



ENGINEERING FLUID MECHANICS		
BACHELOR IN INDUSTRIAL TECHNOLOGY ENGINEERING	COURSE: 2	SEMESTER: 1
BACHELOR IN MECHANICAL ENGINEERING BACHELOR IN INDUSTRIAL ELECTRONICS AND AUTOMATION BACHELOR IN ELECTRICAL ENGINEERING BACHELOR IN ENERGY ENGINEERING	COURSE: 2	SEMESTER: 2

WEEKLY PLANNING									
WEEK	SESSION	DESCRIPTION	GROUP		SPECIAL ROOM FOR SESSION (Computer class room, audio-visual class room)	Indicate YES/NO if the session needs 2 teachers	WEEKLY PROGRAMMING FOR STUDENT		
			LECTURE	SEMINAR			DESCRIPTION	CLASS HOURS	HOMEWORK HOURS (Max. 7h week)
1	1	Course presentation Course motivation: applications of Fluid mechanics Introduction. Solids, liquids and gases. Continuum hypothesis and fluid particle. Density, velocity and internal energy. Local thermodynamic equilibrium. Thermodynamic variables and relations		X		NO	Review of thermodynamics	1.66	3
1	2	Hydrostatics. Volume and surface forces. Hydrostatic pressure. Pressure distribution on a fluid at rest.	X			NO	Study of lecture notes on hydrostatics	1.66	
2	3	Hydrostatics applied to pressure measurements Examples of hydrostatics problems		X		NO	Additional hydrostatics problems	1.66	4
2	4	Computation of hydrostatic forces and moments on planar and curved surfaces. Archimedes' law. Stability of submerged bodies.	X			NO	Study of lecture notes on hydrostatics	1.66	
3	5	Problems 29, 13, 19 and 18 of the collection		X		NO	Additional hydrostatics problems	1.66	5
3	6	Kinematics. Conservation laws in Fluid mechanics and Reynolds transport theorem. Mass, momentum and energy conservation. Fluid volumes and control volumes. Convective flux. Reynolds transport theorem.	X			NO	Study of lecture notes	1.66	
4	7	Continuity equation. Mass conservation equation. Mass flow rate and volume flow rate. 1D approximation of the flux terms. Momentum equation. Volume forces and surface forces. Viscous forces. Conservation of momentum equation. Example: Flow in a contraction section of a conduit.		X		NO	Study of lecture notes and additional problems	1.66	7
4	8	QUIZZ 1	X			YES		1.66	

5	9	Bernoulli equation and example problems		X		NO	Study of lecture notes and additional problems	1.66	5
5	10	Problems solved with the aid of the Bernoulli equation	X			NO	Study of lecture notes and additional problems	1.66	
6	11	LAB SESSION 1		X	LAB 1.0D02	YES	Report on the lab session	1.66	7
6	12	Energy equation. The first law of thermodynamics. Heat transfer. Work exerted by surface forces and by volume forces. Energy conservation equation. Energy balance on fluid machines.	X			NO	Study of lecture notes and additional problems	1.66	
7	13	Angular momentum equation.		X		NO	Study of lecture notes and additional problems	1.66	5
7	14	Problems on conservation laws.	X			NO	Study of lecture notes and additional problems	1.66	
8	15	LAB SESSION 2/3		X	LAB 1.0D02	YES	Report on the lab session	1.66	7
8	16	Dimensional analysis. Units and dimensions. The Pi theorem.	X			NO	Study of lecture notes and additional problems	1.66	
9	17	Problems on dimensional analysis		X		NO	Study of lecture notes and additional problems	1.66	7
9	18	QUIZZ 2	X			YES		1.66	
10	19	LAB SESSION 2/3		X	LAB 1.0D02	YES	Report on the lab session	1.66	5
10	20	Relevant dimensionless parameters in Fluid mechanics. Physical similarity and model theory.	X			NO	Study of lecture notes and additional problems	1.66	
11	21	Problems on dimensional analysis		X		NO	Study of lecture notes and additional problems	1.66	5
11	22	Flow in ducts. Introduction. Laminar and turbulent regimes. Fully developed flow in a circular pipe. Energy conservation equation with frictional losses.	X			NO	Study of lecture notes and additional problems	1.66	
12	23	Problems 10, 13, 14 and 15 of the collection.		X		NO	Study of lecture notes and additional problems	1.66	5
12	24	Secondary losses in pipes bends and elbows. Entrance losses. Expansions and contractions. Valves and other fittings. Analysis of simple pipe systems.	X			NO	Study of lecture notes and additional problems	1.66	
13	25	Problems 2, 20 and 22 of the collection.		X		NO	Study of lecture notes and additional problems	1.66	5
13	26	External flow	X			NO		1.66	
14	27	QUIZZ on the LAB		X	LAB 1.0D02	YES		1.66	7
14	28	QUIZZ 3	X			YES		1.66	
	29	Review problems		X		NO		1.66	1.5

Subtotal 1 **48.33** **78.5**

Total 1 (Hours of class plus student homework hours between weeks 1-14) **126.83**

15		Available for recovery lectures or tutorials							3
16		Assessment preparation and assessment					Assessment preparation and assessment	3	9
17									
18									

Subtotal 2 **3** **12**

Total 2 (Hours of class plus student homework hours between weeks 15-18) **15**

TOTAL (Total 1 + Total 2. Maximum 180 hours)	141.83
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