

## COURSE SYLLABUS 2019-20

Basic information on the course			
Course:	Machine Theory and Mechanisms		
Course code:	44102207	Plan:	Degree in Industrial Chemical Engineering Degree in Mechanical Engineering Degree in Industrial Electronics Engineering Degree in Electrical Engineering
Academic Year:	2019-20	Undergraduate/Graduate:	Bachelor Degree
Degree Year:	2	Type:	Compulsory
Duration:	1 semester		
TIME DISTRIBUTION ACCORDING TO REGULATIONS			
Credits:	6		
Total time:	150		
USE OF LEARNING PLATFORM:	Support for teaching		

TEACHERS			
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Department			
Building			
Office			
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Website			

## OTHER IMPORTANT INFORMATION

### Content justification

This subject is the first in this curriculum where the student acquires the basic knowledge of the kinematics and dynamics of machines. The student will be able to analyse the degrees of freedom of an open or closed kinematic chain. The student will learn to kinematically and dynamically analyse the behaviour of a mechanism and its balancing. In addition, the main types of gears, their classification and the criteria for designing gear trains of different types are studied.

The contents of the subject are organized in the following units:

#### I. Introduction to Mechanism Theory.

1: Mechanisms: Basic Concepts.

#### II. Theory of Mechanisms.

2: Kinematic Analysis by Analytical Methods.

3: Dynamic Analysis by Analytical Methods.

4: Kinematic Analysis Numerical Methods.

5: Dynamic Analysis by Numerical Methods.

6: Basic Basics of Machine Balancing.

#### III. Gears.

7: Gear Theory.

8: Gear Trains.

#### IV. Cams

9: Topology of a Cam Mechanism.

10: Kinematics and Dynamics of Cams.

11: Design of the Cams.

### Courses related in Study Plan

Machines and Mechanisms 1

### Pre-required knowledge

Physics 1, Mathematics 1, Mathematics 2.

## COMPETENCES

### General competences

*Key competences University of Almeria*

- Ability to solve problems

#### *Basic competences*

- Understand and possess knowledge
- Application of the theoretical knowledge

#### Specific competences

Knowledge of the principles of machine theory and mechanisms.

#### **LEARNING OUTCOMES**

The student will handle the kinematic and dynamic analysis of all the transmission parts of a machine considering each of its elements as rigid solids. The specific competence developed, as it appears in the verifying memory of the degree, is: (CRI7) Knowledge of the principles of machine theory and mechanisms.

CT007 – Ability to analyze and evaluate the social and environmental impact of technical solutions.

#### **COMPETENCY ASSESSMENT**

##### **Criteria and assessment tools**

All the students will complete, after the period of lectures ends, a global "final test" related to the theoretical and practical aspects treated during the course.

In addition, the students must perform some laboratory-based practical activities related to the analysis by numerical methods of one or several mechanisms. These activities will be worth 20% of the final grade of the subject.

It is necessary but not sufficient to obtain a grade greater than or equal to 4 out of 10 in the "final test" for passing the course.

The competences (CRI7) Knowledge of the principles of machine theory and mechanisms and Ability to solve problems (UAL3) will be evaluated in the final test and in the laboratory-based practical activities report. The qualification of the UAL3 competition will be excellent, suitable and not suitable. The subject will not be approved if this competence is not reached.

The evaluation of the Understand and possess knowledge competence will compute between 0 and 80% of the final grade, which will be computed based on the written final test.

##### Follow-Up Mechanisms

- Attendance to the tutoring sessions.
- Attendance and participation in seminars.
- Logging in the virtual course.
- Use of the virtual communications tools: forums, emails, etc.
- Preparation and periodic submission of reports.

## COURSE MATERIALS

### Recommended course materials

- Simón Mata, A., Bataller Torras, A., Cabrera Carrillo, J.A., Ezquerro Juanco, F., Guerra Fernández, A.J., Nadal Martínez, F., Ortiz Fernández, A., Fundamentals of Machine Theory and Mechanisms, 1 Ed. Springer International Publishing, 2016.
- Garcia de Jalon, Javier, Bayo, Eduardo, Kinematic and Dynamic Simulation of Multibody Systems: The real-time challenge, 1 Ed. Springer-Verlag New York, 1994.
- Norton, Robert L., Design of Machinery: An Introduction to the Synthesis and Analysis of Mechanisms and Machines, 5 ed. McGraw-Hill, 2012.

*Complementary*

*Other materials*

### Couse materials available in UAL's library

## WEBSITE

- <https://github.com/torresmoreno/MecaServer> (Software MecaServer-Kinematics)