

DEPARTMENT OF MATERIALS SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details				
Code	Academic Year			Semester
NWI201	2			3
Title	T	A	L	ECTS
Physical Chemistry I	3	1	1	6
Language	German			
Level	Undergraduate	X	Graduate	Postgraduate
Department / Program	Materials Science and Technology			
Forms of Teaching and Learning	Face to face			
Course Type	Compulsory	X	Elective	
Objectives	The students gain knowledge about the general principles for the description of physico-chemical contexts. They understand the basics of chemical and electrochemical equilibria and can apply them to different reactions. They are capable of independently performing and evaluating physical-chemical experiments.			
Content	General chemistry: Description of molecular interactions, ideal and real gases, gas mixtures, states of aggregation, single and binary systems with the phases gaseous / liquid / solid, substance separation; Thermodynamics: Thermodynamic functions (ΔU , ΔH , ΔS and ΔG), main theorems of thermodynamics and their application, cycles, the chemical potential, law of mass action: chemical and phase equilibria; Electrochemistry: electrolyte equilibria, electrical conductivity of ions in solution, electrochemical equilibrium (Nernst equation), electrode reactions and galvanic cells.			
Prerequisites	-			
Coordinator	-			
Lecturer(s)	Asist Prof.Dr. Meltem KARAIŞMAİLOĞLU ELİBOL			
Assistant(s)	-			
Work Placement	No			
Recommended or Required Reading				
Books / Lecture Notes	Bechmann W., Schmidt J. „Einstieg in die Physikalische Chemie für Nebenfächler“, Vieweg-Teubner Verlag, 2010			
Other Sources	Bard A. J., Faulkner L.R. „Electrochemical Methods: Fundamentals and Applications“, John Wiley & Sons, Inc., 2001			
Additional Course Material				
Documents	-			
Assignments	-			
Exams	-			
Course Composition				

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Mathematics und Basic Sciences		20%
Engineering		%
Engineering Design		%
Social Sciences		%
Educational Sciences		%
Natural Sciences		70%
Health Sciences		%
Expert Knowledge		10%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	40%
Quiz		
Assignments	1	10%
Attendance		
Recitations		
Projects	1	10%
Final Exam	1	40%
Total		100

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	3	42
Self-Study	14	6	84
Assignments	5	3	15
Presentation / Seminar Preparation			
Midterm Exam	1	2	2
Recitations	14	1	14
Laboratory	14	1	14
Projects			
Final Exam	1	2	2
Total Work Load			172
ECTS Points (Total Work Load / Hours)			6

Learning Outcomes

1	To be able to solve the reaction rate and the reaction constant
2	To be able to determine the effect of concentration, temperature, and time on the reaction rate
3	To learn the behavior of real and ideal gases

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4	To learn the laws of thermodynamic.
5	To perform calculations with thermodynamic variables
6	To determine the properties of a system by using the thermodynamic variables
7	To understand the equilibrium of a system by using the thermodynamic variables
8	To be able to interpret phase diagrams,; to be able to draw phase diagrams by using the required information
9	To understand electrochemical cells and to be able to write the equations for the electrochemical reactions

Weekly Content

1	Reactionskinetic: Basics and definitions Rules for reaction rates
2	Combined reaktions Approximation method Temperature dependence of reaction rate
3	Thermodynamic: basic concepts Temperature and the 0th law of thermodynamics
4	Real Gases İdeal Gases
5	Laboratory: Thermochemistry- To determine principles of calorimetry
6	Work, heat , energy The 1st rule of thermodynamics Cyclic prozesses, Carnot cycle state functions
7	Enthalpy, The Joule Thomson Effect, The 2nd law of thermodynamics, entrophly Laboratory: Thermochemistry-Part II
8	The third law of thermodynamics, The Helmholtz and Gibbs Energies, Maxwell relations
9	Laboratory: To calculate the distribution coefficient of ammonia between water and chlorofom
10	Laboratory: Experiment on solubility of solids to calculate the enthalpy value by using the Gibbs Helmholtz equation
11	Phase diagrams Phase stability and Phase transitions
12	Phase stability and phase transitions continued The thermodynamic description of mixtures The properties of solutions
13	Activities
14	Spontaneous chemical reactions The response of equilibria to the conditions Equilibrium electrochemistry

Contribution of Learning Outcomes to Program Objectives (1-5)

	P1	P2	P3	P4	P5	P6	P7	P8
1	4	5	5	1	1	5	5	
2	4	5	5	1	1	5	5	
3	2	5	5	1	1	5	5	
4	2	5	5	1	1	5	5	
5	5	5	5	1	1	5	5	
6	5	4	5	1	1	5	5	
7	3	4	5	1	1	5	5	
8	3	5	5	1	1	5	5	
9	5	5	5	1	1	5	5	

Contribution Level 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High

Program Learning Outcomes: <https://obs.tau.edu.tr/oibs/bologna/progLearnOutcomes.aspx?lang=en&curSunit=207>



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