**Zał. Nr 2 do ZW 16/2020**

**ASSUMED LEARNING OUTCOMES**

**FACULTY:** Geoengineering, Mining and Geology...........

**MAIN FIELD OF STUDY:** Mining and geology................................

**EDUCATION LEVEL:** first-level (licencjat/inżynier) studies / second-level studies / magister uniform studies\*

**PROFILE:** general academic

Location of the main-field-of study:

Branch of science: Engineering-technological sciences.

Discipline / disciplines (for several disciplines, please indicate the major discipline)

Environmental, Mining and Power Engineering

Explanation of the markings:

P6U – universal first degree characteristics corresponding to education at the first-level studies - 6 PRK level \*

P7U – universal first degree characteristics corresponding to education at the second-level studies - 7 PRK level \*

P6S – second degree characteristics corresponding to education at the first-level studies - 6 PRK level \*

P7S – second degree characteristics corresponding to education at the second-level studies - 7 PRK level \*

W - category "knowledge"  
U - category "skills"  
K - category "social competences"  
K (*faculty symbol*) \_W1, K (*faculty symbol*) \_W2, K (*faculty symbol*) \_W3, … - main-field-of study learning outcomes related to the category "knowledge"  
K (*faculty symbol*) \_U1, K (*faculty symbol*) \_U2, K (*faculty symbol*) \_U3, … - main-field-of study learning outcomes related to the category "skills"  
K (*faculty symbol*) \_K1, K (*faculty symbol*) \_K2, K (*faculty symbol*) \_K3, … - main-field-of study learning outcomes related to the category "social competences"  
S (*faculty symbol*) \_W.., S (*faculty symbol*) \_W.., S (*faculty symbol*) \_W.., … - specialization learning outcomes related to the category "knowledge"  
S (*faculty symbol*) \_U.., S (*faculty symbol*) \_U.., S (*faculty symbol*) \_U.., … - specialization learning outcomes related to the category "skills"  
S (*faculty symbol*) \_K.., S (*faculty symbol*) \_K.., S (*faculty symbol*) \_K.., … - specialization learning outcomes related to the category "social competences"  
… \_inż. – learning outcomes related to the engineer competences

\* delete as applicable

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Main field of study**  **learning outcomes** | **Description of learning outcomes for the main-field-of study**  **Mining and Geology**  After completion of studies, the graduate: | Reference to PRK characteristics | | | | | |
| Universal first degree characteristics (U) | | Second degree characteristics typical for qualifications obtained in higher education (S) | | | |
| Characteristics for qualifications on  7\* levels of PRK | | Characteristics for qualifications on  7 levels of PRK, enabling acquiring engineering competences | |
| **KNOWLEDGE (W)** | | | | | | | |
| K2\_GIG\_W01 | Possesses knowledge about methods of statistical and geostatistical analysis of deposit parameters and their utilisation in data processing | | P7U\_W | | P7S\_WG | |  |
| K2\_GIG\_W02 | Has wide and deep knowledge in the field of physics or chemistry necessary to understand the phenomena effecting the properties of matter | | P7U\_W | | P7S\_WG | |  |
| K2\_GIG\_W03 | Has basic knowledge about the role and principles of financial management | | P7U\_W | | P7S\_WG  P7S\_WK | | P7S\_WG\_inż  P7S\_WK\_inż |
| K2\_GIG\_W04 | Has knowledge about environmental management and monitoring systems in Poland and in the EU with the use of IT tools | |  | | P7S\_WG  P7S\_WK | | P7S\_WK\_inż |
| K2\_GIG\_W05 | Has basic knowledge to understand social and psychological aspects of engineering activity | | P7U\_W | | P7S\_WK | | P7S\_WK\_inż |
| K2\_GIG\_W06 | Knows and understands the non-technical aspects of professional activity within the field Mining and Geology | |  | | P7S\_WK | | P7S\_WK\_inż |
| K2\_GIG\_W07 | Possesses knowledge about processes and technologies applied in the mining and minerals processing industries | |  | | P7S\_WG | | P7S\_WG\_inż |
| Achieves learning outcomes of the category “Knowledge” in one of the specialisations taught in English:  Geotechnical and Environmental Engineering (Geotechnika i Ochrona Środowiska) (S2\_GEE\_W) (Attachment 5)  Mining Engineering (Eksploatacja Podziemna i Odkrywkowa Złóż) (S2\_MGE\_W) (Attachment 6)  Geomatics for Mineral Resources Management – Pathway F (S2\_GME\_W) (Attachment 7)  Geomatics for Mineral Resources Management – Pathway L (S2\_GME\_W) (Attachment 8) | | |  | |  | |  |
| **SKILLS (U)** | | | | | | | |
| K2\_GIG\_U01 | Is able to use the specialist professional language in the range of his study field to communicate in his future work environment | |  | | P7S\_UK | |  |
| K2\_GIG\_U02 | Has language skills of the foreign language he continued to study at the level B2+ defined by the Common European Framework of Reference (CEFR). Understands and commentates specialist texts in the field of mining and geology. Is able to use language means typical for academic language and engineering environment | |  | | P7S\_UK | |  |
| K2\_GIG\_U03 | Concerning his second foreign language - is able to understand quite well speeches and short written texts related to familiar topics of everyday life and professional themes. Is able to write a short text – for example an informal letter | |  | | P7S\_UK | |  |
| K2\_GIG\_U04 | Is able to create a model of spatial variability of a deposit parameter and use the model to design extraction or processing of the raw material | |  | | P7S\_UW | | P7S\_UW1\_inż  P7S\_UW2\_inż  P7S\_UW4\_inż |
| K2\_GIG\_U05 | Is able to use suitable methods and IT tools to manage components of environmental systems | | P7U\_U | | P7S\_UW | | P7S\_UW2\_inż |
| K2\_GIG\_U06 | Understands and is able to commentate information presented in financial statements, is able to assess the financial health of a firm by means of ratio analysis, can do appropriate calculations and make capital budgeting decisions | |  | | P7S\_UW | | P7S\_UW2\_inż |
| K2\_GIG\_U07 | Is able to design technological systems used in the mining or minerals processing industries | |  | | P7S\_UW | | P7S\_UW3\_inż  P7S\_UW4\_inż |
| K2\_GIG\_U08 | Understands the need of lifelong learning, is able to organise the learning process for other people | | P7U\_U | | P7S\_UU | |  |
| K2\_GIG\_U09 | Has skills to work in a team and manage a team in order to fully utilise the potential of team members to achieve the assigned objectives | | P7U\_U | | P7S\_UO | |  |
| Achieves learning outcomes of the category “SKILLS” in one of the specialisations taught in English:  Geotechnical and Environmental Engineering (Geotechnika i Ochrona Środowiska) (S2\_GEE\_U) (Attachment 5)  Mining Engineering (Eksploatacja Podziemna i Odkrywkowa Złóż) (S2\_MGE\_U) (Attachment 6)  Geomatics for Mineral Resources Management – Pathway F (S2\_GME\_U) (Attachment 7)  Geomatics for Mineral Resources Management – Pathway L (S2\_GME\_U) (Attachment 8) | | |  | |  | |  |
| **SOCIAL COMPETENCES (K)** | | | | | | | |
| K2\_GIG\_K01 | Is able to think and act in a creative and entrepreneurial way | |  | | P7S\_KK  P7S\_KR | |  |
| K2\_GIG\_K02 | Understands the need to present to the society (by means of media) information and opinions about the achievements of the Mining industry. Tries to convey this message in an understandable way, showing different points of view. Is aware of the need to build the work safety culture and of his responsibility for the health and lives of other employees | | P7U\_K | | P7S\_KK  P7S\_KO  P7S\_KR | |  |
| K2\_GIG\_K03 | Is aware of the non technical effects of the engineering activities, including environmental aspects and is ready to take responsibility | | P7U\_K | | P7S\_KO  P7S\_KR | |  |

\*delete as applicable

Attachment no. 5

**Specialization**  **Geotechnical and Environmental Engineering. (Geotechnika i Ochrona Środowiska – specjalność w języku angielskim)**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Specialization**  **learning outcomes** | **Description of learning outcomes for the specialization**  **Geotechnical and Environmental Engineering**  After completion of studies, the graduate: | Reference to PRK characteristics | | |
| Universal first degree characteristics (U) | Second degree characteristics typical for qualifications obtained in higher education (S) | |
| Characteristics for qualifications on  7\* levels of PRK | Characteristics for qualifications on  7 levels of PRK, enabling acquiring engineering competences |
| **KNOWLEDGE (W)** | | | | |
| S2\_GEE\_W08 | Has a grounded knowledge in rock and soil mechanics and their applications in underground and surface mining. Has systematic knowledge about changes of the state of stress in rock mass resulting from underground mining excavation and knows their mathematical notation |  | P7S\_WG | P7S\_WG\_inż |
| S2\_GEE\_W09 | Has the state-of-art knowledge in the range of geophysics. Knows the geophysical surveying methods, methods of data processing and interpretation of the results |  | P7S\_WG | P7S\_WG\_inż |
| S2\_GEE\_W10 | Has basic knowledge about computer modelling of 3D objects. Knows the methods of digital modelling of basic geological structures. | P7U\_W | P7S\_WG  P7S\_WK | P7S\_WG\_inż  P7S\_WK\_inż |
| S2\_GEE\_W11 | Knows the methods of integrated analysis of deformations by means of monitoring and numeric FEM modelling, that are necessary to analyse processes undergoing in geoengineering objects and in rock mass due to mining extraction. | P7U\_W | P7S\_WG | P7S\_WG\_inż |
| S2\_GEE\_W12 | Has a good knowledge about financial evaluation of investment projects and their risk assessment | P7U\_W | P7S\_WK | P7S\_WK\_inż |
| S2\_GEE\_W13 | Has a grounded knowledge of the theory, methodologies and tools of project management | P7U\_W | P7S\_WG | P7S\_WG\_inż |
| S2\_GEE\_W14 | Knows the fundamentals of effective communication in project teams, conflict resolution, leadership and team management | P7U\_W | P7S\_WK | P7S\_WK\_inż |
| S2\_GEE\_W15 | Knows the methodical and technical fundamentals of occupational risk assessment based on Polish and international law. Knows the basics of organisation and management of work safety required from mine operational managers | P7U\_W | P7S\_WG  P7S\_WK | P7S\_WG\_inż  P7S\_WK\_inż |
| S2\_GEE\_W16 | Knows the physical and chemical properties of water, chemical components of natural waters and and their contamination, classification and water quality standards. Has knowledge of the physical and chemical processes which influence the content of the trace compounds in the air. Knows the types of waste and the methods for their treatment | P7U\_W | P7S\_WG  P7S\_WK | P7S\_WG\_inż  P7S\_WK\_inż |
| S2\_GEE\_W17 | Knows the procedures and the legal regulation of the environmental impact assessment. Knows the factors influencing this type of assessment, the phases of environmental testing and the effectiveness of available methods |  | P7S\_WG | P7S\_WG\_inż |
| S2\_GEE\_W18 | Knows the methods and legal regulations concerning thermal treatment and disposal of solid, liquid and gaseous waste. Knows the calculation methods of combustion parameters and the physico-chemical processes of waste incineration |  | P7S\_WG | P7S\_WG\_inż |
| S2\_GEE\_W19 | Is familiar with the basic elements and concepts of modern water and waste water purification technology and processes. |  | P7S\_WG | P7S\_WG\_inż |
| S2\_GEE\_W20 | Is familiar with the basic concepts of environmental geotechnics, including physico-chemistry of soils for geoenvironmental engineering and geotechnical aspects of landfilling, stability and deformation of waste dumps |  | P7S\_WG | P7S\_WG\_inż |
| S2\_GEE\_W21 | Knows the chemical techniques of environmental pollution treatment, waste recycling and treatment, as well as pollution control. |  | P7S\_WG | P7S\_WG\_inż |
| S2\_GEE\_W22 | Is familiarized with the basic concept and framework of Environmental and Human Health Risk assessment and its relationship to contaminated land remediation |  | P7S\_WG | P7S\_WG\_inż |
| S2\_GEE\_W23 | Is familiar with the colloidal, and chemical structure of the soil, soil classification, physical and chemical processes taking place in soils, inorganic and organic substance transformation in the soil environment |  | P7S\_WG | P7S\_WG\_inż |
| S2\_GEE\_W24 | Is familiar with solution methods using both analytical and numerical techniques, Knows when the engineering problems can be formulated using differential equations, system of linear equations and system of nonlinear equations | P7U\_W | P7S\_WK |  |
| S2\_GEE\_W25 | Knows principles, concept and terminology of quality management, quality-related corporate activities, requirements of the ISO 9001 standard and the specialities of project quality management. |  | P7S\_WK | P7S\_WK\_inż  P7S\_WG\_inż |
| S2\_GEE\_W26 | Has knowledge about the industrial and municipal waste management, knows the types of wastes, their composition and environmental effect of wastes. Is familiar with the concept of sustainable development and circular economy Knows processes of mechanical waste preparation and general waste preparation technologies. | P7U\_W | P7S\_WG  P7S\_WK | P7S\_WG\_inż  P7S\_WK\_inż |
| S2\_GEE\_W27 | Is familiar with the effects of geological medium on the state and changes of the environment. Knows the objects, methods and legal background of environmental geology. Has knowledge about environmental minerals, their characteristics and role in causing and mitigating of environmental problems. Is familiar with geological hazards |  | P7S\_WG  P7S\_WK | P7S\_WG\_inż  P7S\_WK\_inż |
| S2\_GEE\_W28 | Has knowledge of the processes, technologies and machinery systems used in surface mining and processing of mineral resources |  | P7S\_WG | P7S\_WG\_inż |
| S2\_GEE\_W29 | Knows the techniques of identification of technological processes in a mining company and is familiar with the methods of analysing the possibility of their digitalisation |  | P7S\_WG | P7S\_WG\_inż |
| S2\_GEE\_W30 | Is familiar with methods and tools of computation, designing, and optimisation of mining and processing systems of raw materials and waste supported by mathematical modelling and digital simulation of technological operations |  | P7S\_WG  P7S\_WK | P7S\_WG\_inż  P7S\_WK\_inż |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SKILLS (U)** | | | | |
| S2\_GEE\_U10 | Is able to apply the calculation methods of geomechanics to define the state of stress in rock mass and soils. Is able to use these calculations to assess the stability of excavations |  | P7S\_UW | P7S\_UW2\_inż  P7S\_UW3\_inż |
| S2\_GEE\_U11 | Is able to create field research plan for geophysical data acquisition, perform geophysical surveying, analyse and commentate the results |  | P7S\_UW | P7S\_UW1\_inż  P7S\_UW4\_inż |
| S2\_GEE\_U12 | Is able to apply the computer aided geological modelling tools according to international standards |  | P7S\_UW  P7S\_UU | P7S\_UW1\_inż  P7S\_UW2\_inż |
| S2\_GEE\_U13 | Is able to design and apply a geodetic deformations monitoring system. Is able to perform measurements of deformations (manually and automatically), analyse and verify the results. Is able to use FEM to solve geomechanical problems. | P7U\_U | P7S\_UW  P7S\_UU | P7S\_UW2\_inż |
| S2\_GEE\_U14 | Is able to use the Project Management methodology to plan a project. Is able to prepare the project schedule and control the performance by means of the MS Project tool |  | P7S\_UW P7S\_UO P7S\_UK | P7S\_UW2\_inż |
| S2\_GEE\_U15 | Is able to perform occupational risk assessment for given work environment using software tools. Is able to individually work out elements of occupational health and safety documentation required by the geological and mining law. | P7U\_U | P7S\_UW  P7S\_UO P7S\_UK | P7S\_UW2\_inż P7S\_UW3\_inż |
| S2\_GEE\_U16 | Has the ability to perform laboratory analysis of physical and chemical properties of water and air samples. Is able to assess water and air quality and identify the sources of pollution. |  | P7S\_UW | P7S\_UW1\_inż |
| S2\_GEE\_U17 | Is able to perform an environmental impact assessment for a simple case study |  | P7S\_UW | P7S\_UW2\_inż  P7S\_UW3\_inż |
| S2\_GEE\_U18 | Is able to design the waste incineration process, calculate the combustion parameters, predict the properties of solid combustion residues and control the air pollution |  | P7S\_UW | P7S\_UW4\_inż |
| S2\_GEE\_U19 | Is able to choose the right waste water purification technology concerning environmental protection aspects. |  | P7S\_UW | P7S\_UW2\_inż |
| S2\_GEE\_U20 | Is able to determine the contaminant retention capacity of soils, assess the resulting geotechnical risk and choose the suitable remediation method |  | P7S\_UW | P7S\_UW1\_inż |
| S2\_GEE\_U21 | Is able to choose and design the appropriate chemical technique of environmental pollution treatment for a simple case study | P7U\_U | P7S\_UW | P7S\_UW4\_inż |
| S2\_GEE\_U22 | Is competent in reading and understanding risk assessment documentation and evaluating its correctness. Is able to work together with other field specialists in a risk assessor team. |  | P7S\_UW  P7S\_UO | P7S\_UW3\_inż |
| S2\_GEE\_U23 | Possesses skills to solve environmental protection problems related to the soils. |  | P7S\_UW | P7S\_UW1\_inż |
| S2\_GEE\_U24 | Is able to apply the optimization techniques to various engineering problems. | P7U\_U | P7S\_UW | P7S\_UW2\_inż |
| S2\_GEE\_U25 | Is able to perform professional tasks on a higher level by applying the approach of quality management, including managing or participating in related projects |  | P7S\_UO  P7S\_UK  P7S\_UU |  |
| S2\_GEE\_U26 | Is able to characterize – from process engineering and chemical point of view – and utilize the various wastes. |  | P7S\_UW | P7S\_UW2\_inż  P7S\_UW4\_inż |
| S2\_GEE\_U27 | Is prepared for revealing the geological background of environmental problems as well as mitigating or minimizing these problems. |  | P7S\_UW | P7S\_UW2\_inż  P7S\_UW4\_inż |
| S2\_GEE\_U28 | Possesses the ability to build digital models of technological processes in mining |  | P7S\_UW | P7S\_UW2\_inż  P7S\_UW3\_inż  P7S\_UW4\_inż |
| S2\_GEE\_U29 | Possesses skills to construct simple models and algorithms for mining and processing operations using a spreadsheet. Is able to optimize a simple feedback system of mining operations and / or mineral processing |  | P7S\_UW | P7S\_UW2\_inż  P7S\_UW4\_inż |
| S2\_GEE\_U30 | Is able to perform appropriate calculations and design an open pit excavation. Possesses skills to choose the right mining system regarding the rock mass properties |  | P7S\_UW | P7S\_UW3\_inż  P7S\_UW4\_inż |
| S2\_GEE\_U31 | Is able to effectively communicate with people representing different cultures and communities. Can work in a multicultural team. | P7U\_U | P7S\_OK |  |

\*delete as applicable