

قسم هندسة الإنتاج والمعادن - فرع هندسة المعادن

الدكتوراه

الفصل الأول

1

قسم هندسة الإنتاج والمعادن – فرع هندسة المعادن					
المرحلة	الدكتوراه	الفصل الدراسي	الأول		
اسم المقرر	سلوك ميكانيكي للمعادن	Mechanical behavior of metals			
نظري	2	عملي	---	الوحدات	2
ت	المفردات	الملاحظات			
.1	crystal structure of metals				
.2	stress – strain curves of metals				
.3	plastic deformation in tension				
.4	imperfections (point and defects)				
.5	effect of point defects on mechanical properties				
.6	behavior of dislocations , energy of dislocation				
.7	dislocation in various structures				
.8	movement of dislocations				
.9	grain boundaries , energy of grain boundaries				
.10	twining an mechanical effect				
.11	Role of grain boundaries in plastic deformation				
.12	solid solution strengthening				
.13	precipitation and dispersion hardening				
.14	precipitation in micro alloyed steel				
.15	martensitic transformation				
.16	shape-memory effect				
.17	properties of composites (types of composition)				
.18	aging response of MMCS				
.19	fatigue strength , mechanisms of fatigue				
.20	fatigue crack propagation in metals				
.21	creep and super plasticity				
.22	diffusion creep , dislocation creep				
.23	deformation mechanism				
.24	super plasticity				

قسم هندسة الإنتاج والمعادن – فرع هندسة المعادن					
المرحلة	الدكتوراه	الفصل الدراسي	الأول		
اسم المقرر	هندسة الأسطح	Surface Engineering			
ت	المفردات	عملي	---	الوحدات	2
الملاحظات					
.1	classification of surface treatment methods and selection of cleaning processes				
.2	nature of the surface roughness and measurement				
.3	shot peening				
.4	case hardening , introduction , plasma nitriding , plasma carburising , physical vapor deposition , chemical vapor deposition , salt bath coating process , coating materials and application (case study : alloy coatings for gas turbines)				
.5	hot dip galvanizing , surface preparation , factors effecting galvanig thickness and structure				
.6	galvanized coatings in corrosion service , atmospheric exposure , sea water and salt spray performance , painting of galvanized steel				
.7	electroplated coatings , idealized coatings , knowledge of the subsurface nature , design for plating , advantage and disadvantage of electroplated coatings , effects of deposition parameters , application for electroplated coatings , selection of coatings				
.8	thermal spray coatings , processes , surface preparation coating finishing , uses of thermal spray coatings , corrosion residence , dimensional restoration ,thermal application , electrical applications				
.9	chromate conversion coatings (cccs), formation (pH , cr concentration)				
.10	chromium chromate coatings , chromate phosphate conversion coatings , processing of cccs , composition				
.11	chemical conversion coatings , procedure , phosphate coatings process , control of solution , control of coatings quality				

قسم هندسة الإنتاج والمعادن – فرع هندسة المعادن						
المرحلة	الدكتوراه	الفصل الدراسي		الأول		
اسم المقرر	تحاليل ميتالورجية بالمجهر الإلكتروني		Metallurgical electron microscopy			
نظري	2	عملي	---	الوحدات	2	
ت	الملاحظات					
.1	interaction between electron beam and crystalline material					
.2	defect of lenses					
.3	Methods of producing electrons					
.4	why is the use of electron microscopy					
.5	electron lenses					
.6	aberration of the lenses					
.7	wavelength of the electron					
.8	reducing power					
.9	transmission electron microscopy (TEM), design of TEM (column , magnification , image contrast , dark field and bright field image s etc...					
.10	electron diffraction and analysis (indexing).					
.11	application of TEM , measurement of interplanar distance (a-direct , b- indirect (moir fringes).					
.12	specimen preparation for TEM a- thinning type and stage b- surface and extractive replica technique.					
.13	SEM -principles - specimen stages - design and contraction - image contrast mechanism - electron collector -application of SEM					
.14	Field ion microscope(FIM) - design and operation -image formation -application of FIM Micro analysis - electron micro probe analysis (EPMA) and design detection - quantitative analysis of EPMA .					

قسم هندسة الإنتاج والمعادن – فرع هندسة المعادن			
المرحلة	الدكتوراه	الفصل الدراسي	الأول
اسم المقرر	ميتالورجيا المساحيق	Powder Metallurgy	
ت	نظري	عملي	الوحدات
الملاحظات	المفردات		2
Week	Details		
	Review of powder technology	-General Information	.1
	Production of metallic and ceramic and Nanopowders.	2-1-Mechanical processes 2-2-physical processes 2-3- chemical process 2-4- Ultra fine powders 2-5-Alloy powders 2-6-Methods of production Nano powders	.2
	Classification of powders.	3-1- Basic classification 3-2- Dry classification 3-3- Wet classification	.3
	Granulation of powders	4-1- Granulation mechanisms 4-2- Granulators	.4
	Compaction technique.	5-1- Pressure less shaping technique 5-2- Cold pressure shaping technique 5-3- Pressure shaping Technique with heat	.5
	Consolidation of powders.	6-1- Introduction 6-2- Mechanical fundamentals of consolidation	.6
	Powder Conditioning	7-1- Preliminary Heat Treatment 7-2- Blending or mixing process	.7
	Cermets	8-1- Types of cermets 8-2- Manufacturing 8-3- Application ..	.8
	Dispersion-strengthened materials	9-1- Method of manufacturing 9-2- Limitation of dispersion strengthened alloys 9-3- Applications	.9
	Laser- Assisted Grinding of ceramics	10-1-Introduction 10-2- Micro fracture 10-3-Macro fracture 10-4Stock removal mechanism	.10
	Double fraction model in lapping of ceramic	11-1- Introduction 11-2- Double fracture model 11-3- Preparation of materials 11-4-Apparatus	.11
	Mechanisms for grinding of ceramics	12-1- Introduction 12-2 Indentation fracture mechanics approach 12-3 Machining approach	.12
	Bearing materials.	13-1-Types of bearing materials 13-2-Methods of production. 13-3- Properties of oil impregnation 13-4-Applications 13-5-Dry lubricated bearings a- Graphite b- P.T.E.F. Bearings	.13
	Tool materials	14-1-Cemented carbides 14-2- production of carbides a- Raw materials b- Milling c-cold pressing and shaping d" sintering e- machining 14-3- Applications of cemented carbides	.14

		a- cutting tools b-cemented carbides wear -Resistant materials 14-4-Oxide (or ceramic) Tools 14-5- Boride Tools 14-6- Diamond Tools a-Manufacture of diamond tools b- Application of diamond tools	
	Sintered friction materials	15-1- Manufacturing method 15-2- Properties of sintered friction materials 15-3- Friction material formulation 15-4- Opposing plate	.15

قسم هندسة الإنتاج والمعادن – فرع هندسة المعادن						
المرحلة	الدكتوراه	الفصل الدراسي	الأول			
اسم المقرر	المواد الهندسية المتقدمة	Advanced Engineering Materials				
نظري	2	عملي	---	الوحدات	2	
ت	الملاحظات					
.1	المفردات					
Week 1-2	Introduction, Nature of Engineering Materials, Metals Ceramics, Polymers Composites					
Week 3-4	Martensitic Transformation, Shape Memory alloys					.2
Week 5	Electrical Properties; Electrical Conduction; Ionic Conduction					.3
Week 6-7	Magnetic Properties; Ferromagnetism; Superconductivity					.4
Week 8-10	Composite Materials; Metal -Matrix Composites; Polymer- Matrix Composites; Ceramic -Matrix Composites; Carbon - Carbon Composites: Polymer- Matrix Composites for Microelectronics					.5
Week 11	Materials Characterization					.6
Week 12-13	High Temp Materials; Superalloy; Intermetallics; Coating for high Temperature Applications					.7
Week 14-15	Nanoscale Materials					.8

قسم هندسة الإنتاج والمعادن – فرع هندسة المعادن					
المرحلة		الدكتوراه		الفصل الدراسي	
اسم المقرر -		Nanoscience & Nanotechnology			
ت		المفردات		الملاحظات	
		نظري	2	عملي	---
			2	الوحدات	2
.1	Nanoscience principles and nanostructured materials				
.2	What is nanotechnology? Why nanotechnology?				
.3	Commercial application of nanotechnology				
.4	Nano material preparation				
.5	Sintering of nanoparticles				
.6	EPD principles and techniques				
.7	NanoFGMTBC				
.8	Nanoparticles of advanced materials				
.9	Mechanics of nanostructure				
.10	Synthesis of HTC				
.11	Advanced nanobioceramic				
.12	Materials for use in the body and biomaterials in the body system				
.13	Soft tissue and hard tissue				
.14	Cell biomaterials				
.15	Metallic biomaterials, ceramic biomaterials, polymer biomaterials and composite biomaterials				
.16	Biological biomaterials nanotechnology in medicine				
.17	Pathology, biomaterials and clinical practice tissue				
.18	Carbon nanomaterials				
.19	Carbon nanostructured				
.20	Carbon nanotubes				
.21	CVD growth of nanotubes				
.22	Nanotubes manufacturing techniques				
.23	Single wall carbon nanotubes				
.24	Electrodeposited nanotubes				
.25	Focused ion beam in nanotechnology				
.26	Atomic manipulation by scanning tunnelling microscopy				
.27	Atomic wires				
.28	Nanoparticles biomedicine and biodegradable polymer nanocomposites				
.29	Bionanodevices				
.30	Nitride nanotubes and nanopowders processes				