

28811 - Mechanical Engineering

Syllabus Information

Academic Year: 2019/20

Subject: 28811 - Mechanical Engineering

Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia

Degree: 424 - Bachelor's Degree in Mechatronic Engineering

ECTS: 6.0

Year: 2

Semester: First semester

Subject Type: Compulsory

Module: ---

1.General information

1.1.Aims of the course

The main goal of the subject is to build graduate engineers with the particular ability to carry out the analysis and design of mechanical systems. Accordingly, learners will be able to understand a wide range of physical phenomena, develop creative abilities for problem resolution, with the aim of application of the acquired knowledge.

The combination of the competence achieved leads the graduated engineers on Industrial Organisations to access a wide field of professional positions.

The main goal of the subject guarantee graduate engineers to acquire competence that will be included in

This subject belongs to the common training module to face, in addition to the generic competence of the subject, the following principles of machine theory

Brief presentation of

Mechanical engineering is a huge part field of engineering that involves the use of the principles of physics and systems. Traditionally, it has been the branch of engineering that using the application of physical principles and

Mechanical Engineering is the branch of the machines, equipment and facilities always keeping in mind the environment. To fulfil its task, mechanical engineering analyzes the needs, develops and solves technical problems and developments, transforming them into elements, machines, equipment and facilities that provide a suitable resources.

Students enrolled in this subject are recommended to have pursued the subject Física I, where the fundamental subject are explained.

? **Practical Classes:** The teacher resolves practical problems or cases for demonstrative purposes. This type of teaching complements the theory shown in the lectures with practical aspects.

— **Laboratory Workshop:** Practical activities will be conducted in the computer room 1.1 software mechanism (GIM 16.0) with the presence and teacher mentoring.

? **Individual Tutorials:** Those carried out giving individual, personalized attention with a teacher from the department. Said tutorials may be in person or online.

4.2. Learning tasks

Programmed learning activities	<p>The program offered to the student to help them achieve their target results is made up of the activities...</p> <p>Involves the active participation of the student, in a way that the results achieved in the learning are developed, not taking away from those already set out, the activities are the following:</p> <p>? Face-to-face generic activities:</p> <p>? Theory sessions: The theoretical concepts of the subject are explained and illustrative examples developed as a support to the theory when necessary.</p> <p>? Practice Sessions: Problems and practical cases are carried out, complementary to the concepts studied.</p> <p>? Laboratory Workshop: This work is tutored by a teacher, in groups of no more than 20 students.</p> <p>? Generic non-class activities:</p> <p>? Study and understanding of the theory taught in the lectures.</p> <p>? Understanding and assimilation of the problems and practical cases solved in the practical classes.</p> <p>? Preparation of seminars, solutions to proposed problems, etc.</p> <p>? Preparation of laboratory workshops, preparation of summaries and reports.</p> <p>? Preparation of the written tests for continuous assessment and final exams.</p> <p>The subject has 6 ECTS credits, which represents 150 hours of student work in the subject trimester, in other words, 10 hours per week for 15 weeks of class.</p> <p>A summary of a weekly timetable guide can be seen in the following table. These figures are from the subject file in the Accreditation Report of the degree, taking into account the experimentation considered for the said subject is moderate.</p>
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Activity	Weekly school hours
Lectures	3
Laboratory Workshop	1
Other Activities	6

4.3. Syllabus

The course will address the following topics:

Topic 1: Structural Analysis of Mechanisms Plans

Introduction: Historical development of the theory of mechanisms and machines

- ? Terminology mechanisms
- ? Classifications of elements and kinematic pairs of a mechanism
- ? Mobility and Degrees of Freedom: Criteria Grübler
- ? Act Grashoff Theorem and Graphical Analysis
- ? Obtaining a mechanism kinematic scheme

Topic 2: Kinematic Analysis of Mechanisms Plans

- ? Statement of the problem Kinematic
- ? Relative Movement Plano
- ? Relative Instant Center
- ? Determination of the instantaneous centres' mechanism
- ? Theorem Aronhold -Kennedy
- ? Calculation of speed of a mechanism analytically
- ? Calculation of speed of a mechanism graphically

Topic 3: Dynamic Analysis of Mechanisms Plans

- ? Dynamic Approach problem
- ? Calculation of acceleration of a mechanism analytically
- ? Calculation of acceleration of a mechanism graphically
- ? Forces of inertia mechanisms
- ? Balance mechanisms

Topic 4: Kinematic Analysis of Gear and Gear Trains

- ? Gears: Gear Fundamental Law
- ? Classification of Gears
- ? Gear Trains
- ? Classification Gear Trains
- ? Applications: Differential of a vehicle

Topic 5: Theory of Mechanical Vibrations

- ? Fundamental concepts in vibration
- ? Systems degree of freedom
- ? Free Vibrations in systems of one degree of freedom
- ? Vibrations systems forced a degree of freedom
- ? Resonance Phenomenon

4.4.Course planning and calendar

Weeks	WEEKLY PLANNING SEMESTER	
1 ^a 2 ^a	Topic 1	Exercise No. 1 Continuous Assessment
3 ^a 4 ^a 5 ^a 6 ^a	Topic 2	Exercise No. 2 Continuous Assessment 1st Practice with software GIM (Topic 1 and 2) 1st Written Test (Topic 1 and 2)
7 ^a 8 ^a 9 ^a	Topic 3	Exercise No. 3 Continuous Assessment 2nd Practice with software GIM (Topic 3) 2nd Written Test (Topic 3)

The weekly schedule of the subject will be published at <http://www.eupla.unizar.es/asuntos-academicos/calendario-y-horarios>

The dates of the global evaluation test (**official calls**) will be published at <http://www.eupla.unizar.es/asuntos-academicos/examenes>

10 ^a 11 ^a 12 ^a	Topic 4	Exercise No. 4 Continuous Assessment 3rd Written Test (Topic 4)
13 ^a 14 ^a 15 ^a	Topic 5	Exercise No. 5 Continuous Assessment 4th Written Test (Topic 5)

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4.5. Bibliography and recommended resources

http://biblos.unizar.es/br/br_citas.php?codigo=28811&year=2019

Recommended resources:

Material	Format
Topic theory notes Topic problems	Paper/repository
Topic theory notes Topic presentations Topic problems Related links	Digital/Moodle E-Mail
Educational software GIM 16	Web page: http://www.ehu.eus/compmech/software/