

PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE
COLLEGE OF ENGINEERING
DEPARTMENT OF ELECTRICAL ENGINEERING
ABET COURSE SYLLABI

ICH1104 FLUID MECHANICS

Credits and contact hours:	10 UC credits/10 hours (4 h. Lectures ; 0,5 h. Assistanship; 0,5 h. Labs and 5 h. Independent learning experiences)
Instructor's name:	Rodrigo Cienfuegos, Bonifacio Fernández, Amador Guzmán
Course coordinator's name	Bonifacio Fernandez
Textbook:	Introducción a la mecánica de fluidos, 4 ^a edición Ediciones Universidad Católica, B. Fernández L., 2005.
Course Catalog Description:	This course is oriented to present the fundamental concepts and tools of the Fluid Mechanics for applications in engineering science. The students will learn to construct simple quantitative models of fluids behavior based on a control volume forms, differential form and dimensional analysis. They should know how to develop and apply the basic equations, and the limitations of different models.
Prerequisite Courses:	FIS1522 Waves and Heat, MAT1523 Calculus III, MAT1532 Differential Equations
Co-requisite Courses:	None
Status in the Curriculum:	Required
Course Learning Outcomes:	<ol style="list-style-type: none">1. Scope of fluid mechanics, properties of fluids2. To formulate and solve problems of fluid statics, including behavior of pressure, and the force on surface and bodies immersed in it.3. To describe the movement of fluids based on kinematic forms.4. Development and applications of control volume forms of the basic equations of conservation of mass, energy and momentum5. Development and applications of differential forms of the basic equations of conservation of mas and momentum for ideal fluids (Euler and Bernoulli) and viscous fluids (Navier Stokes).6. To understand the concepts of boundary layer and its practical consequences on the fluid résistance and dynamic forces.7. To evaluate friction and singular energy loses.
Relation of Course to ABET Criteria:	<ol style="list-style-type: none">a. Knowledge of mathematics, science and engineeringb. Design and conduct experiments: analyze and interpret data

Topics covered:

1. INTRODUCTORY CONCEPTS
 - 1.1 Properties of fluids
 - 1.2 Fluid Movement description
 - 1.3 Basis of dimensional analysis
2. STATIC OF FLUID
 - 2.1 Pressure and its properties
 - 2.2 Forces on surfaces
 - 2.3 Forces on submerged and floating bodies
3. BASIC EQUATIONS IN INTEGRAL FORM FOR A CONTROL VOLUME
 - 3.1 Relation of system derivatives to control volume formulation
 - 3.2 Conservation of mass
 - 3.3 Energy equation
 - 3.4 Momentum equation
4. DIFFERENTIAL ANALYSIS OF FLUID MOTION
 - 4.1 Kinematic of fluids
 - 4.2 Continuity equation
 - 4.3 Dynamics of non-viscous fluid (Euler and Bernoulli equations)
 - 4.4 Dynamics of viscous fluids (Navier Stokes equations)
5. APPLICATIONS TO REAL FLUIDS
 - 5.1 Laminar and turbulent boundary layers
 - 5.2 Separation and lift and drag forces
 - 5.3 Friction losses in closed conduits
 - 5.4 Minor losses