



University of Nicosia, Cyprus

Course Code CHEM-135	Course Title Physical Chemistry	ECTS Credits 6
Department Life and Health Sciences	Semester Fall, Spring	Prerequisites CHEM-105 General Chemistry
Type of Course Required	Field Chemistry	Language of Instruction English/Greek
Level of Course 1 st Cycle	Year of Study 1 st	Lecturer Dr. Photos Hajigeorgiou
Mode of Delivery Face-to-face	Work Placement N/A	Co-requisites None

Objectives of the Course:

The main objectives of the course are to:

- Give students an introduction to the basic principles of physical chemistry
- Assist students in the development of strong problem-solving skills
- Help students to cultivate critical thinking in the approach to learning
- Help students acquire sound hands-on practical skills in the chemistry lab.

Learning Outcomes:

After completion of the course students are expected to be able to:

1. Discuss and apply the basic concepts of thermodynamics to the study of the energetics of chemical reactions.
2. Discuss the behavior of ideal and real gases in terms of the ideal/real gas equations and in terms of the kinetic-molecular theory.
3. Identify the various types of intermolecular forces and discuss how they affect the physical properties of matter.
4. Explain the factors governing the process of dissolution, and utilize the mathematical expressions for colligative properties of solutions to calculate the molar masses of proteins.
5. Utilize both qualitatively and quantitatively data related to experiments in chemical kinetics and in chemical equilibria, and discuss the balance between kinetics and equilibria in chemical industrial reactions.
6. Apply the principles of chemical equilibria to weak acids to compute various

properties of such systems, such as pH, acid-dissociation constants and equilibrium concentrations.

7. Name the principal constituents of the Earth's atmosphere and discuss the physical and chemical processes that contribute to the depletion of the ozone layer, global warming, and climate effects.
8. Interpret chemical and physical processes in terms of the principles of thermodynamics, and demonstrate the importance of Gibbs free energy in determining the spontaneity of chemical processes.

Course Contents:

1. Thermochemistry
2. Gases
3. Intermolecular Forces in Liquids
4. Properties of Solutions (Colligative Properties)
5. Chemical Kinetics
6. Chemical Equilibrium (including weak acid equilibria)
7. Chemistry of the Environment
8. Chemical Thermodynamics

Laboratory Experiments, Demonstrations and Workshops

1. Laboratory Safety Demonstrations
2. Estimation of the Molar Mass of Carbon Dioxide Gas
3. Calorimetry: Heat of Neutralization
4. Determination of the Rate Law and Activation Energy
5. Spectrophotometric Techniques in Chemistry (Workshop)
6. Spectrophotometric Determination of a Rate Law
7. Chemical Equilibrium: Determination of the Dissociation Constant of Acetic Acid
8. Molar Heat of Solution for Ionic Solids
9. Chemical Thermodynamics Calculations (Workshop)

Learning Activities and Teaching Methods:

Lectures, Laboratory Practical Sessions, Workshops, and Assignments.

Assessment Methods:

Laboratory Practical Sessions, Tests, Final Examination

Required Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
1. T.L. Brown, H.E. Lemay, B.E. Bursten, C.J. Murphy	Chemistry The Central Science	Prentice Hall	2009 11 th Edition	ISBN: 0-13- 235848-4
2. P.G. Hajigeorgiou	CHEM-135 Laboratory Manual	University of Nicosia	2009	
3. P.G. Hajigeorgiou	CHEM-135 Lecture Notes	University of Nicosia	2009	

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
1. R.H. Petrucci, W.S. Harwood, and F.G. Herring	General Chemistry Principles and Modern Applications	Prentice Hall	2002 8 th Edition	ISBN: 0- 13-014329- 4
2. J. Olmsted III, and G.M. Williams	Chemistry The Molecular Science	WCB Publishers	1997 2 nd Edition	ISBN: 0- 8151-8450- 6