**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 6 / 7\* levels of PRK | Characteristics for qualifications on 6 and 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\_WGP7S\_WK | P7S\_WG\_inżP7S\_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\_WGP7S\_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\_inżP7S\_UW2\_inżP7S\_UW4\_inż |
| K2\_GIG\_U05  | Is able to use suitable methods and IT tools to manage components of environmental systemstems | 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\_inżP7S\_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\_KKP7S\_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\_KKP7S\_KOP7S\_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\_KOP7S\_KR |  |

\*delete as applicable

**Attachment no. 7**

**Specialization Geomatics for Mineral Resource Management – Pathway F**

|  |  |  |
| --- | --- | --- |
| **Specialization****learning outcomes** | **Description of learning outcomes for the specialization****Geomatics for Mineral Resource Management – Pathway F**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 6 / 7\* levels of PRK | Characteristics for qualifications on 6 and 7 levels of PRK, enabling acquiring engineering competences |
| **KNOWLEDGE (W)** |
| S2\_GMR\_W08 | *Principles and Application of InSAR and GIS in mining*A student has extended knowledge of the acquisition and processing of remote sensing and radar digital images. A student has general and advanced knowledge of terrestrial, airborne and satellite data acquisition technologies and their importance for the development and progress of exact and natural sciences. | P7U\_W | P7S\_WG | P7S\_WG\_inż |
| S2\_GMR\_W09 | *Principles and Application of InSAR and GIS in mining*Student has extended knowledge of the use of geoformation systems in the analysis of objects, phenomena and processes in space, regardless of the hardware platform. | P7U\_W | P7S\_WG | P7U\_W |
| S2\_GMR\_W10 | *Project Management, Appraisal and Risk Evaluation*Student has in-depth knowledge in the field of the economic evaluation of investment projects and investment risk assessment. | P7U\_W | P7S\_WK | P7S\_WK\_inż |
| S2\_GMR\_W11 | *Project Management, Appraisal and Risk Evaluation*Student has a well-established knowledge of the theory, methodology and tools of project management. | P7U\_W | P7S\_WK | P7S\_WK\_inż |
| S2\_GMR\_W12 | *Project Management, Appraisal and Risk Evaluation*Student has broadened knowledge about the principles of effective communication in teams, conflict resolution, leadership and team management. | P7U\_W | P7S\_WK | P7S\_WK\_inż |
| S2\_GMR\_W13 | *Engineering Geophysics*Student has the latest knowledge in geophysics. He/she knows the methods of measuring geophysical quantities, their processing and interpretation. | P7U\_W | P7S\_WG | P7S\_WG\_inż |
| S2\_GMR\_W14 | *Integrated Analysis of Deformations in Geomechanical Engineering*Student knows the methods of integrated deformation analysis with the use of monitoring results and numerical modelling. This knowledge is necessary for the analysis of the processes taking place in geoengineering objects and in the rock mass during mining and after its completion. | P7U\_W | P7S\_WG | P7S\_WG\_inż |
| S2\_GMR\_W15 | *Integrated Analysis of Deformations in Geomechanical Engineering*Student has the knowledge necessary to determine the impact on the surface of the area of underground or open cast mining carried out using various mining methods. | P7U\_W | P7S\_WG | P7S\_WG\_inż |
| S2\_GMR\_W16 | *Occupational Health and Safety*Student knows the methodological and technical basics of occupational risk assessment in the light of Polish and international law. He knows the basics of organization and management of work safety, necessary for management and supervision of mining operations. | P7U\_W | P7S\_WGP7S\_WK | P7S\_WG\_inżP7S\_WK\_inż |
| S2\_GMR\_W17 | *Applied Remote Sensing in Geosciences*Student knows the theory and use of satellite remote sensing systems, laser scanning and radar imagery needed to obtain spatial information about the environment. | P7U\_W | P7S\_WG | P7S\_WG\_inż |
| S2\_GMR\_W18 | *Underground Mine Surveying*Student knows the concepts of mining, geology and mining geodesy as well as the basic measurement methods used in conducting underground vertical and horizontal workings. Can describe the implementation measurements performed during the excavation of underground mining workings and tunnel construction. | P7U\_W | P7S\_WG | P7S\_WG\_inż |
| S2\_GMR\_W19 | *Geomonitoring*Student has knowledge of deformation monitoring techniques in the spectrum of engineering disciplines such as mining and construction engineering. Can use the latest techniques for monitoring and analysis of deformation measurements, automation of measurements and development trends and the selection of basic methods used to solve problems of monitoring various engineering objects. | P7U\_W | P7S\_WG | P7S\_WG\_inż |
| S2\_GMR\_W20 | *Operations Management*Student knows the basic decision models in management with the use of IT applications. | P7U\_W | P7S\_WK | P7S\_WK\_inż |
| S2\_GMR\_W21 | *Geomodelling – Geostatistics for Natural Resource Modelling*Student knows the methods of modelling objects in a multidimensional space. H/she can identify the target mining excavation by the applicable criteria of balance in the environment of three-dimensional modelling. | P7U\_W | P7S\_WGP7S\_WK | P7S\_WG\_inżP7S\_WK\_inż |
| S2\_GMR\_W22 | *Special Topics Geokinematics*Student knows the legal conditions for the protection of mining areas. The student distinguishes the nature of direct and indirect deformations resulting from mining activities. He/she can determine its influence on the ground and underground infrastructure in the aspect necessary for the quantitative and qualitative description of the size of the surface and rock deformation. The student can predict the effects of exploitation. He/she can forecast deformation to apply mining and construction prophylaxis in mining areas to minimize mining influence on the surface. | P7U\_W | P7S\_WG | P7S\_WG\_inż |
| S2\_GMR\_W23 | *Applied Spatial Data Analysis and Modelling - Case Study*Student has extended knowledge of the effective use of geoinformation systems for the collection and processing of data used in modelling natural and anthropogenic phenomena or processes. | P7U\_W | P7S\_WG | P7S\_WK\_inż |
| S2\_GMR\_W24 | *Geomatics for Mineral Resource and Reserve Management*Student knows the methods of supporting the safe, economic and environmentally responsible exploitation of mineral deposits. His/her knowledge relates in particular to the processes of exploration and recognition of deposits and optimization of mining design. | P7U\_W | P7S\_WGP7S\_WK | P7S\_WG\_inżP7S\_WK\_inż |
| S2\_GMR\_W25 | *Reclamation*Student knows the theory and practice of reclamation in mining as a necessary element of balancing the influence of mining. The student knows the methods and processes of environmental remediation, the procedures for their planning and monitoring by EU standards. | P7U\_W | P7S\_WG | P7S\_UW1\_inżP7S\_UW2\_inż |
| S2\_GMR\_W26 | *Human Resources Management & Organizational Behaviour*Sstudent understands the importance of human resources for organizations and human behaviour in organizations. The student knows the methods to analyze the problems of human and organizational resource management. | P7U\_W | P7S\_WGP7S\_WK | P7S\_WG\_inż |
| **SKILLS (U)** |
| S2\_GMR\_U10 | *Principles and Application of InSAR and GIS in mining*Student can acquire and process digital spatial data from remote sensing and radar studies. The student can interpret and conclude on their basis using modern geoinformatics tools using GIS analytical functions. | P7U\_U | P7S\_UW | P7S\_UW1\_inżP7S\_UW2\_inż |
| S2\_GMR\_U11 | *Computer Aided Geological Modelling and Geostatistics*Student can use computer-aided tools for deposit modelling and mine design by current world standards. | P7U\_U | P7S\_UWP7S\_UU | P7S\_UW1\_inżP7S\_UW2\_inż |
| S2\_GMR\_U12 | *Project Management, Appraisal and Risk Evaluation*Student can plan a project using the Project Management methodology. The student knows how to prepare a schedule and control project implementation with the use of Microsoft Project software. | P7U\_U | P7S\_UWP7S\_UOP7S\_UK | P7S\_UW2\_inż |
| S2\_GMR\_U13 | *Engineering Geophysics*Student can plan measurements of geophysical quantities in the field. The student can carry out measurements and analyze them together with the interpretation of the obtained results. | P7U\_U | P7S\_UW | P7S\_UW1\_inż |
| S2\_GMR\_U14 | *Integrated Analysis of Deformations in Geomechanical Engineering*Student knows how to design and apply a geodetic deformation monitoring system. The student can measure deformation manually and in an automatic system. He/she can carry out a computer analysis of the measurement results along with the verification of calculations. The student can solve problems in the field of geomechanics with the use of FEM. | P7U\_U | P7S\_UWP7S\_UU | P7S\_UW2\_inż |
| S2\_GMR\_U15 | *Occupational Health and Safety*Student can carry out an occupational risk assessment for selected factors of the working environment with the use of computer tools. The student can independently develop the elements of work safety documents required by the provisions of the geological and mining law. | P7U\_U | P7S\_UWP7S\_UOP7S\_UK | P7S\_UW2\_inżP7S\_UW3\_inż |
| S2\_GMR\_U16 | *Applied Remote Sensing in Geosciences*Student can identify the types and properties of land cover and land use with the use of multispectral imaging and laser scanning data. | P7U\_U | P7S\_UW | P7S\_UW1\_inżP7S\_UW2\_inżP7S\_UW3\_inżP7S\_UW4\_inż |
| S2\_GMR\_U17 | *Underground Mine Surveying*Student has the ability to a practical selection of methods and application of techniques to monitor deformation in mining and construction engineering. The student can apply the theory of error propagation in the design and implementation of measurement campaigns. | P7U\_U | P7S\_UW | P7S\_UW1\_inżP7S\_UW2\_inżP7S\_UW3\_inżP7S\_UW4\_inż |
| S2\_GMR\_U18 | *Geomonitoring*Student has the ability to a practical selection of methods and application of techniques to monitor deformation in mining and construction engineering. | P7U\_U | P7S\_UW | P7S\_UW1 inż.P7S\_UW2 inż.P7S\_UW3 inż.P7S\_UW4 inż. |
| S2\_GMR\_U19 | *Operations Management*Student can apply and interpret basic decision models with the use of IT applications. | P7U\_U | P7S\_UWP7S\_UOP7S\_UU | P7S\_UW2\_inż |
| S2\_GMR\_U20 | *Geomodelling – Geostatistics for Natural Resource Modelling*Student can build a digital model of objects in a multidimensional space on the example of an economic model of a deposit according to alternative criteria and estimate its value.Student can use a diverse software environment to optimize the above digital models and present the results obtained. | P7U\_U | P7S\_UWP7S\_UK | P7S\_UW1\_inżP7S\_UW2\_inż |
| S2\_GMR\_U21 | *Special Topics Geokinematics*A student can solve current problems related to the forecasting and monitoring of rock movements caused by the extraction of minerals from deposits. A student can use the methods of inverse modelling to estimate the parameters of prognostic models based on the monitoring data. | P7U\_U | P7S\_UW | P7S\_UW1 inż.P7S\_UW2 inż.P7S\_UW3 inż.P7S\_UW4 inż |
| S2\_GMR\_U22 | *Applied Spatial Data Analysis and Modelling - Case Study*Student can independently create solutions for complex practical problems related to mining and geoengineering. To solve them, a student uses knowledge of geodesy, geoengineering, geotechnical engineering and engineering geology, and uses modern methods of geospatial data analysis, geomodelling and GIS systems. | P7U\_U | P7S\_UWP7S\_UK | P7S\_UW1 inż.P7S\_UW2 inż. |
| S2\_GMR\_U23 | *Geomatics for Mineral Resource and Reserve Management*Student can determine the resources and reserves of mineral resources according to international standards. Student can use the methods to monitor operational resources. | P7U\_U | P7S\_UWP7S\_UK | P7S\_UW1\_inżP7S\_UW2\_inż |
| S2\_GMR\_U24 | *Geomatics for Mineral Resource and Reserve Management* Student can use the tools of computer-aided modelling of deposits and designing mines by the current world standards. | P7U\_U | P7S\_UWP7S\_UK | P7S\_UW1\_inżP7S\_UW2\_inż |
| S2\_GMR\_U25 | *Reclamation*Student is qualified to scientifically explain reclamation measures, plan technical measures and calculate financial expenses. |  | P7S\_UW | P7S\_UW2\_inżP7S\_UW4\_inż |
| S2\_GMR\_U26 | *Human Resources Management & Organizational Behaviour*Student is competent in creating, assigning responsibilities and managing teams implementing various types of projects. A student can communicate effectively with representatives of various industries and communities as well as interact and work in a group. | P7U\_U | P7S\_UWP7S\_UK | P7S\_UW2\_inż |
| S2\_GMR\_U27 | Student can communicate effectively with representatives of different cultures and communities, interact and work in a multicultural group. | P7U\_U | P7S\_UK |  |
| S2\_GMR\_U28 | Student can use literature, databases and other sources. A student can plan and carry out experiments and computer simulations, interpret the obtained results and draw conclusions. | P7U\_U | P7S\_UWP7S\_UK |  |