

**AGH**AGH UNIVERSITY OF SCIENCE  
AND TECHNOLOGY

Module name: Mining geology

Academic year: 2019/2020 Code: BGES-2-205-EG-s ECTS credits: 3

Faculty of: Geology, Geophysics and Environmental Protection

Field of study: Applied Geology Specialty: Economic Geology

Study level: Second-cycle studies Form and type of study: Full-time studies

Lecture language: English Profile of education: Academic (A) Semester: 2

Course homepage: —

Responsible teacher: dr inż. Bielowicz Barbara (bbiel@agh.edu.pl)

## Module summary

Mining geology

## Description of learning outcomes for module

MLO code	Student after module completion has the knowledge/ knows how to/is able to	Connections with FLO	Method of learning outcomes verification (form of completion)
Skills: he can			
M_U001	Student is able to plan and perform sampling and estimate error value of sampling method	GES2A_U07	Project
M_U002	Student is able to estimate deposit resources and error value of estimation	GES2A_U10, GES2A_U09	Project
Knowledge: he knows and understands			
M_W001	Student have a knowledge on GY sampling method	GES2A_W05	Examination
M_W002	Student has a knowledge on international deposits classification	GES2A_W05, GES2A_W04	Examination

## Number of hours for each form of classes

Suma	Form of classes										
	Lectures	Auditorium classes	Laboratory classes	Project classes	Conversation seminar	Seminar classes	Practical classes	Fieldwork classes	Workshops	Prace kontrolne i przejściowe	Lektorat
30	15	0	0	0	0	0	15	0	0	0	0

## FLO matrix in relation to forms of classes

MLO code	Student after module completion has the knowledge/ knows how to/is able to	Form of classes										
		Lectures	Auditorium classes	Laboratory classes	Project classes	Conversation seminar	Seminar classes	Practical classes	Fieldwork classes	Workshops	Prace kontrolne i przejściowe	Lektorat
Skills: he can												
M_U001	Student is able to plan and perform sampling and estimate error value of sampling method	+	-	-	-	-	-	+	-	-	-	-
M_U002	Student is able to estimate deposit resources and error value of estimation	+	-	-	-	-	-	+	-	-	-	-
Knowledge: he knows and understands												
M_W001	Student have a knowledge on GY sampling method	+	-	-	-	-	-	+	-	-	-	-
M_W002	Student has a knowledge on international deposits classification	+	-	-	-	-	-	+	-	-	-	-

## Student workload (ECTS credits balance)

Student activity form	Student workload
Udział w zajęciach dydaktycznych/praktyka	30 h
Preparation for classes	15 h
przygotowanie projektu, prezentacji, pracy pisemnej, sprawozdania	15 h
Realization of independently performed tasks	15 h
Summary student workload	75 h
Module ECTS credits	3 ECTS

## Additional information

## Module content

### Lectures

Goals and methodology of mining geology. Classification of deposit models and methods of their reconnaissance. Geological mapping of deposits (direct and indirect). Sampling of deposit in underground workings, drill-holes, open pits, dumps (type of sampling: channel sampling – chip sampling – grab sampling – bulk sampling – drill core sampling, geometry and spacing of samples, Gy's theory of sampling, sampling errors). Deposit parameters (thickness, grade, bulk density, accumulation, geologic and value continuity, interpolation with inverse distance weighting methods, contouring). Statistical analysis of variability and reliability of parameters values (exploratory data evaluation, histograms, distributions, classic statistical parameters, linear correlation and regression, multiple regression). Ore – resources (reserves) evaluation by classical (traditional) methods (method of: sections, isolines, triangles, polygons, statistical). Introduction to geostatistical ore- resources (reserves) estimation (semivariograms, model fitting, point and block kriging, volume – variance relationship, selective mining units, grade – tonnage curve). Classification of resources and reserves of deposit (polish classification, JORC code, three-dimensional United Nations Framework Classification).

### Practical classes

Strategy of deposit sampling in underground workings and open pits. Sampling protocol. Calculation of fundamental errors according to Gy's formula. Assessment of random and systematic errors of sampling and assaying. Contour maps of deposits parameters using deterministic and geostatistical interpolators. Statistical characteristics of deposit parameters variability. Contouring of economic deposits in plane and vertical profile. Statistical and geostatistical methods of resource calculation, confidence intervals. Classical methods of resource estimation: methods of polygons, sections, isolines. Grade-tonnage curve.

### Field trip

Field trip to the bituminous coal mine allowing the students to become familiar with the duties of mining geologists, to measure stratigraphic sections, and collect the samples. The students are required to submit a field trip report.

### Teaching methods and techniques:

Lectures: Treści prezentowane na wykładzie są przekazywane w formie prezentacji multimedialnej w połączeniu z klasycznym wykładem tablicowym wzbogaconymi o pokazy odnoszące się do prezentowanych zagadnień.

Practical classes: Nie określono

### Warunki i sposób zaliczenia poszczególnych form zajęć, w tym zasady zaliczeń poprawkowych, a także warunki dopuszczenia do egzaminu:

Nie określono

### Zasady udziału w poszczególnych zajęciach, ze wskazaniem, czy obecność studenta na zajęciach jest obowiązkowa:

Lectures:

- Attendance is mandatory: No

- Participation rules in classes: Studenci uczestniczą w zajęciach poznając kolejne treści nauczania

zgodnie z syllabusem przedmiotu. Studenci winni na bieżąco zadawać pytania i wyjaśniać wątpliwości. Rejestracja audiowizualna wykładu wymaga zgody prowadzącego.

Practical classes:

- Attendance is mandatory: Yes
- Participation rules in classes: Nie określono

### **Method of calculating the final grade**

average grade from two projects and exam

### **Sposób i tryb wyrównywania zaległości powstałych wskutek nieobecności studenta na zajęciach:**

Nie określono

### **Prerequisites and additional requirements**

Student must have graduated ore petrology course.

### **Recommended literature and teaching resources**

1. Marjoribanks R., - Geological Methods in Mineral Exploration and Mining, 2010

### **Scientific publications of module course instructors related to the topic of the module**

Barbara BIELOWICZ, Jacek R. Kasiński (2014) - The possibility of underground gasification of lignite from Polish deposits /International Journal of Coal Geology ; vol. 131, s. 304-318.

Barbara BIELOWICZ (2012) - Petrographic composition of Polish lignite and its possible use in a fluidized bed gasification process / International Journal of Coal Geology ; vol. 116-117, s. 236-246.

Barbara BIELOWICZ (2012) - A new technological classification of low-rank coal on the basis of Polish deposits / Fuel : the science and technology of fuel and energy ; vol. 96, s. 497-510.

### **Additional information**

None