|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 1. Course title: Physical Chem. II. sem. | | | | | |
|  | | | | |
| 2. Code: | | 3. Type (lecture, practice etc.): seminar | | | |
|  | | | | |
| 4. Contact hours: 2 hoursper week | | 5. Number of credits (ECTS): 3 | | | |
|  | | | | |
| 6. Preliminary conditions (max. 3):  Physical Chemistry I. lect. and sem. | | | | | |
|  | | | | |
| 7. Announced:fall semester, spring semester, both | | | | | |
|  | | | | |
| 8. Limit for participants: 12 students/group | | | | | |
|  | | | | |
| 10. Responsible teacher (faculty, institute and department):  Beáta Lemli, PhD (Faculty of Science, Institute of Chemistry, Department of General and Physical Chemistry) | | | | | |
|  | | | | |
| 11. Teacher(s) and percentage: | | Dr. Beáta Lemli | | 80 % | |
| Dr. András Kiss | | 20 % | |
|  | |  | |
|  | |  | |
|  | |  | |
|  | | | | |
| 12. Language:English | | | | | |
|  | | | | |
| 13. Course objectives and/or learning outcomes: The scope is to understand the basic rules of electrochemistry, material structure backgrounds necessary for evaluation of experimental results, also improving modeling ability of students according to the structure of materials. | | | | | |
|  | | | | |
| 14. Course outline   1. The scope of electrochemistry, the properties of electrolytes, current conduction in electrolytes, transference number. 2. The thermodynamics of electrode processes, double layer, half-reactions, electrode potential. 3. Types of electrodes and their function, rate of charge transfer, polarization. Electrolysis. Concentration and Galvani cells, ion selective electrodes. 4. Basic experiments revealing the structure of the matter. 5. Principles of quantum theory, properties, specific mathematical backgrounds. 6. Schrödinger equation, interpretation of the wave function, normalization, the Hamilton operator. 7. Basics of interpretation of structure by quantum chemistry. Principles, quantum numbers, spin. 8. The hydrogen atom, structure of many-electron atoms and ions. 9. Spin orbital interaction, atomic spectra, atomic terms, energy states. 10. The chemical bonding, molecular orbital method, the hydrogen molecule, LCAO-MO approach, structure of homonuclear diatomic molecules and heteronuclear diatomic molecules, hybridization, hybrid orbitals, delocalization. 11. Metals, band theory of metals, semiconductors, intermolecular interactions. 12. Symmetry of molecules. Symmetry transformations, point groups, character tables. 13. Few inference of symmetry: evaluation of IR and Raman spectra. Negligible integrals, selection rules. | | | | | |
|  | | | | |
| 15. Mid-semester works  written exams week 6-7 and week 13-14 | | | | | |
|  | | | | |
| 16. Course requirements and grading  The acceptance criteria for both written exam is 50%.  Grades:  0–49% fail  50–64% acceptable  65–74% average  75–84% good  85–100% excellent | | | | | |
|  | | | | |
| 17. List of readings   1. Peter Atkins, Julio de Paula: Physical Chemistry, W. H. Freeman and Company, New York, 2010. | | | | | |
|  | | | | |
| 18. Recommended texts, further readings   1. Peter Atkins, Julio de Paula: Physical Chemistry, W. H. Freeman and Company, New York, 2010. | | | | | |
|  | | | | |
| **Date** | 13 April, 2017 | **Prepared by** |  | | |
| Beáta LEMLI, PhD  responsible reader | | |
|  | | | | |
| **Endorsed by** | | |  | | |
| Dr. László Kollár, DSc program supervisor | | |