

Course guide

220235 - 220235 - Machine Theory

Last modified: 18/05/2026

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

Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2013). (Optional subject).
MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2025). (Optional subject).

Academic year: 2026 **ECTS Credits:** 3.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: Francisco Javier Freire Venegas

Others: Marañón Martínez, Ana
Diaz Gonzalez, Carlos Gustavo

REQUIREMENTS

IMPORTANT: These courses are complements to the compulsory training received in the degree by non-GrETI students. Therefore, students from GrETI have already taken them in their curriculum and will not be able to take them as general electives.

TEACHING METHODOLOGY

The teaching methodology is divided into two parts:

- Face-to-face sessions - participation of contents and completion of exercises.
- Laboratori session.
- Self study work and exercises and activities.

In the sessions of exhibition -participation of the contents, the teaching staff will introduce the theoretical bases of the subject, concepts, methods and results illustrating them with convenient examples and requesting, where appropriate, the accomplishment of exercises to facilitate- and their understanding.

The student, independently, must work the material provided by the teaching staff and the result of the work sessions-problems in order to assimilate and set the concepts. The teaching staff will provide a plan for study and follow-up activities (ATENEA).

LEARNING OBJECTIVES OF THE SUBJECT

When finishing the subject the students must know in the concepts, principles and basic fundamentals of kinematics and the dynamics of the multi-body mechanical systems.

STUDY LOAD

Type	Hours	Percentage
Self study	48,0	64.00
Hours large group	27,0	36.00

Total learning time: 75 h

CONTENTS

Module 1: Mechanisms-Degrees of freedom

Description:

How to determine the degrees of freedom of the mechanisms.

Related activities:

1,2,3

Full-or-part-time: 18h

Theory classes: 6h

Self study : 12h

Module 2: Kinematics

Description:

Calculation of speeds and accelerations

Related activities:

1,2,3

Full-or-part-time: 32h

Theory classes: 12h

Self study : 20h

Module 3: Transmissions-Epicyloid Trains

Description:

Study of mechanical transmissions

Related activities:

1,2,3

Full-or-part-time: 25h

Theory classes: 9h

Self study : 16h

ACTIVITIES

Activity 1: Large group sessions

Full-or-part-time: 43h

Theory classes: 19h

Self study: 24h



Activity 2: Laboratory

Description:

Normally a practice will be done in the Laboratory. This session can be replaced by an alternative practical activity if necessary.

Full-or-part-time: 8h

Theory classes: 2h

Self study: 6h

Activity 3: Controls in class

Full-or-part-time: 12h

Theory classes: 3h

Self study: 9h

Activity 4: Final exam

Full-or-part-time: 12h

Theory classes: 3h

Self study: 9h

GRADING SYSTEM

- 15% Laboratory
- 15% Control in class 1
- 15% Control in class 2
- 15% Control in class 3
- 40% Final exam at the end of the course

Redirection of unsatisfactory grades in the final exam:

- It will be done by means of a written test on the day reserved by the School for the final exam.
- Students whose final grade is 2.0 or higher have the right to apply.
- The new final mark will be calculated by replacing the final exam grade with the re-conducting test grade, if and only if the latter exceeds the previous grade.

BIBLIOGRAPHY

Basic:

- Paul, Burton. Kinematics and dynamics of planar machinery. Englewood Cliffs, NJ: Prentice Hall Int, cop. 1979. ISBN 9780135160626.
- Norton, Robert L. Diseño de maquinaria: síntesis y análisis de máquinas y mecanismos. 6a ed. Aravaca: McGraw-Hill, 2020. ISBN 9788448620998.
- Shigley, Joseph Edward; Uicker, John Joseph. Teoría de máquinas y mecanismos. México [etc.]: McGraw-Hill, 1982. ISBN 9789684512979.
- Khamashta Shahin, M.; Álvarez Martínez, L.; Capdevila Pagés, R. Problemas de cinemática y dinámica de máquinas. 2ª ed. Terrassa: Departament d'Enginyeria Mecànica, 1994. ISBN 8476530358.

RESOURCES

Other resources:

ATENEA documents