 Topic 4	2	2	6
11	Master class Exercices	Topic 4	2	2	6
12	Exercices	Practice 4 Topic 5	2	2	6
13	-	-			
14	Master class Exercices	Topic 5	2	2	6
15	Practices Master class Exercices	Practice 5 Topic 5	2	2	6
16-17	Evaluation	Exam 2	2		3
18	Tutoring	Tutoring			
19	Evaluation	Retake	2		

Evaluation

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

- Exams
  - Test 1: 25%
  - Test 2: 40%
- Exercises: 20%
- Practices and group project: 15%

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

Note: If the student does not attend any of the practices or any of the reports is evaluated as Not Correct, the grade of the subject will be Not Attended.

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