

**AGH**AGH UNIVERSITY OF SCIENCE
AND TECHNOLOGY

Module name: Mining CAD

Academic year: 2019/2020 Code: GIPZ-2-311-CP-s ECTS credits: 3

Faculty of: Mining and Geoengineering

Field of study: - Specialty: Controlling of production processes

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

Lecture language: English Profile of education: Academic (A) Semester: 3

Course homepage: —

Responsible teacher: dr inż. Skrzypkowski Krzysztof (skrzypko@agh.edu.pl)

Module summary

The module is connected with underground cut of useful minerals both hard coal, ore and salt. Module embraces a structure of prospecting, access, preparatory and exploitation excavations.

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)
Social competence: is able to			
M_K001	Student can chose the most appropriate panel mining system adapt to it schedule production.	IPZ2A_K03, IPZ2A_K01, IPZ2A_K02	Execution of a project, Participation in a discussion, Case study, Project, Test, Activity during classes
M_K002	Student can analyze different underground mining systems of exploitation.	IPZ2A_K03, IPZ2A_K01, IPZ2A_K02	Execution of a project, Participation in a discussion, Case study, Project, Test, Activity during classes
Skills: he can			
M_U001	Student can use the program for purpose to design underground exploitation system in ore mining.	IPZ2A_U02, IPZ2A_U01, IPZ2A_U04, IPZ2A_U03	Execution of a project, Participation in a discussion, Case study, Report, Project, Test, Activity during classes
M_U002	Student can use the program for purpose to design underground exploitation system in hard coal mine.	IPZ2A_U02, IPZ2A_U01, IPZ2A_U04, IPZ2A_U03	Execution of a project, Participation in a discussion, Case study, Report, Project, Test, Activity during classes
Knowledge: he knows and understands			

M_W001	Student knows mine design for room and pillar mining systems	IPZ2A_W04, IPZ2A_W01, IPZ2A_W03, IPZ2A_W05, IPZ2A_W02	Execution of exercises, Participation in a discussion, Case study, Test, Activity during classes
M_W002	Student knows mineable: shape optimizer, reserves optimizer and mine layout optimizer.	IPZ2A_W04, IPZ2A_W01, IPZ2A_W03, IPZ2A_W05, IPZ2A_W02	Execution of exercises, Participation in a discussion, Case study, Presentation, Test, Activity during classes

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	0	0	30	0	0	0	0	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
Social competence: is able to												
M_K001	Student can chose the most appropriate panel mining system adapt to it schedule production.	-	-	+	-	-	-	-	-	-	-	-
M_K002	Student can analyze different underground mining systems of exploitation.	-	-	+	-	-	-	-	-	-	-	-
Skills: he can												
M_U001	Student can use the program for purpose to design underground exploitation system in ore mining.	-	-	+	-	-	-	-	-	-	-	-
M_U002	Student can use the program for purpose to design underground exploitation system in hard coal mine.	-	-	+	-	-	-	-	-	-	-	-
Knowledge: he knows and understands												
M_W001	Student knows mine design for room and pillar mining systems	-	-	+	-	-	-	-	-	-	-	-

M_W002	Student knows mineable: shape optimizer, reserves optimizer and mine layout optimizer.	-	-	+	-	-	-	-	-	-	-	-
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Student workload (ECTS credits balance)

Student activity form	Student workload
Udział w zajęciach dydaktycznych/praktyka	30 h
Preparation for classes	14 h
przygotowanie projektu, prezentacji, pracy pisemnej, sprawozdania	14 h
Realization of independently performed tasks	15 h
Examination or Final test	1 h
Contact hours	1 h
Summary student workload	75 h
Module ECTS credits	3 ECTS

Additional information

Module content

Laboratory classes

Underground cut of deposit

Laboratory classes in the MineScape program provide state-of-the-art tools for the strategic planning of underground mining operations. During classes, students know how to maximise the system of exploitation.

Laboratory classes embrace:

1 - General informations about functions and modules in the MineScape program. 2 - Design data and import data from other graphics programs. 3 - Create specs, grid, graphic, surface, post, traingulations and blocks files. 4 - Draw points, lines, cross-sections, polygons. 4 - Create reggular and irregular forms of deposits. 5 - Create cross - sections from surfaces and solids with drawing auxiliary section lines. 6 - Drill holes profiles with elements of schema, setup and definition of display. 7 - Model of coal or ore deposit with taking into account the lithology, e.g. thickness, interlayer oraz a stucture inside MineScape program, e.g. elements and sequences. 8 - Create underground access, preparatory and exploitation excavations for longwall panel as well as room and pillar mining systems.

During classes, students know how to maximise the system of exploitation. Classes include mineable shape optimizer; automatically produces optimizer excavation design to maximize the value of recovered deposit within the given geometry and design constraints. It support a wide variety of underground mining methods and can quickly generate individual excavations designs within a resource model. Mining activities from three - dimensional design elements and sequences.

Teaching methods and techniques:

Laboratory classes: W trakcie zajęć laboratoryjnych studenci samodzielnie rozwiązują zadany problem praktyczny, dobierając odpowiednie narzędzia. Prowadzący stymuluje grupę do refleksji nad problemem, tak by otrzymane wyniki miały wysoką wartość merytoryczną.

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

Every two weeks a student performs a final task from individual project contents. In case of failure to obtain credit from part of the project, student has the opportunity to take the final pass, which is carried out in the last class.

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

Laboratory classes:

- Attendance is mandatory: Yes
- Participation rules in classes: Studenci wykonują ćwiczenia laboratoryjne zgodnie z materiałami udostępnionymi przez prowadzącego. Student jest zobowiązany do przygotowania się w przedmiocie wykonywanego ćwiczenia, co może zostać zweryfikowane kolokwium w formie ustnej lub pisemnej. Zaliczenie zajęć odbywa się na podstawie zaprezentowania rozwiązania postawionego problemu. Zaliczenie modułu jest możliwe po zaliczeniu wszystkich zajęć laboratoryjnych.

Method of calculating the final grade

Final mark: 70 % mark from project + 30 % mark from final test.

On the classes require 100% presence.

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

Absence in class can be made up by participating in classes of another group or by performing an additional task.

Prerequisites and additional requirements

Completed course: Technique of Underground Deposits Exploitation.

On the classes require 100% presence.

Recommended literature and teaching resources

1. Minescape Website: <http://new.abb.com/enterprise-software/intelligent-mining-solutions/minescape>
2. Hustrulid W.A., Bullock R.L., 2001: Engineering Fundamentals and International Case Studies.
3. Karzulovic A., Alfaro M., 2004: Mass Mining. Santiago, Chile.
4. Darling P., 2011: SME Mining Engineering Handbook. Third edition.
5. Possibilities of using MineScape software to analyze the model of cutting ore deposit / Krzysztof SKRZYPKOWSKI, Waldemar KORZENIOWSKI, Andrzej Gądek, Radosław Misiak. Scientific Papers of the Institute for Mineral Resources and Energy, Polish Academy of Sciences, 2018 nr 103, s. 91-102.

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

1. Skrzypkowski K., 2016: Determination of load for rock bolt support under conditions of underground exploitation of zinc and lead ores for shortwall-pillar system. Interdisciplinary topics in mining and geology (eds. Hardygóra, Bac-Bronowicz, Drzymała), Wrocław University of Science and Technology, Faculty of Geoengineering, Mining and Geology.
2. Skrzypkowski K., Korzeniowski W., 2016: Multilayer exploitation of zinc and lead ore deposits in "Olkusz-Pomorzany" mine. Selected issues related to mining and clean coal technology : monograph / eds. Marek Borowski, Justyna Swolkień ; AGH University of Science and Technology. Faculty of Mining and Geoengineering.
3. Skrzypkowski K., 2014: Transformation of method of mining of mineral deposits. W: Interdyscyplinarne zagadnienia w górnictwie i geologii, T. 5 / pod red. Jana Drzymały. — Wrocław : Wydział Geoinżynierii, Górnictwa i Geologii Politechniki Wrocławskiej, 2014. — ISBN: 978-83-937788-5-0. — S. 191-196. — Bibliogr. s. 195, Streszcz., Abstr.

4. Piechota S., Korzeniowski W., Skrzypkowski K., 2008: Mining methods with draw control used in hard coal mines. Mining review, t. 64 nr 6 s. 1-8.
5. Rak Z., Skrzypkowski K., Stasica J., 2014: Exploitation of thin deposits by means of rotary drilling method. Mining Review, t. 70 nr 2, s. 18-24.

Additional information

In case of absence, the student may make up class by performing additional tasks associated with the underground graphic exploitation of mineral deposits.