

GDAŃSK UNIVERSITY

Subject card

| Subject name and code | Chemistry II, PG_00027572 | | | | | | | | |
|--|---|--|--|-------------------------------------|-------------------|--|---------|-----|--|
| Field of study | Nanotechnology | | | | | | | | |
| Date of commencement of studies | October 2020 | | Academic year of realisation of subject | | | 2020/2021 | | | |
| Education level | first-cycle studies | | Subject group | | | Obligatory subject group in the field of study Subject group related to scientific research in the field of study | | | |
| Mode of study | Full-time studies | | Mode of delivery | | at the university | | | | |
| Year of study | 1 | | Language of instruction | | ۱ | Polish | | | |
| Semester of study | 2 | | ECTS credits | | | 4.0 | | | |
| Learning profile | general academic profile | | Assessment form | | | assessment | | | |
| Conducting unit | Department of Chemistry and Technology of Functional Materials -> Faculty of Chemistry | | | | | | | | |
| Name and surname | Subject supervisor | | prof. dr hab. inż. Elżbieta Luboch | | | | | | |
| of lecturer (lecturers) | Teachers | | prof. dr hab. Anna Lisowska-Oleksiak prof. dr hab. inż. Elżbieta Luboch | | | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | t | Seminar | SUM | |
| | Number of study hours | 30.0 | 15.0 | 0.0 | 0.0 | | 0.0 | 45 | |
| | E-learning hours included: 0.0 | | | | | | | | |
| | Adresy na platformie eNauczanie: CHEMIA II dla Nanotechnologii - Moodle ID: 12668 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=12668 | | | | | | | | |
| Learning activity and number of study hours | Learning activity | Participation in didactic classes included in study plan | | Participation in consultation hours | | Self-study | | SUM | |
| | Number of study hours | 45 | | 5.0 | | 50.0 | | 100 | |
| Subject objectives | Strengthening the knowledge that is the subject of general chemistry with a particular focus on the following issue: the structure and properties of chemical substances. | | | | | | | | |

| Learning outcomes | Course outcome | Subject outcome | Method of verification | | | |
|------------------------------------|--|---|--|--|--|--|
| | K6_W01 | Student discusses relations between substance properties and types of underlying bonds. Student is also able to bind the properties of materials with the possibility of their use. | [SW1] Assessment of factual knowledge | | | |
| | K6_U01 | Student can individually in the textbooks or other literature search for relevant information. | [SU4] Assessment of ability to use methods and tools [SU2] Assessment of ability to analyse information | | | |
| | K6_U04 | Student is able to draw conclusions and formulate opinions. Student is able to analyze the obtained results. | [SU2] Assessment of ability to analyse information | | | |
| | K6_W05 | Student explains chemical formulae and defines fundamental laws of chemistry. Student characterises chemical bonds. Student names inorganic compounds and discusses their general properties. Student builds formulae from names and names from chemical compound formulae and evaluates organic compound reactivity. Student evaluates the structure of biologically important macromolecules. Student explains which elements of the polymer structure influence on their properties. Student explains the role of the knowledge of energy effects associated with chemical changes. Student analyses properties of electrolyte solutions. | [SW1] Assessment of factual knowledge | | | |
| Subject contents | LECTURE: Periodic table of elements. Periodic changes in certain quantities: ionisation energy of elements, electron affinity, electronegativity of elements. Atomic and ionic radii. Chemical bonds: main types of bonds. Covalent bond: description of electrons in molecules based on the electron theory of chemical bonds and theory of molecular orbitals. Bending and anti-bonding orbitals. Shapes of molecular orbital areas: or and m molecules based on hybridisation. Delocalised bonds. Aromatic compounds: properties, examples. Explanation of molecule shapes: VSEPR method. Polarisation of chemical bonds. Inter-molecular interactions. Hydrogen bond and its effects on chemical compound physical properties. General characteristics of states of matter. Solid: crystal systems, types of unit cells, ionic, covalent, molecular and metallic crystals. Crystal structure and substance physical properties. Types of chemical reactions. Oxidation and reduction reactions. Oxidation state. Nomenclature of inorganic compounds: compounds: notion of the central atom and the ligand, examples of complex compounds and their names; properties of complex compounds: notion of the central atom and the ligand, examples of complex compounds and their names; properties of complex compounds: notion of the central atom and the ligand, examples of other reactions. Organic compounds: classification, nomenclature. Organic chemistry. Methods of identification of organic substances. Macromolecules: methods of polymer synthesis, polymer structure and its properties. Biologically important molecules: the structure of proteins, lipids, sugars, and nucleic acids. Chemical thermodynamics: eatic series ionic. Second law of thermodynamics: entropy, free energy, free energy of reaction, spontaneous processes, equilibrium reactions. Equilibrium in aqueous solutions. Electrony of acids and bases, HSAB theory. Strong electrolytes, ionic activity and strength. TUTORIALS: Basic concepts and bases, HSAB theory. Strong electrolytes, ionic activity and strength. TUTORIA | | | | | |
| Prerequisites and co-requisites | | | | | | |
| Assessment methods | Subject passing criteria | Passing threshold | Percentage of the final grade | | | |
| and criteria | Tutorials: two written tests | 50.0% | 35.0% | | | |
| | Lecture: two written colloquia | 50.0% | 65.0% | | | |

| Recommended reading | Basic literature | L. Jones, P. Atkins "Chemia ogólna. Cząsteczki, materia, reakcje" PWN 2009. 2. A. Bielański "Podstawy chemii nieorganicznej" PWN 2002 3. F.A. Cotton, G. Wilkinson, P.L. Gaus "Chemia nieorganiczna. Podstawy" PWN 2002 4. M.J. Sienko, R.A. Plane "Chemia. Podstawy i zastosowania" WNT 20024. 5. L. Pajdowski "Chemia ogólna" PWN 1999 6. P.W. Atkins "Podstawy chemii fizycznej" PWN 1999 7. E. Białecka-Floriańczyk, J. Włostowska "Chemia organiczna" WNT, Warszawa 2007 8. J. McMurry "Chemia organiczna" PWN 2005 9. red. E. Luboch, M. Bocheńska, J.F. Biernat "Chemia ogólna. Ćwiczenia laboratoryjne" Wyd. PG 2003 10. W. Gorzelany, H. Słaby, A. Śliwa "Obliczenia chemiczne: Zbiór zadań z chemii ogólnej i analityki nieorganicznej" PWN 1987 11. K.M. Pazdro, A. Rola-Noworyta "Akademicki zbiór zadań z chemii ogólnej", Oficyna Edukacyjna*Krzysztof Pazdro, 2013. | | | |
|--|--|--|--|--|--|
| | Supplementary literature | 1. W. Kołos, J. Sadlej "Atom i cząsteczka" WNT 2007 2. P.W. Atkins "Przewodnik po chemii fizycznej" PWN 1997 3. P.W. Atkins "Chemia fizyczna" PWN 2007 4. P. Mastalerz "Chemia organiczna" Wyd. Chemiczne 2002 5. A. Cygański "Metody elektroanalityczne" WNT 1995 | | | |
| | eResources addresses | CHEMIA II dla Nanotechnologii - Moodle ID: 12668 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=12668 | | | |
| Example issues/ example questions/ tasks being completed | eResources addresses CHEMIA II dla Nanotechnologii - Moodle ID: 12668 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=12668 <i>Possible topics to pass the lecture</i> . Ionization energy of elements: definition, changes in the periodic table. Electronegativity of elements: Pauling electronegativity scale and Alired and Rochow scale. MO Theory - characterize the molecule: Typical examples of hybridization of atomic orbitals and fluic transacteristic angles between bonds. Multiple bonds: CO2 boils at -78 °C and SiO2 at a temperature of approx. 2500 °C. Please explain the difference. Delocatised bonds: aromatic compounds and their general characteristics. Please draw at least three formulas of aromatic heterocycic compounds, their names and meaning. Define hydrogen bond (hydrogen-bridge) and give examples of compounds which have: a) the intermolecular hydrogen bond (three examples) and jain intramolecular hydrogen bond (three examples) and yain intramolecular hydrogen bond (three examples) and yain intramolecular hydrogen bond (bree examples) and yain intramolecular hydrogen bond (see rystal structure of fullerence Co. General characteristics of covalen crystal structure of the diamond. Why diamond has excellent transparency? The crystal structure intermediate between molecular and covalent: the crystal structure of graphite. Please indicate the oxidation state of al elements in the given compounds, ex (xSOA, KaMnO4, Cr2O3, KSO3O, KMMO4, NaH, KC2rO7, MnO2, H2O2. Please indicate formulas of inorganic compounds with the following names, eg. iposphoric/ acid; ammonia, hydrogen choride, chloric/VII) acid, sodium chlorateVII), soniaum in, sodium peroxide, sodium hydrogen suffate(VI); potasium chromateVII); rubidium superxide. General characteristics of p-block metals. General characteristics of p-block metals. Block General characteristics of p-block metals. Somersim of co | | | | |
| Work placement | Not applicable | | | | |