uc3m | Universidad Carlos III de Madrid

Vicerrectorado de Estudios
Apoyo a la docencia y gestión del grado

COURSE: Design of structure against impact		
DEGREE: Bachelor's Degree in Industrial Technologies Engineering	YEAR: 4	TERM: 1

WEEKLY PLANNING							
W E E K	**S E S S I O N**	**DESCRIPTION**	**TEACHING (mark X)**		**SPECIAL ROOM FOR SESSION (Computer class room, audio-visual class room)**	**WEEKLY PROGRAMMING FOR STUDENT**	
			L E C T U R E S	**S E M I N A R S**		**DESCRIPTION**	**CLASS HOURS (1,66=50+50 min)**	**HOMEWORK HOURS (Max. Estim. 6,5h)**
1	1	Topic 0: STRUCTURE AGAINST IMPACT: CONCEPT, INTEREST AND MATERIALS. Introduction.	X			Personal work topic 0: concepts study	1,66	6,5
	2	Topic 0: Types of protection. Momentum, impact and impulse		X		Personal work topic 0: exercises and discussion.	1,66	
2	3	Topic 0: Materials used for protection.	X			Personal work topic 0: exercises and discussion.	1,66	6,5
	4	Topic 1: ADVANCE MATERIAL MODELS FOR DYNAMIC LOADING. Introduction		X		Personal work topic 1: concepts study	1,66	
3	5	Topic 1: Metals. Tresca and Von Mises.	X			Personal work topic 1: concepts study	1,66	6,5
	6	Topic 1: Ceramics. Mohr yandDrucker-Prager.		X		Personal work topic 1: exercises and discussion.	1,66	
4	7	Topic 1: Composite. Orthotropic elasticity. Failure criteria (Tsai Hill) and damage model (linear). Delamination (Brewer failure criteria and linear damage model).	X			Personal work topic 1: exercises and discussion.	1,66	6,5
	8	Topic 2:ELASTIC AND PLASTIC WAVES. Introduction.		X		Personal work topic 2: concepts study	1,66	
5	9	Topic 2: Elastic wave propagation.	X			Personal work topic 2: concepts study	1,66	6,5
	10	Topic 2: Plastic wave propagation.		X		Personal work topic 2:exercises and discussion.	1,66	
6	11	Topic 2: Shock wave and Equation of state.	X			Personal work topic 2: exercises and discussion..	1,66	6,5

WEEKLY PLANNING

WEEK	SESSION	DESCRIPTION	TEACHING (mark X)		SPECIAL ROOM FOR SESSION (Computer class room, audio-visual class room)	WEEKLY PROGRAMMING FOR STUDENT		
			LECTURES	SEMINARS		DESCRIPTION	CLASS HOURS (1,66=50+50 min)	HOMEWORK HOURS (Max. Estim. 6,5h)
	12	Topic 3: DYNAMIC MATERIAL CHARACTERIZATION. Introduction		X		Personal work topic 3: concepts study	1,66	
7	13	Topic 3: Medium strain rate characterization. Charpy test and low velocity impact test. Partial exam 1.	X			Personal work topic 3: concepts study, exercises and discussion.	1,66	6,5
	14	Topic 3: High strain rate characterization. Hopkinson bars and Taylor tests.		X		Personal work topic 3: exercises and discussion.	1,66	
8	15	Topic 3: Lab. Medium strain rate characterization			Lab	Trabajo grupo sobre el laboratorio.	1,66	6,5
	16	Topic 3: Lab. High strain rate characterization			Lab	Trabajo grupo sobre el laboratorio.	1,66	
9	17	Topic 4. : VIRTUAL TESTING: MEF MODELS APPLIED TO DYNAMIC CHARACTERIZATION. Introduction	X			Personal work topic 4: concepts study	1,66	6,5
	18	Topic 4: Explicit MEF. Partial Exam		X		Personal work topic 4: concepts study	1,66	
10	19	Topic 4: Laboratorio. Uso de MEF para carectización a alta velocidad de deformación 1/2	X		Computer	Group work about lab.	1,66	6,5
	20	Topic 4: Lab. MEF for high strain rate characterization 2/2		X	Computer	Group work about lab.	1,66	
11	21	Topic 5 PENETRATION MECHANICS OF METALS, CERAMICS, FABRIC AND COMPOSITE. Introduction	X			Personal work topic 5: concepts study	1,66	6,5
	22	Topic 5. Penetration mechanics in metals. Piercing vs Plugging.		X		Personal work topic 5: concepts study, exercises and discussion.	1,66	
12	23	Topic 5. Empirical models. Thor, SRI and BRL equations. Cunnif curves. Lambert Jonas.	X			Personal work topic 5: concepts study, exercises and discussion.	1,66	6,5
	24	Topic 5. Analytical models. Pack-Evans. Tate & Alekseevskii. Rosenberg & Dekel. Energetic balance. Awerbuch & Bodner. Florence model		X		Personal work topic 5: concepts study, exercises and discussion.	1,66	
13	25	Topic 5. Penetration mechanics in composite and fabrics. Energy balance. Roylance.	X			Personal work topic 5: concepts study, exercises and discussion.	1,66	6,5
	26	Topic 6. APLICATION OF DESIGN OF STRUCTURE AGAINST IMPACT. Introduction. Partial exam 2.		X	Computer	Group work about lab.	1,66	
14	27	Topic 6. Ballistic impact model using FEM. 1/2	X		Computer	Group work about lab.	1,66	6,5

WEEKLY PLANNING								
W E E K	S E S S I O N	DESCRIPTION	TEACHING (mark X)		SPECIAL ROOM FOR SESSION (Computer class room, audio-visual class room)	WEEKLY PROGRAMMING FOR STUDENT		
			L E C T U R E S	S E M I N A R S		DESCRIPTION	CLASS HOURS (1,66=50+50 min)	HOMEWORK HOURS (Max. Estim. 6,5h)
14	28	Topic 6. Ballistic impact model using FEM 2/2		X	Computer	Group work about lab.	1,66	6,5
	29	Additional session		X			1,66	3,25
Subtotal 1							48	94
Total 1 *(Hours of class plus student homework)*							142	

15		Tutorials, handing in, etc					3,6	-
16		Assessment					4	10
17								
18								
Subtotal 2							8	10
Total 2 *(Hours of class plus student homework)*							18	

TOTAL (*Maximun 160 horas*)	160