



COURSE: Stability and Integrity of Aerospace Structures		
DEGREE: Aerospace Engineering	YEAR: 3rd	TERM: 2nd

La asignatura tiene 29 sesiones que se distribuyen a lo largo de 14 semanas. Los laboratorios pueden situarse en cualquiera de ellas. Semanalmente el alumno tendrá dos sesiones, excepto en un caso que serán tres

WEEKLY PLANNING									
WEEK	SESSION	DESCRIPTION	GROUPS (mark X)		SPECIAL ROOM FOR SESSION (Computer class room, audio-visual class room)	Indicate YES/NO If the session needs 2 teachers	WEEKLY PROGRAMMING FOR STUDENT		
			LECTURES	SEMINARS			DESCRIPTION	CLASS HOURS	HOMEWORK HOURS (Max. 7h week)
1	1	INTRODUCTION/SCOPE OF COURSE - Review of pre-requisite concepts STRUCTURAL IDEALIZATION - Idealization of a panel - Bending of open and closed section beams - Shear of open section beams - Shear of closed section beams - Torsion of open and closed section beams	X				Reading the corresponding book chapters Study and personal work	1,6	7
1	2	Exercises		X			Solve the proposed problems	1,6	
2	3	WING SPAR AND BOX BEAMS - Tapered wing spar - Open and closed section beams	X				Reading the corresponding book chapters Study and personal work	1,6	7

		- Beams having variable stringer areas							
2	4	Exercises		X			Solve the proposed problems	1,6	
3	5	WINGS - Three-boom shell - Bending - Torsion - Shear and Shear centre	X				Reading the corresponding book chapters Study and personal work	1,6	7
3	6	IT-PROJECT I LAB			X		Solve the proposed project	1,6	
4	7	FUSELAGE - Bending - Shear	X				Reading the corresponding book chapters Study and personal work	1,6	7
4	8	Exercises		X			Solve the proposed problems	1,6	
5	9	STRUCTURAL JOINTS - Fittings - Lugs - Riveted joints	X				Reading the corresponding book chapters Study and personal work	1,6	7
5	10	Exercises		X			Solve the proposed problems	1,6	

6	11	STRUCTURAL STABILITY COLUMNS (1/2) - Elastic buckling of ideal columns. - The Euler curve. - Critical buckling stress. - End constraint effects - Inelastic buckling of columns. - The Euler-Engesser curve.	X				Reading the corresponding book chapters Study and personal work	1,6	7
6	12	Exercises		X			Solve the proposed problems	1,6	
7	13	STRUCTURAL STABILITY COLUMNS (2/2) - Real effects on column stability: Imperfections - Offset loads - Initial curvature - Local Buckling and Crippling	X				Reading the corresponding book chapters Study and personal work	1,6	6

		- Crippling stress - The Johnson-Euler curve.							
7	14	Exercises		X			Solve the proposed problems	1,6	
8	15	STRUCTURAL STABILITY PLATES (1/2) - Elastic buckling of plates - Under compression loads - Under shear loads - Under bending loads - Under combined loading	X				Reading the corresponding book chapters Study and personal work	1,6	7
8	16	EXPERIMENTAL LABORATORY		X			Experimental Lab Session: Diagonal Tension	1,6	
9	17	STRUCTURAL STABILITY PLATES (2/2) - Plastic effects in plate buckling - Effect of panel curvature - Panel failure - Failure of compression panels - Failure of shear panels. Diagonal Tension.	X				Reading the corresponding book chapters Study and personal work	1,6	6
9	18	Exercises		X			Solve the proposed problems	1,6	

10	19	MIDTERM 1 (Idealization and Stability)	X						
10	20	STRUCTURAL INTEGRITY FATIGUE (1/3) - Introduction to Fatigue - Examples of the detrimental effect of fatigue on aerospace structures	X				Reading the corresponding book chapters Study and personal work	1,6	7
10	21	IT-PROJECT II LAB			X		Solve the proposed project	1,6	4
11	22	STRUCTURAL INTEGRITY FATIGUE (2/3) - Constant Amplitude Fatigue - SN Curves - Endurance limit	X				Reading the corresponding book chapters Study and personal work	1,6	6

		- Stress ratio effects - Statistical variability (Scatter) - Stress concentrations							
11	23	Exercises		X			Solve the proposed problems	1,6	
12	24	STRUCTURAL INTEGRITY FATIGUE (3/3) - Variable Amplitude Fatigue - Definition of cycle - Cycle counting - Cumulative damage rules - Residual stresses and their effect - Design criteria	X				Reading the corresponding book chapters Study and personal work	1,6	6
12	25	Exercises		X			Solve the proposed problems	1,6	
13	26	STRUCTURAL INTEGRITY LINEAR ELASTIC FRACTURE MECHANICS (1/2) - Energy release rate. Griffith failure criteria. - Stress Intensity Factors. Irwin failure criteria. - Determination of Stress Intensity Factors.	X				Reading the corresponding book chapters Study and personal work	1,6	6
13	27	IT-PROJECT III LAB			X		Solve the proposed project	1,6	
14	28	Exercises		X			Solve the proposed problems	1,6	
14	29	STRUCTURAL INTEGRITY LINEAR ELASTIC FRACTURE MECHANICS (2/2) - Plastic zone size. - Fracture Toughness and failure prediction. - Thickness effects on Fracture Toughness. - The plane strain Fracture Toughness test. - Limits of applicability of Linear Elastic Fracture Mechanics.	X				Reading the corresponding book chapters Study and personal work	1,6	7
Subtotal 1								48,33	93,66
Total 1 (Hours of class plus student homework hours between weeks 1-14)								142	

15		Tutorials, handing in, etc							10
16		Assessment						3	15
17									

18										
								Subtotal 2	3	25
								Total 2 (<i>Hours of class plus student homework hours between weeks 15-18</i>)	28	

TOTAL (<i>Total 1 + Total 2. Maximum 180 hours</i>)								170	
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