



Subject card

| | | | | | | | |
|---|--|---|-------------------------------------|------------|--|---------|-----|
| Subject name and code | Applied Chemistry, PG_00044433 | | | | | | |
| Field of study | Engineering Management | | | | | | |
| Date of commencement of studies | October 2019 | Academic year of realisation of subject | | | 2019/2020 | | |
| 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 | Part-time studies | Mode of delivery | | | at the university | | |
| Year of study | 1 | Language of instruction | | | Polish | | |
| Semester of study | 2 | ECTS credits | | | 4.0 | | |
| Learning profile | general academic profile | Assessment form | | | assessment | | |
| Conducting unit | Department of Quality Management and Commodity Science -> Faculty of Management and Economics | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | prof. dr hab. inż. Maria Szpakowska | | | | | |
| | Teachers | dr inż. Ewa Marjańska mgr Anna Wendt prof. dr hab. inż. Maria Szpakowska | | | | | |
| Lesson types and methods of instruction | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 16.0 | 16.0 | 0.0 | 0.0 | 0.0 | 32 |
| | E-learning hours included: 0.0 | | | | | | |
| 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 | 32 | 8.0 | | 60.0 | 100 | |
| Subject objectives | To familiarize students with basic chemical compounds and their application and the acquisition of chemical calculation skills. Application of basic chemical calculations to solve ecological problems. | | | | | | |
| Learning outcomes | Course outcome | Subject outcome | | | Method of verification | | |
| | [K6_W08] has a basic knowledge of the changes taking place in the organisation and its environment, taking into account environmental problems | Understands the basic processes occurring in the environment. | | | [SW3] Assessment of knowledge contained in written work and projects | | |
| | [K6_K04] is aware of the importance of the non-technical impacts of engineering activities, including environmental impacts | Knows the basics of environmental management according to ISO 14000. | | | [SK1] Assessment of group work skills [SK5] Assessment of ability to solve problems that arise in practice | | |
| | [K6_U01] interprets and analyses the phenomena and processes taking place in the economy and organisation using basic theoretical knowledge of economics, management and science | Understands the concept of sustainable development. | | | [SU1] Assessment of task fulfilment | | |
| | [K6_K02] identifies problems related to undertaking various tasks, including engineering in the changing conditions of the organisation's functioning; takes into account the ethical aspect related to the implementation of the organisation's tasks | Defines basic chemical compounds and determines their applications. | | | [SK1] Assessment of group work skills [SK5] Assessment of ability to solve problems that arise in practice | | |
| | [K6_W11] has the basic knowledge of mathematics, physics and chemistry necessary to solve technical problems | Solves simple chemical tasks related to the construction of matter and the existence of chemical compounds in nature. | | | [SW1] Assessment of factual knowledge | | |

| Subject contents | <p>LECTURE</p> <p>General concepts and model of environmental contamination as well as chemical laws and structure of matter</p> <p>Periodic table and the structure of elements</p> <p>Molecule structure, ionization energy, electronic affinity, electronegativity</p> <p>Atomic, ionic, hydrogen and coordination bonds</p> <p>The state of gas, excellent gases, technical, fuel, gases in the air</p> <p>Sources of air pollution, smog, greenhouse effect, ozone hole, radioactive contamination</p> <p>Liquid state, physical and chemical properties of water, water hardness, natural water and sewage, wastewater treatment, solutions, concentration and solubility</p> <p>Glassy state, glass</p> <p>Solid state, crystals and their types,</p> <p>Types of chemical compounds, oxides, bases, acids, salts</p> <p>Chemical reactions, water dissociation, neutralization reactions, redox reactions</p> <p>Chemical kinetics</p> <p>Electrochemistry, electrolysis, voltage series, galvanic cells</p> <p>Metals, classification, minerals, precious stones, metal alloys, corrosion</p> <p>Silicon and silica applications</p> <p>Chemistry of coal, hydrocarbons, alcohols and phenols, ethers, aldehydes and ketones, organic acids, esters, soaps and detergents</p> <p>Chemical compounds and waste, waste classification, recycling, composting, biogas, incineration, storage</p> <p>Organic, municipal, industrial, energy, hazardous waste</p> <p>Soil contamination</p> <p>EXERCISES</p> <p>Introduction. Rules for passing the subject</p> <p>Construction of the periodic table of elements. Total patterns. Periodicity law. Valence. Constitution law.</p> <p>Chemical equations. Patterns of two-component elements of main groups (oxides, hydrides). Atomic number and mass number. Isotopes.</p> <p>Basics of chemical calculations</p> <p>Molar mass. Molecular weight. Molecular interpretation of chemical transformations. Stoichiometric ratios in chemical transformations. Avogadro's law. Examples and techniques of chemical calculations.</p> <p>Rapid reaction and chemical equilibrium</p> <p>The concept of the speed of a chemical reaction. Factors influencing the speed of chemical reactions.</p> <p>Constant chemical equilibrium. The law of the masses. The rule of outrage. The influence of pressure, temperature on the equilibrium constant. Examples of calculations.</p> <p>Saturated, unsaturated and supersaturated solutions. Energy effects accompanying dissolution processes.</p> <p>Methods for expressing concentration of solutions. Dilutions and conversion of concentrations.</p> <p>Reactions in aqueous solutions</p> <p>Water dissociation. PH scale. Determination of pH of solutions. Dissociation.</p> <p>Properties of inorganic compounds</p> <p>Division of inorganic compounds. Construction and nomenclature. Basic reactions.</p> <p>Galvanic cells</p> <p>Half-cells and their types. Half-cell potential. Electromotive force. A series of voltage. Galvanic cells as a power source. Calculations.</p> <p>Electrolysis</p> <p>Electrolyser construction. Faraday's Law. Faraday's standing. Practical applications of electrolysis - tasks.</p> <p>Redox reactions. Corrosion of metals and methods of its eradication. Works.</p> <p>Written test from part 1 - 5 tasks.</p> <p>Holdgate Model - tasks</p> <p>Waste classification in the light of the Waste Act 2001, including novellas</p> <p>Analysis of the waste catalog</p> <p>Environmental management in the light of ISO 14000</p> | | | | | | | | | | | | | | |
|---------------------------------|---|-------------------------------|--|--------------------------|-------------------|-------------------------------|-------------------|-------|-------|----------------------|-------|-------|--------------------|-------|-------|
| Prerequisites and co-requisites | Basics of mathematics and physics | | | | | | | | | | | | | | |
| Assessment methods and criteria | <table border="1"> <thead> <tr> <th data-bbox="456 1619 794 1653">Subject passing criteria</th> <th data-bbox="799 1619 1137 1653">Passing threshold</th> <th data-bbox="1142 1619 1481 1653">Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 1653 794 1686">exercises reports</td> <td data-bbox="799 1653 1137 1686">60.0%</td> <td data-bbox="1142 1653 1481 1686">25.0%</td> </tr> <tr> <td data-bbox="456 1686 794 1720">exercises colloquium</td> <td data-bbox="799 1686 1137 1720">60.0%</td> <td data-bbox="1142 1686 1481 1720">35.0%</td> </tr> <tr> <td data-bbox="456 1720 794 1753">lecture colloquium</td> <td data-bbox="799 1720 1137 1753">60.0%</td> <td data-bbox="1142 1720 1481 1753">40.0%</td> </tr> </tbody> </table> | | | Subject passing criteria | Passing threshold | Percentage of the final grade | exercises reports | 60.0% | 25.0% | exercises colloquium | 60.0% | 35.0% | lecture colloquium | 60.0% | 40.0% |
| Subject passing criteria | Passing threshold | Percentage of the final grade | | | | | | | | | | | | | |
| exercises reports | 60.0% | 25.0% | | | | | | | | | | | | | |
| exercises colloquium | 60.0% | 35.0% | | | | | | | | | | | | | |
| lecture colloquium | 60.0% | 40.0% | | | | | | | | | | | | | |

| | | |
|---------------------|--------------------------|--|
| Recommended reading | Basic literature | <p>J. Sienko, R.A.Plane, <i>Chemia, Podstawy i zastosowania</i>, WNT, Warszawa, 1979;</p> <p>K.M. Pazdro, <i>CHEMIA dla kandydatów na wyższe uczelnie</i>, PWN, Warszawa, 1985;</p> <p>L. Pauling, P.Pauling, <i>Chemia</i>, PWN, Warszawa, 1983;</p> <p>J. Kroschwitz, M. Winokur, <i>Chemistry, A first course</i>, McGraw-Hill Book Company, 1980, 2005;</p> <p>F. A. Cotton, G. Wilkinson, P.L.Gaus, <i>Chemia nieorganiczna</i>, Warszawa, PWN, 1995;</p> <p>J. E. Andrews, P. Brimblecombe, T.D. Jickells, P.S. Liss, <i>Wprowadzenie do chemii środowiska</i>, WNT, Warszawa 2000;</p> <p>S. F. Zakrzewski, <i>Podstawy toksykologii środowiska</i>, WN PWN, Warszawa 2000;</p> <p>C. Rosik-Dulewska, <i>Podstawy gospodarki odpadami</i>, WN PWN, Warszawa 2000;</p> <p>M. Popkiewicz, <i>Świat na rozdrożu</i>, Wydawnictwo Sonia Draga, Katowice, 2012;</p> <p>M. Popkiewicz, <i>Rewolucja energetyczna, Ale po co?</i> Wydawnictwo Sonia Draga, Katowice, 2016;</p> <p>J. Datta, P. Jutrzenka Trzebiatowska, P. Kasprzyk <i>Wybrane zagadnienia recyklingu tworzyw sztucznych i gumy</i>, Wydawnictwo PG, Gdańsk 2018;</p> <p>J. Taubman, <i>Węgiel i alternatywne źródła energii, Prognozy na przyszłość</i>, PWN, Warszawa, 2011;</p> <p>D. Yergin, <i>The Quest, W poszukiwaniu energii</i>, Publishing Kurhaus Media, 2013.</p> |
| | Supplementary literature | Mary K. T., Louis T., <i>Introduction to Environmental Management</i> , CRC Press, 2009 |
| | eResources addresses | |

| | |
|---|---|
| <p>Example issues/ example questions/ tasks being completed</p> | <p>Application of selected chemical compounds of solid, liquid and gaseous state.</p> <p>Types of bonds in liquids. Physical and chemical properties of water and other solvents.</p> <p>Description of application of selected acids, aldehydes, ketones, alcohols and organic compounds.</p> <p>Application of technical and fuel gases.</p> <p>Calculations of concentration of solutions' components. Calculation of EMF and quantity of cells necessary for adequate voltage gain.</p> <p>Environmental contamination model</p> <p>ISO 14000</p> <p>Classification of waste and harmful substances pn the basis of regulations</p> |
| <p>Work placement</p> | <p>Not applicable</p> |