29917 - Fluid Mechanics

Información del Plan Docente

Academic Year	2017/18
Faculty / School	110 - Escuela de Ingeniería y Arquitectura
Degree	435 - Bachelor's Degree in Chemical Engineering
ECTS	6.0
Year	2
Semester	Second 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

There are two learning methodologies: (1) learning in the class or in the lab supervised by the teacher (2) individual learning out of the class.

There will be three kind of supervised learning activities: (1) big group classes (2) reduced group classes (half of the group) and (3) lab sessions (four groups of three students each).

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In each context, the most suited tools will be used to increase the performace of the learning activities.

On the other hand, the student will have to review some readings and videos to supplement his learning outside the class. Besides, the student will have to reply to some questions every week.

In addition, the student will be able to contact the teacher individually to solve specific problems.

5.2.Learning tasks

Big group classes

Each session will be divided in three parts:

1. Brief lecture to give an overview of the main concepts.
2. The students solve an example about the lecture.
3. The example is solved in front of the class and some debate is carried out.

Small group classes

Each session will last for one hour.

- The teacher chooses two exercises.
- The students solve these problems in pairs.
- The teacher walks around the class and replies to questions.
- Finally, the solution is discussed.

Lab sessions

There will be five lab sessions within the term, each one lasting two hours.

In each session, there will be four groups of three students each.

In this context, the teacher will have a wonderful opportunity to explain the most relevant topics of Fluid Mechanics.

Student individual work

The student will have to carry out and sumbit some short exercises every week. This will encourage the student to keep up the attention on the course throughout the whole term.

On the other hand, to improve communications and autonomous-learning skills, a small project will be carried out in groups involving two more courses from the same term ("Materials Engineering" and "Mechanics"). In this project, the methodology "Problem Based Learning" will be employed.

Clinical tutorials

The teacher will be available to discuss the doubts with the students individually.

5.3.Syllabus

1. Introduction
2. Kinematics
3. Statics of fluids
4. Conservation equations
5. Dimensional Analysis and Similarity
6. Dimensionless equations

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7. Unidirectional flow of viscous fluids
8. Ideal fluids flow
9. Boundary layer
10. Open channel flow
11. Lubrication

5.4.Course planning and calendar

		Full group class			Small group	
Semana		Lecture	Individual work	Assessment	Exercises	Lab
1	Introduction. Kinematics	0.67	0.67	0.67	1	
2	Statics of Fluids	0.67	0.67	0.67	1	
3	Conservation equations	0.67	0.67	0.67	1	2
4	Conservation equations	0.67	0.67	0.67	1	
5	Dimensional analysis	0.67	0.67	0.67	1	2
6	Dimensional analysis	0.67	0.67	0.67	1	
7	Unidirectional flow of viscous fluids	0.67	0.67	0.67	1	
8	Unidirectional flow of viscous fluids	0.67	0.67	0.67	1	2
9	Flow of ideal fluids	0.67	0.67	0.67	1	
10	Flow of ideal fluids	0.67	0.67	0.67	1	2
11	Boundary layer	0.67	0.67	0.67	1	
12	Boundary layer	0.67	0.67	0.67	1	2
13	Open channel flow. Lubrication	0.67	0.67	0.67	1	
14	Review	0.67	0.67	0.67	1	
	TOTAL	9.30	9.30	9.30	14	10

5.5.Bibliography and recommended resources

BB Castro Hernández, Elena de. Ejercicios de clase y problemas de examen resueltos de mecánica de fluidos/ Elena de Castro Hernández, Juan Manuel Fernández García Madrid: Paraninfo , cop. 2014

BB Fox, Robert W.. Fluid mechanics / Robert

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BB	W. Fox...[et al.] . - 9th ed., SI version. Hoboken, NJ : John Wiley & Sons, cop. 2016 Hauke Bernardos, Guillermo. An introduction to fluid mechanics and transport phenomena / G. Hauke New York : Springer, cop. 2008
BB	Hauke Bernardos, Guillermo. Fenómenos de transporte : [introducción a la transferencia de cantidad de movimiento, calor y materia] / Guillermo Hauke Zaragoza : [el autor], cop. 2008

LISTADO DE URLs:

Apuntes de Mecánica de Fluidos del Prof. Dopazo
[http://euler.cps.unizar.es/DOPAZO.pdf]