COURSE: MATERIALS SCIENCE AND ENGINEERING		
DEGREE: INDUSTRIAL ELECTRONICS AND AUTOMATION ENGINEERING	YEAR: 2	TERM: 2

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)
1	1	Introduction to the course. Bonds in solids.		x		Description of the course organization. Evaluation system. Recommended bibliography. Concepts of Materials Science and Engineering. Families of materials. Properties, applications and selection of materials. Bond in solids. Relationship between bond structure and properties in materials.	1,66	6,5
	2	Crystalline structure in solids.	x			Unt cell description. Crystalline systems, main metallic structures and interstitial positions, notation of atomic positions, directions and planes. Calculation of linear, planar and volumetric density.	1,66	
2	3	Exercises of crystalline structures.		x		Problems & exercises	1,66	6,5
	4	Defects in crystalline structures.	x			Description of defects in solids: point, line, volume defects. Solid solution concept. Hume-Rothery rules.	1,66	
	5	Exercises of defects in crystalline structures.		x		Problems & exercises	1,66	

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3	6	Mass transport. Diffusion.	x			Description of diffusion mechanisms in solids. Study of Fick´s laws. Influence of temperature.	1,66	6,5
4	7	Problems of Mass transport. Diffusion.		x		Problems & exercises	1,66	6,5
	8	Equilibrium phase diagrams.	x			Definition of phase diagram. Tipes of phase diagrams related with solubility. Invariant reactions. Calculations in phase diagrams.	1,66	
5	9	Problems of Equilibrium phase diagrams.		x		Problems & exercises	1,66	6,5
	10	Mechanical properties.	x			Tipes of mechanical test. Definition of elastic and plastic deformation. Hardening mechanisms. Nominal stress-strain curve. True stress-strain curve. Methods to measure hardness in MSE.	1,66	
6	11	Problems of Mechanical properties.		x		Problems & exercises	1,66	6,5
	12	Electrical properties.	x			Classification of materials: conductor, semiconductor and insulator. Bands theory. Aplications. Materials selection exercises.	1,66	
7	13	Test I (Sessions 1-9)		x		First partial test	1,66	6,5
	14	Meatllic materials	x			Calsification of metallic materials. Description of ferrous and non ferrous metals. Meatllic materials obtention. Study of solidification process.	1,66	
	15	Steel: Equilibrium transformations.		x		Study of Fe-C phase diagram. Phases microconstituents and invariant reactions. Exercises of Fe-C phase diagram.	1,66	

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8	16	Steel: Non-Equilibrium transformations.	x			Study of non-equilibrium phases. TTT diagram. Description of the thermal treatments and its relationship with the fianl properties of the steel. Hardenability concept. Jominy test.	1,66	6,5
9	17	Problems of Steel: Non-Equilibrium transformations.		x		Problems & exercises	1,66	6,5
	18	Ceramic materials.	x			Cerami materials classification. Study of main ceramic materials and their properties. Obtention methods. Aplications.	1,66	
10	19	Problems of Ceramic materials.		x		Problems & exercises	1,66	6,5
	20	Test II (Sessions 10-17)	x			Second partial test	1,66	
11	21	Polymer materials.		x		Polymer materials classification. Calculation of molecular weight. Study of polymer characteristics: crystallinity and glass transition temperature. Tipes of polymer related with thermal behavior. Obtention methods. Aplications.	1,66	6,5
	22	Mechanical properties of polymer materials. Problems of Polymer materials.	x			Description of mechanicla behavior of polymers and the relation with their structure. Problems & exercises	1,66	
12	23	Composite materials.		x		Classification of composite materials related with their composition and structure of matrix and reinforcemnt. Calculation of th mechanical properties. Manufacturing methods.	1,66	6,5
	24	Problems of Composite materials.	x			Problems & exercises	1,66	
	25	Test III (Sessions 18-24)		x		Third partial test.	1,66	

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13	26	Crystalline structures.			Laboratory	Study of ain crystalline structures in metals. Searching of interstitial positions. Meatls determination by Xray Diffraction. Bragg´s law.	1,66	6,5
14	27	Cold working in metals.			Laboratory	Study of varition of hardness and electriacal properties after the cold working of a brass sample. Study of the properties after annealing.	1,66	6,5
	28	Steel thermal treatments.			Laboratory	Microstructural study of steel after thermal treatment. Toughness determination by charpy test at different temperature. Calculation of brittle-ductile transition temperature.	1,66	
	29	Polymer characterization.			Laboratory	Polymer determinationby study of thermal behavior, Belstein test, density measurement. Polymer classification: thermoplastic and thermosetting.	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**	

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