Course specification

University/Academy: Damanhour University

Faculty/Institute: Science

Department: Chemistry

1. course Data:		
Course code: Chem. 403	Course title: Physical Chemistry 6	Academic year/level:2010-2011 Fourth year /1st term
Specialization: Special Chemistry	No. of instructional units: lecture 3hrs/week tutorial 3hrs/week practical 6 hrs/week	

2. course Aim	By the end of this course, students should be able to: **This course is designed to give advanced ideas on phase equilibria, physical chemistry of high polymers and electrochemistry that may be required by chemists in the course of their careers. The course is aimed to provide practical training for students in laboratory techniques, methods, instrumentation, and data analysis.**
3. Intended learning outcome	
a) Knowledge and understanding	By the end of this course, students should be able to: **At the end of this course the students will be able to** **a1- illustrate phase equilibria of different component** **a2- mention monomers , oligomers and polymers, identify shape of polymers, recognize the chemical structure and discuss thermodynamics of polymers in solution.** **a3- Define on the advanced Electrochemistry**
b) Intellectual skills	**At the end of this course the students will be able to** **b1- contrast knowledge and understanding of essential facts, concepts, principles and theories relating to chemistry problems.** **b2- Apply such knowledge and understanding to the solution of qualitative and quantitative problems of a familiar and unfamiliar nature.** **b3- represent scientific material both orally and in writing in a scholarly**

	manner.
c) Professional skills	**At the end of this course students will have the ability to:** **c1- use their practical skills and understand the scientific approach in Physical chemistry of high polymers, electrochemistry and phase rule.** **c2- examin the polymeric structure** **c3- Report the best solvent used in dissolution of polymers from studying dissolution and kinetics of swelling and solve problems related to physical chemistry of high polymers.**
d) General skills	**At the end of this course students will have:** **d1- Work in groups,** **d2. Use information and communication technology.** **d3- write report, relating to qualitative and quantitative information, extending to situations where evaluations have to be made on the basis of limited information.**
4. course content	**Phase equilibria:** introduction, homo- and heterogeneous equilibrium, definitions of P, C and F. -Deduction of the phase rule equation, -Thermodynamic treatment of the phase rule (Clausius- Clapeyron Equation). One component systems: (water system and CO2 system). -One component systems: (sulfur system), -Two component systems: classification, -Two component systems continued Two component systems: solid-liquid equilibria , eutectic systems with completely miscible liquids, and with partially miscible liquids. Two component systems: solid-liquid equilibria , eutectic systems exhibiting congruent and incongruent melting point Two component systems: Solid solution, completely miscible, ideal non ideal solid solution , partial miscible solid solution. Three component systems: Construction of the phase diagram, System of three liquids, Plait point, effect of temperature. Three component systems: retrograde solubility, three components system with two and three pairs of partially miscible liquids. Three component systems with two salts and liquid **Electrochemistry (2):** Introduction -Debye- Hückel theory. - Ion association -Ion solvent interaction. -Ion solvent interaction (continued)

	Models and theories of electric double layer. -Models and theories of electric double layer (continued) -Electrocapillary phenomenon -Kinetics of electrode processes (continued) -Polarization and overvoltage -Polarization and overvoltage (continued) -Kinetics of electrode process -Kinetics of electrode process (continued) - Introduction to corrosion **Physical Chemistry of high polymers:** -Chemical structure of monomers. -Chemical structure polymers -Synthesis of polymers -chemical transformations of polymers. -Polymer chain flexibility -Dissolution and swelling. -Degree and kinetics of swelling. -Determination of molecular size Molecular weight and shape in solution Molecular mass distribution of polymers. -Distribution curves. -Thermodynamics of polymer solution.
5. Teaching and learning methods	**4.1. Lecture** **4.2. Contact hours** **4.3. Problem-Based Learning** **4.4. Encourage students to use online and library resources**
6.teaching and learning methods for students with special needs	--------
7. Student Assessment	**1 Practical Examination** **1 Final-Term Examination**
a) Procedures used:	----------
b) Schedule:	**Assessment 1Practical Examination Week 12**

	Assessment 1Final-Term Examination Week16
c) Weighing of Assessment:	Mid-Term Examination: 10 Final-Term Examination: 150 Practical Examination: 80 Semester Work: 10 Total: 250
8.List of Textbooks and References:	Modern Electrochemistry 1: Ionics, John O'M. Bockris and Amulya K.N. Reddy, Springer; 2nd edition (March 1998). General Chemistry, Peter William Atkins and J. A. Beran, W.H. Freeman &Sons Company; 2nd edition (March 1992) Text book of of polymer science , Fred W .Billmeyer,Jr,2nd edition (1970). *Physical chemistry of polymers, David Sobolev and Nicholas Bobrov, 2nd edition (1978). *Contemporary polymer chemistry , Harry R. Allcock, and Frederick W.Lampe(1981)
a) Course Notes	Lecture notes of physical chemistry for 4th year students - faculty of science – Damanhour - Alexandria University.
b) Required Books (Textbooks)	----------
c) Recommended Books	ORGANIC and PHYSICALCHEMISTRY OF POLYMERS, Yves Gnanou Michel Fontanille,(2008)
d) Periodicals, web sites,…,etc	**www.openlearn.com** **www.wikkipedia.com** **http://www.pslc.ws/mactest/glass.htm** **http://www.ndt-ed.org/EducationResources/CommunityCollege/Materials/Introduction/polymers.htm** **http://www.answers.com/topic/polymer?cat=health** **http://chem.chem.rochester.edu/~chem421/index.htm**

Course Instructor: **Head of Department:** Dr. Medhat A. Shaker

Dr. Medhat A. Shaker **Date:** -----/-----/----