

29729 - Theory of Machines and Mechanisms

Información del Plan Docente

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| Academic Year | 2017/18 |
| Faculty / School | 110 - Escuela de Ingeniería y Arquitectura |
| Degree | 434 - Bachelor's Degree in Mechanical Engineering |
| ECTS | 6.0 |
| Year | 3 |
| Semester | First semester |
| Subject Type | Compulsory |
| Module | --- |

1.General information

1.1.Introduction

1.2.Recommendations to take this course

1.3.Context and importance of this course in the degree

1.4.Activities and key dates

2.Learning goals

2.1.Learning goals

2.2.Importance of learning goals

3.Aims of the course and competences

3.1.Aims of the course

3.2.Competences

4.Assessment (1st and 2nd call)

4.1.Assessment tasks (description of tasks, marking system and assessment criteria)

5.Methodology, learning tasks, syllabus and resources

5.1.Methodological overview

The methodology followed in this course is oriented towards 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.

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Classroom materials will be available via Moodle. These include a repository of the lecture notes used in class, the course syllabus, as well as other course-specific learning materials.

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

5.2.Learning tasks

The course includes 6 ECTS organized according to:

- Lectures (2 ECTS): 50 hours.
- Laboratory sessions (0.4 ECTS): 10 hours.
- Guided assignments (0.2 ECTS): 5 hours.
- Autonomous work (3.32 ECTS): 83 hours.
- Tutorials (0.08 ECTS): 2 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: There will be 5 laboratory classes along the course and last 2 hours each. 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 sessions 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 90 hours to study theory, solve problems, prepare lab sessions, and take exams.

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

5.3.Syllabus

Module 0. Introduction. Types and operation of fluid machines. Classification of fluid machines.

Module 1. Review of principles. Energy exchange in turbomachinery. Powers, losses and efficiencies.

Module 2. Fundamental Theory of turbomachinery. Geometric and kinematic aspects of flow impeller.

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Module 3. Theory 1-D of radial turbomachinery. Characteristic curves. Aerodynamic theory of axial machines and turbines.

Module 4. Dimensional analysis on turbomachinery. Modeling. Scale effects.

Module 5. Specific parameters.

Module 6. Operation of pumping and ventilation lines. Fluid distribution networks.

Module 7. Flow control in lines pumping and ventilation.

Module 8. Cavitation. Effects of cavitation in turbomachinery. Dimensional analysis on cavitation.

5.4.Course planning and calendar

For further details concerning the timetable, classroom and further information regarding this course please refer to the "Escuela de Ingeniería y Arquitectura " website (<https://eina.unizar.es/>)

5.5.Bibliography and recommended resources

[BB: Basic Bibliography / BC: Additional Bibliography]

- [BB] García Rodríguez, Juan Antonio. Teoría de máquinas e instalaciones de fluidos / Juan Antonio García Rodríguez y Esteban Calvo Bernad . - 1ª ed. Zaragoza : Prensas de la Universidad de Zaragoza, 2013.
- [BC] Mataix, Claudio. Turbomáquinas hidráulicas : turbinas hidráulicas, bombas, ventiladores / Claudio Mataix . - 2ª ed. rev. y corr. / Por Antonio Arenas ; con la colaboración de Eva Arenas y Alexis Cantizano Madrid : Universidad Pontificia de Comillas 200.
- [BC] Turbopumps and pumping systems / Ahmad Nourbakhsh ... [et al.] Brelin [etc.] : Springer, cop. 2008