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| **logo University of Management & Technology**  School of Science  Department of Chemistry | | | | |
| CH-314 PHYSICAL CHEMISTRY-II | | | | |
| **Lecture Schedule** |  | **Semester** | |  |
| **Pre-requisite** | Intermediate or A Level Chemistry | **Credit Hours** | | 4 |
| **Instructor(s)** |  | **Contact**  **Moodle Link** | |  |
|  |
| **Office** |  | **Office Hours** | |  |
| **Course Description** | The course focuses on electrochemistry, Emulsions and Gels, Photochemistry and polymer chemistry and their applications to chemical systems. Emphasis is given towards attaining a good fundamental understanding of the topics included. Topics include kinetic theory of gases, quantum mechanics and atomic structure, statistical thermodynamics and surface chemistry. | | | |
| **Expected Outcomes** | Participants who successfully complete this course will be able to learn and understand the basic concepts of;   1. The energetics that drive chemical reactions and physical changes; 2. Relationship between macroscopic properties and the molecular make up of matter; 3. Quantitative aspects of chemical equilibria and phase transitions. 4. The fundamental concepts of quantum chemistry, using models for the energies encountered for atoms and molecules; 5. Atomic and molecular spectroscopy; 6. Fundamental concepts of chemical kinetics. | | | |
| **Textbook(s)** | 1. Atkins, P.W. “Physical Chemistry” 8th ed., W.H. Freeman and Co. New York (2006). 2. Haq N. B. “Modern Physical Chemistry” Caravan Book House Lahore (2013).   Side Readings:  2. Alberty R. “Physical Chemistry” 17th ed., John Wiley and Sons (1987).  3. Laidler K.J. “The World of Physical Chemistry” 1st ed., Oxford University Press (1993).  4. Barrow G.M. “Physical Chemistry” 5th ed., McGraw Hill (1992). | | | |
| **Grading Policy** | * Quizzes: 15% * Assignments: 05% * Midterms: 20% | | * Lab Work: 20% * Final: 40% | |

**Course Schedule**

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| **Week** | **Lecture #** | **TOPICS** | **CH** | **SECTIONS** |
| 1\* | 1  2 | **Photochemistry** Introduction, Photochemical and thermal reactions, Light absorption,  Laws of Photochemistry, Quantum yield and experimental determination. | 12  12 | 12.1-12.3  12.4-12.6 |
| 2\* | 1  2 | **Photochemistry** Photophysical processes, non radiative/relative relaxation processes  Quantitative/ Kinetic aspects of fluourescence of photochemical reactions. | 12  12 | 12.7-12.9  12.10-12.11 |
| 3\* | 1  2 | **Photochemistry** photochemical reaction between H2 and Br2  photochemical reaction between H2 and Cl2  Chemiluminiscence, Photosensitized reactions, Lasers | 12  12 | 12.12-12.13  12.14-12.16 |
| 4\* | 1  2 | **Polymer Chemistry**, Introduction, Classification of polymers and polymerization processes.  Step growth polymerizations, Examples | 13  13 | 13.1-13.2  13.3-13.4 |
| 5\* | 1  2 | **Polymer Chemistry**, Chain growth polymer polymerization processes. Copolymerization, polymerizations with examples.  Molecular weight averages | 13  13 | 13.5-13.6  13.7-13.8 |
| 6\* | 1  2 | **Polymer Chemistry,** Molecular mass determination methods, Analytical methods for the characterization of polymers.  **Electrochemistry,** Introduction, Conductors and insulators, Ohm’s Law | 13  09 | 13.8-13.9  9.1-9.3 |
| 7\* | 1  2 | **Electrochemistry,** Electrolytic conductance, Equivalent and molar conductance.  Measurement of conductance, cell constant. | 09  02 | 9.4-9.5  9.6-9.7 |
| 8\* | 1  2 | **(MID TERM EXAM)** |  |  |
| **Electrochemistry,** Variations in conductance & effect of temperature | 09 | 9.8-9.9 |
| 9\* | 1  2 | **Electrochemistry,** Effect of dielectric constant and viscosity of solvent on conductance.  Arrhenius theory of electrolytic dissociation, Ostwald’s dilution law. | 09  09 | 9.10-9.11  9.12-9.13 |
| 10\* | 1  2 | **Electrochemistry,** Theory of strong electrolytes, Debye-Huckel theory.  Wein and Debye-Falkenhagen effects, activity coefficients of electrolytes | 09  09 | 9.14-9.16  9.17-9.21 |
| 11\* | 1  2 | **Emulsions and Gels,** Introduction, colloidal system, characterization  Surfactants, properties, Gibb’s isotherm | 11  11 | 11.1-11.4  11.5-11.7 |
| 12\* | 1  2 | **Emulsions and Gels,** Critical Micelle concentration, Micellization  Thermodynamics of micellization, techniques used for measurement | 11  11 | 11.8-11.9  11.10-11.11 |
| 13\* | 1  2 | **Emulsions and Gels,** Theories of emulsion types, stability of emulsion.  Breaking of emulsion, methods of emulsion preparation. | 11  11 | 11.12-11.13  11.14-11.15 |
| 14\* | 1  2 | **Emulsions and Gels,** Applications of emulsions, Gels.  Methods of preparation of gels, Properties of gels. | 11  11 | 11.16-11.17  11.18-11.19 |
| 15\* | 1  2 | Applications of gels Advanced applications of colloidal systems  Revisions | 11 | 11.20 |

**\* -** Tentative