UNIVERSITAT POLITÈCNICA DE CATALUNYA
BARCELONATECH
Escola Superior d'Enginyeries Industrial, Aeroespacial i Audiovisual de Terrassa

GUIA PENDENT D'APROVACIÓ

General description

Name of the course**: Advanced Fluid Mechanics**

Department: **729**

ECTS: **3 ECTS**

Degree: **Greti/Greta/Greva**

Level:

Language: English

Code: **205237**

Type: **Elective**

Lecturers

Main teacher: Robert Castilla

Others: -

General learning objectives of the course

Competencies

Specific competencies	
Generic competencies	

Credits: total hours of student work

		Dedication	
		Hours	%
Directed learning	Large Group (G)	30	
Autonomous learning		45	

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Modules

Module 1: Micro and Nano fluids		Dedication: 15 hours	Small group: 6 hours Autonomous learning: 9 hours
Description	1.1 Introduction 1.2 Shear-Driven flows 1.3 Pressure-Driven flows 1.4 Surface-Tension Driven flows		
Related activities (*)	Assignment 1		

Module 2: Rheology		Dedication: 15 hours	Small group: 6 hours Autonomous learning: 9 hours
Description	2.1 Classification of fluids 2.2 Generalised Newtonian Fluid 2.3 Viscoelastic fluids		
Related activities (*)	Assignment 2		

Module 3: Turbulence		Dedication: 15 hours	Small group: 6 hours Autonomous learning: 9 hours
Description	3.1 Statistical description of turbulence 3.2 Scales of Turbulent flow 3.3 Wall flows		
Related activities (*)	Assignment 3		

Module 4: Boundary Layer		Dedication: 15 hours	Small group: 6 hours Autonomous learning: 9 hours
Description	4.1 Laminar boundary layer 4.2 Turbulent boundary layer 4.3 Control of boundary layer		
Related activities (*)	Assignment 4		

Module 5: Fluid Flow in Porous Media		Dedication: 15 hours	Small group: 6 hours Autonomous learning: 9 hours
Description	5.1- Introduction to flow in porous media 5.2.- Darcy's law 5.3.- Mathematical description of flow in porous media and basic examples		
Related activities (*)	Assignment 5		

Grading system (assessment)

The final grade will be the average of the 5 assignments grades.

Teaching methodology

The course is developed through lectures including theoretical sessions imparted with the aid of notes, slides and more applicative and more visual sessions with videos and simulations. Practical cases and assignment will be discussed in class as well.

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References

Basic	Kundu, Pijush K.; Cohen, Ira M.; Dowling, David R. Fluid mechanics [en línia]. 5th ed. Amsterdam Rudyak, V., Aniskin, V.M., Maslov, A.A., Minakov, A.V., Mironov, S.G.(2018) Micro- and Nanoflows. Springer Karniadakis, G., Beskok, A., & Aluru, N. (2006). Microflows and nanoflows: fundamentals and simulation (Vol. 29). Springer Science & Business Media. IIrgens, F. (2014). Rheology and non-newtonian fluids. New York: Springer International Publishing. Turbulent Flows, by Stephen B. Pope, Cambridge University Press, 2000 Engineering Fluid Mechanics , H. Song, Springer Nature, 2018 Modeling Transport Phenomena in Porous Media with Applications, Das et al. , Springer Nature, 2018
Complementary	Schlichting, H., & Gersten, K. (2016). Boundary-layer theory. Springer.