Code/Date	
Name	Geomechanics
Responsible	**Surname** Sdvyzhkova **Given Name** Olena **Academic Title** Prof.Dr
Lecturer(s)	**Surname** Sdvyzhkova **Given Name** Olena **Academic Title** Prof.Dr **Surname** Babets **Given Name** Dmytry **Academic Title** Assoc.Prof, PhD.
Duration	Three months
Competencies	The module provides the development of expertise and methodological skills in the field of rock mechanics. The students learn the theory and practical rock engineering to estimate the geomechanical situation and predict the behavior of rock mass in different geological terms. They will be qualified to simulate the rock stress-strain state and determine support parameters providing the effective mining and safety. Additionally the student will be qualified to carry out geomechanical monitoring to forecast the rock pressure manifestations.
Contents	Basics of continuum mechanics, strength theories and failure criterions, post-failure behavior of rocks, numerical simulation of rock stress-strain state, support loading, opening stability, safe factor and probability of failure, geomecanical processes at longwall mining, mining rate effect, dynamic manifestations of rock pressure, methods of observation in situ, rock mass properties and probability estimation of scale effect.
Literature	Rock mechanic (Novy druc, 2003), Rock Mechanics: For Underground Mining (Springer, 2004), Practical rock engineering (Balkema, 2007).
Types of Teaching	lecture 45h, exercises (30 h), practical training (15h).
Pre-requisites	Mathematic-scientific fundamentals, geology, basics of elasticity theory
Applicability	
Frequency	Schedule for duty courses during the 1 and 2 semester will be regulated by the academic commission together with the lecturer before the 1 semester beginning.
Requirements for Credit Points	Preconditions for module examination: submission and positive evaluation of module exercises and 2 homework. Module examination: written exams about course topics (120 minutes)
Credit Points	6
Grade	The grade for this module is the average grade of the written exam and 2 home works.
Workload	Time effort is 180 hours and consist of 90 h presence time and 90 h self-study (self-study includes autonomous and instructed preparation, home work and preparation for exams).

Code/Dates	
Name	Mineral Processing
Responsible	All involved lectures of the master course Ore Concentration and Technologies of Mineral Processing,
Duration	1 semester
Competencies	The students should get the ability to solve scientific tasks in the field of advanced mineral processing. They should be able to prepare a scientific presentation of its work and defend it in front of an audience. Ecological aspects also have to be considered in the work. The master thesis is a kind of examination which completes the entire course. The work is the proof, that the students are able to solve scientific problems by their own.
Contents	Analysis of literature and science works; testing geological equipments and methods for technological estimate of minerals; realization of calculations and numerical simulations; scientific analysis and generalization of the results (period of the months). Preparation of scientific work and paper in a colloquium (30 min oral presentation with discussion).
Literature	Guideline for the preparation of scientific works at TU Bergakademie Freiberg from 27.06.2005, DIN 1422, part 4 (08/1985); Hints for task-specific literature will be given.
Types of teaching	Lectures, laboratory and practical work, colloquium.
Pre-requisites	Proof of the successful conclusion of mandatory and optional modules (see study and examination regulations).
Applicability	Mandatory module and final part within the master course International Master of Science in Advanced Mineral Processing.
Frequency	Every year
Requirements for Credit Points	Positive assessments of the master thesis (as a rule by two examiners. First examiner is the responsible university lecturer, second examiner will be determined by the board of examiners, whereby the. First examiner has the right to propose the second one, the second examiner does not need to be a member of the university); successful defense of the work in a colloquium.
Credit Points	6
Grade	The overall grade for the cluster is a computed of the grade for thesis (weighting 2) and the grade for colloquium (weighting 1).
Workload	The total time budgeted for the module is set at approximately 180h (preparation of master thesis and colloquium).

Code/Dates	
Name	Modern geo-technology of open-cast mining
Responsible	**Surname** Cherep **First name** Andrii, **Academic Title** Associate Professor, PhD
Lecturer(s)	**Surname** Cherep **First name** Andrii, **Academic Title** Associate Professor, PhD **Surname** Lozhnikov **First name** Olexiy, **Academic Title** PhD
Duration	1 semester
Competencies	Students should be able to solve scientific problems related to rational and complex deposit development of open cast mining, to analyze and substantiate the selection of development system and mining and transport equipment, to systematize conditions according to which technogenic deposits are formed and to determine the technology of their formation.
Contents	The study of modern approaches to the selection of the rational development systems and mining and transport equipment in open cast mining. Complex development of open casts and the principles of technogenic deposits' formation. The classification of technogenic formations according to purpose, the systematization of conditions, the choice of effective technology of technogenic deposits' forming and their further mining.
Literature	Nauchnye osnovy ratsional'nogo prirodopol'zovaniya pri otkrytoi razrabotke mestorojdeniy: monografiya / Pivniak G., Gumenik I., Drebenstedt C., Panasenko A. - 2011. (Rus); Klassifikatsiya tehnogennykh formirovaniy pri otkrytykh gornykh rabotakh / Gumenik I. // Gorny jurnal. - 1988. - №12. - S. 53-56. (rus); Ekologiya girnychogo vyrobnytstva / Baka M., Gumenik I., Redchits. - 2004. (ukr); Formuvannya ta rozrobka takhnogennykh rodovysch / Gumenik I., Semeniy P. - 2012. (ukr)
Types of teaching	16 weeks course with exercises (lecture 32h, practical training 20h).
Prerequisites	Basic knowledge on mineral and their using in society, mineral prospecting and exploring, evaluation of deposits.
Applicability	
Frequency	Schedule for duty courses during the 1 and 2 semester will be regulated by the academic commission together with the lecturer before the beginning of the 1 semester.
Requirement for credit points	Written exams about course topics (120 minutes), 2 reports related to the exercises (RP1,RP2).
Credit points	3
Grade	The grade for his module is taken from non weighted average of the written exams and the two reports.
Workload	Work load is 90 hours, comprising 52 hours course time and 38 hours working at home. The latter comprises time for preparation and home work as well as preparation for exams.

Code/Dates	
Name	Underground construction
Responsible	Prof. Alexander V. Solodyankin, Prof. Alexander N. Shashenko, Assoc. Prof. Vladislav V. Kovalenko
Lecturer(s)	Prof. Alexander V. Solodyankin, Prof. Alexander N. Shashenko, Assoc. Prof. Vladislav V. Kovalenko
Duration	3 months
Competencies	Participants will receive knowledge of the comprehensive utilization of underground space, technologies of construction of underground facilities by open, underground and special methods of construction, the work organization, and the environmental aspects of underground construction. Participants will be able to take reasonable method of construction of the object, technology and equipment for construction of the object, to determine the basic parameters of the organization of work.
Contents	Peculiarities of interaction between society and nature at the present stage. Current status and problems of development of underground space. The interaction of an underground facility with the surrounding natural environment. Re-use of underground facilities and waste mine workings. The use of underground space of cities. Underground structures of the transport destination. Underground facilities for public use. Industrial underground structures. Buildings for Energy industry. Underground storage tanks. Facilities for special purposes. Integrated use of underground space.
Literature	B. Lysikov, L. Kaufmann. Underground structures, Nord-Press, Donetsk, 2005; L.Hall. Underground Buildings: more than meets the eye. Sander,CA, Quill Driver Books, 2004.; R.S.Sinha. Underground Structures: Design and Construction. New York, Elsevier. Pub. 1991 R. Sterling. Underground Space Design. New York, Van Nostrand Reinhold, 1993.
Types of Teaching	Lectures (22 hours), practical training (12 hours)
Pre-requisites	Basic knowledge of geomechanics and construction technology of underground workings
Applicability	International Master of Science in Advanced Mineral Resources Development
Frequency	The order of the course will be regulated by the academic commission together with lecturers before the beginning of the 3rd academic semester
Requirements for Credit Points	Written and oral exam on the topics of the course (120 min), the examination paper and a report on practical exercises
Credit Points	3
Grade	The grade for this module is taken from weighted average of the written exams and report proportionally to the hours spent on lectures and practical training
Workload	Work load for the course is 90 hours, of which 34 hours are spent in the class, 4 hours are devoted to consultations, 2 hours are spent on exam and 50 hours of are spent on self-study.

Code/Dates	
Name	Modern geotechnology of underground mining.
Responsible	**Surname** Kovalevs'ka **First name** Iryna **Academic Title** Prof.Dr.
Lecturer(s)	**Surname** Kovalevs'ka **First name** Iryna **Academic Title** Prof.Dr. **Surname** Dychkovs'kiy **First name** Roman **Academic Title** Cand.Sci.(Tech), Assoc.Prof.
Duration	One month.
Competencies	Participants will improve their basic knowledge with respect to new progressive technologies in underground mining, management of strain and stress state of the massif substantiation of rational parameters of various types of support and others.
Contents	Knowledge of new mining methods of mineral deposits extraction together with new methods of roof management during high rater of the longwall advance. Specific attention is given to mathematical simulation of the support functioning in development mine workings, study stress-strain state of the rock massif and development of new bolt support designs. Specific focus is given to unmanned mineral extraction technologies development using electro-hydraulic management systems of machinery. Plough systems are examined for coal extraction from thin and very thin seams. Analytical models describing geomechanical interaction "massif – support" system elements. Knowledge about boreholes underground gasification technology. Also research of gas hydrates and development of technologies for their extraction scrutinized.
Literature	New techniques and technologies in mining (Balkema, 2010). Technical and Geoinformational Systems in Mining (Balkema, 2011). Technology of underground mining of sheeted mineral deposits (Poligrafist,2003 Rus). Development of scientific bases of lifting the stability of mine excavations (Lizunov Pres, 2010 Rus). Methods of calculation displacement and strengthening of edge rock mining excavations (Lizunov Pres, 2010 Rus).
Types of Teaching	4 weeks course with exercises (lecture 35h, practical training 10h).
Pro – requisites	Basic knowledge on mineral and their using in society, mineral prospecting and exploring, evaluation of deposits.
Applicability	
Frequency	Schedule for duty courses during the 1 and 2 semester will be regulated by the academic commission together with the lecturer before the beginning of the 1 semester.
Requirements for Credit Points	Written exams about course topics (120 minutes), 2 reports related to the exercises (RP1,RP2) and one homework.
Credit Points	3
Grade	The grade for his module is taken from non weighted average of the written exams and the two reports.
Workloads	Work load is 90 hours, comprising 45 hours course time and 45 hours working at home. The latter comprises time for preparation and home work as well as preparation for exams.

Code/Dates	
Name	Technical and Economic Assessment of Mining and Post Mining
Responsible	**Surname** Bardas **First name** Artem **Academic Title** Prof. Dr.
Lecturer	**Surname** Bardas **First name** Artem **Academic Title** Prof. Dr.
Duration	4 month
Competencies	Participants will improve their knowledge of economic assessment of mining and post mining with respect to reclamation of post mining territory, utilization of mine water, usage of mine workings and extracted rocks during the exploitation period of coal mines and after it.
Contents	Pros and cons of mining on new territories. Evaluation of potential losses and incomes of mining project realization. Calculation of mining project costs. Choice of mining technique on mineral deposit's design stage. Economic assessment of managerial decisions during the pit closure stage. Elimination of mining enterprises and their transformation in ecologically sustainable systems.
Literature	Bosson, R., Varon, B. Mining industry and the developing countries. [excludes fuel sources and construction materials], Oxford University Press,New York, 2008, 304 ; Sweigard, R.J. , Ramani, R.V. A regional comparison of postmining land use practices (1983); Rebecca A. Adler, Marius Claassen, Linda Godfrey, and Anthony R. Turton, Water, mining, and waste: an historical and economic perspective on conflict management in South Africa, The Economics of Peace and Security Journal, ISSN 1749-852X Adler, Claassen, Godfrey, and Turton, Water, mining, waste: South Africa p. 33 – Vol. 2, No. 2 (2007)
Types of Teaching	16 weeks course with exercises (lecture 40h, practical training 40h)
Pre-requisites	Basic knowledge of environmental economics
Applicability	
Frequency	
Requirement for credit points	Written exam about course topics, report and two essays
Credit points	6
Grade	The grade for this module is taken from non weighted average of the written exam, report and two essays
Workload	Workload is 180 hours, comprising 80 hours course time and 100 hours working at home. The latter comprises time for preparation and homework as well as preparation for exams.

Code/Dates	
Name	Legal Issues of Environment
Responsible	**Surname** Shashenko **First name** Dmytro **Academic Title** Associate Prof.
Lecturer(s)	**Surname** Grischak **First name** Sergei **Academic Title** Associate Prof. **Surname** Shashenko **First name** Dmytro **Academic Title** Associate Prof.
Duration	3 months.
Competencies	Participants will improve their basic knowledge with respect to issues of the environmental law in mining in EU, Ukraine, Russian Federation.
Contents	Analysis and characteristics of the EU environmental policy influence to the legal issues of the mining industry. Targets, principles and requirements of environmental law. Legal protection. Access to information, public participation in decision-making and access to justice in environmental matters. Conformance inspection and environmental liability. Environmental protective power. Industrial objects. Transportation gas emissions. Ozone protection and climate change. Water protection. Integrated waste management. Regulation of production circulation. EU in International Environmental Law and Policy.
Literature	Dhondt Nele. Integration of Environmental Protection into other EC Policies. Legal Theory and Practice. Groeningen; Europa Law Publishing, 2003. Hedemann-Robinson Martin. Enforcement of European Union Environmental Law:
Types of Teaching	12 weeks course with exercises (lecture 20h, practical training 10h).
Pro – requisites	Basic knowledge on mineral and their using in society, environmental law, legal issues of the mining industry.
Applicability	
Frequency	Schedule for duty courses during the 1 and 2 semester will be regulated by the academic commission together with the lecturer before the beginning of the 1 semester.
Requirements for Credit Points	Written exams about course topics (120 minutes), 1 reports related to the exercises (RP1) and one homework.
Credit Points	2,5
Grade	The grade for his module is taken from non weighted average of the written exams and the one reports.
Workloads	Work load is 75 hours, comprising 30 hours course time and 45 hours working at home. The latter comprises time for preparation and home work as well as preparation for exams.