

Academic Year/course: 2022/23

## 29719 - Mechanism and Machine Theory

### Syllabus Information

**Academic Year:** 2022/23

**Subject:** 29719 - Mechanism and Machine Theory

**Faculty / School:** 110 - Escuela de Ingeniería y Arquitectura

**Degree:** 434 - Bachelor's Degree in Mechanical Engineering

**ECTS:** 6.0

**Year:** 2

**Semester:** Second semester

**Subject Type:** Compulsory

**Module:**

## 1. General information

### 1.1. Aims of the course

This course presents main topics on kinematics and dynamics of machines, introducing relative motion, cams, gear trains, balancing problems, etc. It is a basic support for mechanical engineers in their professional exercise.

### 1.3. Recommendations to take this course

It is strongly recommended previous competences in mathematics, physics, graphical representation, and specially in Mechanics (position, velocity, acceleration, absolute and relative frame, forces, torque...). Without these all topics, student will not be able to understand relative motion, balancing concepts or the cam movement, for example.

## 2. Learning goals

## 3. Assessment (1st and 2nd call)

## 4. Methodology, learning tasks, syllabus and resources

### 4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. It is based on participation and the active role of the student favors the development of communication and decision-making skills. A wide range of teaching and learning tasks are implemented, such as lectures, guided assignments, laboratory sessions, autonomous work, and tutorials.

Students are expected to participate actively in the class throughout the semester.

Further information regarding the course will be provided on the first day of class.

### 4.2. Learning tasks

The course includes 6 ECTS organized according to:

- Lectures (1.8 ECTS): 45 hours.
- Laboratory sessions (0.6 ECTS): 15 hours.
- Guided assignments (0.4 ECTS): 10 hours.
- Autonomous work (3.0 ECTS): 75 hours.
- Tutorials (0.2 ECTS): 5 hours.

Lectures: the professor will explain the theoretical contents of the course and solve illustrative applied problems. These problems and exercises can be found in the problem set provided at the beginning of the semester. Lectures run for 3 weekly hours. Although it is not a mandatory activity, regular attendance is highly recommended.

Laboratory sessions: sessions will take place every 2 weeks. Students will work together in groups actively doing tasks such as practical demonstrations, measurements, calculations, and the use of graphical and analytical methods.

Guided assignments: students will complete assignments, problems and exercises related to concepts seen in laboratory sessions and lectures. They will be submitted at the beginning of every laboratory session to be discussed and analyzed. If assignments are submitted later, students will not be able to take the assessment test.

Autonomous work: students are expected to spend about 75 hours to study theory, solve problems, prepare lab sessions, and take exams.

Tutorials: the professor's office hours will be posted on the degree website to assist students with questions and doubts. It is beneficial for the student to come with clear and specific questions.

### **4.3. Syllabus**

The course will address the following topics:

1. Mechanisms: definitions, tipology, DOF. Introduction to the synthesis of mechanisms
2. Methods of kinematic analysis of mechanisms
3. Methods of dynamic analysis of mechanisms
4. Analysis and design of mechanisms of special interest: cam-follower and gears trains
5. Balancing of machines
6. Steady state machines: flywheel effect

### **4.4. Course planning and calendar**

For further details, please refer to the "Escuela de Ingeniería y Arquitectura" website (<https://eina.unizar.es/>)