

## Course guide

### 220091 - M - Mechanics

Last modified: 19/04/2023

**Unit in charge:** Terrassa School of Industrial, Aerospace and Audiovisual Engineering  
**Teaching unit:** 712 - EM - Department of Mechanical Engineering.

**Degree:** BACHELOR'S DEGREE IN INDUSTRIAL TECHNOLOGY ENGINEERING (Syllabus 2010). (Compulsory subject).

**Academic year:** 2023    **ECTS Credits:** 4.5    **Languages:** Catalan

#### LECTURER

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**Coordinating lecturer:** JORDI ROMEU GARBI

**Others:** JORDI PALMIOLA CREUS - TERESA PAMIES GOMEZ -  
- ANDREU BALASTEGUI MANSO

#### DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

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**Specific:**

CE13-INDUS. Knowledge of the principles of machine theory and mechanisms. (Common module in the industrial branch)

#### TEACHING METHODOLOGY

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The educational methodology is divided into four parts:

- Presencial sessions of contents exhibition
- Presencial sessions of practical work
- Autonomous work of study and realization of exercises and activities

In the content exhibition sessions the teaching staff will introduce the theory bases of the subject, methods, concepts and results with examples of engineer character to facilitate their understanding.

The teaching staff will guide students in the application of the theory concepts for solve problems related with industrial engineering in the sessions of practical work in the classroom. It will purpose exercises which students have to solve in the classroom with partners and the teacher, or out of the classroom, in order to learn the utilization of tools for solving problems.

The autonomous work will consist on problems and conceptual questions which are proposed in the bibliography. They will develop everything what has been seen in the presencial sessions of content exhibition and practical work.

#### LEARNING OBJECTIVES OF THE SUBJECT

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The subject introduces to student in applied knowledge of the mechanics and in the concepts and principles which determine the behaviour of the structures with dynamic solicitations on duty.

#### STUDY LOAD

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Type	Hours	Percentage
Hours large group	31,0	27.56
Hours medium group	14,0	12.44
Self study	67,5	60.00

**Total learning time:** 112.5 h



## CONTENTS

### 1.1 Particle kinematics

**Description:**

Reference and coordinate system  
Normal and tangential components  
Motion relative to rotating axes

**Specific objectives:**

Recovery of past knowledge from previous courses

**Related activities:**

1,2,3

**Full-or-part-time:** 7h

Theory classes: 2h  
Practical classes: 1h  
Self study : 4h

### 1.2 Kinematical motions

**Description:**

Degrees of freedom  
Motion of a rigid body: rotation and translation  
Motion properties

**Full-or-part-time:** 18h 30m

Theory classes: 4h  
Practical classes: 2h  
Self study : 12h 30m

### 1.3 Kinetics of rigid bodies

**Full-or-part-time:** 20h

Theory classes: 6h  
Practical classes: 2h  
Self study : 12h

### 1.4 Planar motion

**Full-or-part-time:** 16h

Theory classes: 4h  
Practical classes: 2h  
Self study : 10h

### 1.5 Particle kinetics

**Full-or-part-time:** 5h

Theory classes: 2h  
Practical classes: 1h  
Self study : 2h



### 1.6 Kinetics of the rigid bodies

**Full-or-part-time:** 7h

Theory classes: 2h

Practical classes: 1h

Self study : 4h

### 1.7 Inertia

**Full-or-part-time:** 5h

Theory classes: 2h

Practical classes: 1h

Self study : 2h

### 1.8 Equation of motion

**Full-or-part-time:** 18h

Theory classes: 5h

Practical classes: 2h

Self study : 11h

### 1.9 Planar kinetics

**Full-or-part-time:** 16h

Theory classes: 4h

Practical classes: 2h

Self study : 10h

## ACTIVITIES

### LARGE GROUP SESSIONS

**Full-or-part-time:** 42h

Theory classes: 28h

Self study: 14h

### MEDIUM GROUP SESSIONS

**Full-or-part-time:** 21h

Practical classes: 14h

Self study: 7h

### PARTIAL EXAM

**Full-or-part-time:** 24h 10m

Theory classes: 1h

Self study: 23h 10m



## FINAL EXAM

**Full-or-part-time:** 25h 20m  
Theory classes: 2h  
Self study: 23h 20m

## GRADING SYSTEM

- Partial examination: 30%
- Final exam: 50%
- Ordinary activities of class (partial): 10%
- Ordinary activities of class (final): 10%

All those students who cannot attend the partial examination or who not pass it, will have the option to recover the note by taking the final exam of the subject. The passing of the final exam with a grade equal to or higher than 5 replaces the partial exam grade with a 5 point qualification.

## EXAMINATION RULES.

The partial and final examination will be individual without material support (notes or books).  
The ordinary activities will develop in groups with other classmates and teacher but without material support.

## BIBLIOGRAPHY

### Basic:

- Capdevila Pagés, Ramón [et al.]. Cinemática. 2a ed. Barcelona: Edicions UPC, 2001. ISBN 8483014696.
- Capdevila Pagés, Ramón [et al.]. Dinámica. Barcelona: Edicions UPC, 1993. ISBN 8476532830.
- Capdevila Pagés, Ramón [et al.]. Mecánica: problemas [on line]. Barcelona: Edicions UPC, 2004 [Consultation: 19/05/2020]. Available on: <http://hdl.handle.net/2099.3/36624>. ISBN 8483017806.

### Complementary:

- Meriam, J. L.; Kraige, L.G. Mecánica para ingenieros. Vol. 2, Dinámica [on line]. 3a ed. Barcelona: Reverté, 1998-1999 [Consultation: 20/09/2022]. Available on: <https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=5635460>. ISBN 8429142592.

## RESOURCES

### Audiovisual material:

- Tutorial Simulink
- Apunts de Mecànica