FUNDAMENTALS OF SOLUTION THERMODYNAMICS Code Semester Local Credits ECTS Credits Course Implementation, Hours/Week MET 214E 4 2.5 4 2 1 - Department/Program Metallurgical and Materials Engineering Course Language English Course Opencequisites MET 215E Engineering General Education Ourse Opence Category Basic Science Engineering Design General Education by Content, % Basic Science Engineering Design General Education Ourse Obscription diffuencial reactions of the Sibbo-Duber relation to the dister asolutions, relation between free energy a phase equilibria in binary systems, binary hase diagrams, the phase rule and application or the distrumistic model for solutions, relation between free energy a phase equilibria in binary systems, binary hase diagrams. Course Objectives 2. To teach them to perform thermodynamic calculations of reaction that involve component is solution with the various medium, a calculations of reaction that involve component is solution and its components. Course Learning 2. Cateach thermodynamic operties of a olution and its components. 2. Calculate thermodynamics of an ideal solution. 3. Us provide students to teach solution. 0. Ustomes	Course Name											
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	COURSE PLAN					
Weeks	Topics	Course Outcomes				
1	Introduction to solution thermodynamics, integral molar thermodynamic properties and partial molar thermodynamic properties of solutions	1				
2	Integral molar thermodynamic properties and partial molar thermodynamic properties of solutions	1				
3	Ideal solutions and thermodynamic properties	1,2				
4	Non-ideal solution, dilute solutions	1,2				
5	Application of the Gibbs-Duhem equation of the determination of activity-1	1,3				
6	Application of the Gibbs-Duhem equation of the determination of activity-2	1,3				
7	Regular solutions and thermodynamic properties	4				
8	Investigation of alloys by means of chemical bonding	4,5				
9	Free energy – composition change, binary phase equilibrium diagrams	4,5,6				
10	Binary phase equilibrium diagrams and Gibbs phase rule	4,5,6				
11	Measurement techniques of thermodynamic properties	7				
12	Alternative standard states: Raoult and Henry standard state	8				
13	Dilute solutions dissolving more than one solute-1	8				
14	Dilute solutions dissolving more than one solute-2	8				

Relationship between the Course and Metallurgical and Materials Engineering Curriculum

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	Student Outcomes			
		1	2	3
1	an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering science and mathematics	X		
2	an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare as well as global, cultural, social, environmental and economic factors			x
3	an ability to communicate effectively with a range of audiences			
4	an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts		x	
5	an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	x		
6	an ability to develop and conduct appropriate experimentation, analyse and interpret data, and use engineering judgement to draw conclusions	x		
7	an ability to acquire and apply new knowledge as needed, using appropriate learning strategies		X	

1: Little, 2: Partial, 3: Full

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Course relationships with major elements of the field and material classes

		Co	Level of Contribution	
		1	2	3
	STRUCTURE			
	PROPERTIES			
MAJOR ELEMENT	DESIGN EXPERIMENT/ANALYSE DATA			
OF THE FIELDS	PROCESSING			X
	COST/PERFORMANCE	X		
	QUALITY/ENVIRONMENT			
	DESIGN PROCESS OR PRODUCT	X		
	METAL			X
MATERIAL CLASSES	CERAMICS AND GLAS		X	
	POLYMERS			
	COMPOSITES			
BIO	BIOMATERIALS			

1: Little, 2. Partial, 3. Full

Prepared by	<u>Date</u>	Revision #	<u>Signature</u>
Assist. Prof. Dr. Nuri SOLAK	December 2020		