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| 1. Course title: Physical Chem. II. lect. | | | | | |
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| 2. Code: | | 3. Type (lecture, practice etc.): lecture | | | |
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| 4. Contact hours: 4 hoursper week | | 5. Number of credits (ECTS): 5 | | | |
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| 6. Preliminary conditions (max. 3):  Physical Chemistry I. lect. | | | | | |
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| 7. Announced:fall semester, spring semester, both | | | | | |
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| 8. Limit for participants: - | | | | | |
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| 10. Responsible teacher (faculty, institute and department):  Sándor Kunsági-Máté, PhD (Faculty of Science, Institute of Chemistry, Department of General and Physical Chemistry) | | | | | |
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| 11. Teacher(s) and percentage: | | Dr. Sándor Kunsági-Máté | | 80 % | |
| Dr. András Kiss | | 20 % | |
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| 12. Language:English | | | | | |
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| 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. | | | | | |
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| 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. | | | | | |
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| 15. Mid-semester works  Attending lectures is highly recommended. | | | | | |
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| 16. Course requirements and grading  Oral exam starts with a short test. Solving it the student proves that she/he could learn the basic definitions, equations, laws, and has the necessary problem solving expertise. After successful test the student draws two question leaflets with topics about the text. After a short preparation the exam starts with a short presentation using chalk for drawing and derivations. The student also answers questions raised during the exam. | | | | | |
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| 17. List of readings   1. Peter Atkins, Julio de Paula: Physical Chemistry, W. H. Freeman and Company, New York, 2010. | | | | | |
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| 18. Recommended texts, further readings   1. Peter Atkins, Julio de Paula: Physical Chemistry, W. H. Freeman and Company, New York, 2010. | | | | | |
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| **Date** | 13 April, 2017 | **Prepared by** |  | | |
| Sándor KUNSÁGI-MÁTÉ, PhD  responsible lecturer | | |
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| **Endorsed by** | | |  | | |
| Dr. László Kollár, DSc program supervisor | | |