



Course guides

3200512 - TDMM2 - Theory and Design of Machines and Mechanisms II

Last modified: 29/05/2020

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

Degree: BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Compulsory subject).

Academic year: 2020 **ECTS Credits:** 6.0 **Languages:** Catalan, Spanish

LECTURER

Coordinating lecturer: Rafel Sitjar

Others: Albert Català

PRIOR SKILLS

Students will be expected to have taken and preferably passed the following subjects: Mechanical Systems, Elasticity and Strength of Materials.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

1. MEC: Skills for the calculation, design and testing of machines.

Transversal:

3. SELF-DIRECTED LEARNING - Level 3. Applying the knowledge gained in completing a task according to its relevance and importance. Deciding how to carry out a task, the amount of time to be devoted to it and the most suitable information sources.

TEACHING METHODOLOGY

- Face-to-face lectures and problem solving sessions.
- Independent learning and exercises.

In the face-to-face lecture sessions, the lecturer will introduce the basic theory, concepts, methods and results for the subject and use examples to facilitate students' understanding.

Students will be expected to study in their own time so that they are familiar with concepts and are able to solve the exercises set.

The transversal piece of work on the course will concentrate on the study of an object, machine or real mechanism. It will be completed outside of class time in groups.

LEARNING OBJECTIVES OF THE SUBJECT

In the subject, students will become familiar with and apply the concepts covered in Mechanical Systems, Elasticity and Strength of Materials.



STUDY LOAD

Type	Hours	Percentage
Hours large group	45,0	30.00
Self study	90,0	60.00
Hours medium group	15,0	10.00

Total learning time: 150 h

CONTENTS

TOPIC 1: INTRODUCTION

Description:

- Introduction to the study of mechanisms.
- Nomenclature used in the field.
- Definition of basic mechanical elements.
- Combination of mechanical elements.

Full-or-part-time: 5 h

Theory classes: 2h

Self study : 3h

TOPIC 10: STRESS STATES

Description:

- Definition.
- Simple stress states.
- Distribution of stresses inside parts.
- Representation of stress states.
- Stress at an angle α .
- Principal stresses.
- Mohr's circle.

Full-or-part-time: 20 h

Theory classes: 8h

Self study : 12h

TOPIC 11: THEORIES OF FRACTURE

Description:

- Definition and limitations.
- Factor of safety.
- Maximum normal stress theory.
- Maximum tangential stress theory.
- 8.7 The maximum distortion energy criterion
- Applications.

Full-or-part-time: 30 h

Theory classes: 12h

Self study : 18h



TOPIC 12: FATIGUE OF MATERIALS

Description:

- Wöhler fatigue testing machine.
- Finite and infinite life.
- Goodman and Soderberg diagrams.
- Diagrams of real parts.
- Determination of equations for the calculation of parts.

Full-or-part-time: 30 h

Theory classes: 12h

Self study : 18h

TOPIC 13: CALCULATION OF MACHINE ELEMENTS

Description:

- Calculation of axles.
- Calculation of fixed joints.
- Calculation of detachable joints.

Full-or-part-time: 20 h

Theory classes: 8h

Self study : 12h

TOPIC 14: INTRODUCTION TO FINITE-ELEMENT CALCULATION

Description:

- Calculation of axles.
- Calculation of machine parts.

Full-or-part-time: 20 h

Theory classes: 8h

Self study : 12h

GRADING SYSTEM

- 1er examen, 25%
- 2on examen, 25%
- 3er examen, 25%
- 4art examen, 25%

For those students who meet the requirements and submit to the reevaluation examination, the grade of the reevaluation exam will replace the grades of all the on-site written evaluation acts (tests, midterm and final exams) and the grades obtained during the course for lab practices, works, projects and presentations will be kept.

If the final grade after reevaluation is lower than 5.0, it will replace the initial one only if it is higher. If the final grade after reevaluation is greater or equal to 5.0, the final grade of the subject will be pass 5.0.

EXAMINATION RULES.



BIBLIOGRAPHY

Basic:

- Shigley, Joseph Edward. Diseño en ingeniería mecánica. 6a ed. México: McGraw-Hill, 2002. ISBN 9701036468.
- Decker, Karl-Heinz. Elementos de máquinas. Bilbao: Urmo, 1980. ISBN 8431403403.
- Decker, Karl-Heinz. Elementos de unión. Bilbao: Urmo, 1980. ISBN 8431403438.
- Norton, Robert L. Diseño de máquinas. México: Prentice-Hall Hispanoamericana, 1999. ISBN 9701702573.