MODULE HANDBOOK

2020

MINING ENGINEERING DEPARTMENT
FACULTY OF ENGINEERING
HASANUDDIN UNIVERSITY

Course Module

INDONESIAN LANGUAGE

Module identification code	009U0032
Semester(s) in which the module is taught	1st Semester
Person responsible for the module	1. Dr. Kaharuddin, M.Hum. 2. Andi Meirling AJ, S.S., M.Hum. 3. Ravika, S.S., M.Hum. 4. Nursamsilis Lutfin, S.S., M.Pd. 5. Drs. St. Nursa'adah
Lecturer	1. Dr. Kaharuddin, M.Hum. 2. Andi Meirling AJ, S.S., M.Hum. 3. Ravika, S.S., M.Hum. 4. Nursamsilis Lutfin, S.S., M.Pd. 5. Drs. St. Nursa'adah
Type of teaching	Teaching methods used in this course are: o Lectures, Collaborative Learning, Small Groups, Contextual Teaching and Learning Discussion and Reviewing the results of each lecture; o Structured assignments (i.e., essays and case study).
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	-
Intended learning outcomes	**Attitude** To internalize academic value, norm, and ethic, also to effectively communicate in community life. (ILO-01)
Course Learning Objective	1. Able to do oral communication effectively using Bahasa 2. Able to write Scientific Writing by applying good and correct Indonesian language rules according to the Indonesian Spelling Guidelines (EYD)
Module content	Learning achievements in Indonesian Language courses are expected to be able to make Scientific Papers by applying good and correct Indonesian language rules according to the Indonesian Spelling Guidelines.
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 70% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Forms of assessment	Assessment is carried out based on written examinations, assessment/evaluation of the learning process and performance with the following components: Presence: 5% Structured tasks: 10% Practical tasks: 10% Mid Test: 35% Final Test: 40%
Recommended literature	Chaer, Abdul. 2006. Tata Bahasa Praktis Bahasa Indonesia. Jakarta:Rineka Cipta. Anggaraini, Asih, dkk.2006. Mengasah Keterampilan Menulis Ilmiah di Perguruan Tinggi. Yogyakarta:Graha Ilmu.

	Wiyanto, Asul. 2004. Terampil Menerapkan Kaidah Ejaan Bahasa Indonesia. Jakarta. Grasindo. Finoza, Lamuddin.2001. Komposisi Bahasa Indonesia. Jakarta: Diksi Insan Mulia. Sri Nugraheni, Aninditya dan Muhammad Rohmani. 2011. Belajar Bahasa Indonesia: Upaya Terampil Berbicara dan Menulis Karya Ilmiah. Surakarta: Cakra Media. Widjono H. S. 2005. Bahasa Indonesia. Jakarta: PT Grasindo.
Date of last amendment made	

Course Module **CIVIC EDUCATION**	
Module identification code	011U0032
Semester(s) in which the module is taught	1st Semester
Person responsible for the module	Dr. Safriadi, S.IP., M.Si.
Lecturer	1. Dr. Safriadi, S.IP., M.Si. 2. Dr. A. Lukman Irwan, S.IP. 3. Dr. Rahman Saeni 4. Andi Naharuddin, S.IP., M.Si. 5. Dr. Abd Asis, S.H., M.H. 6. Rahmatullah, S.IP., M.Si.
Type of teaching	Teaching methods used in this course are: o Lecture (i.e., case study) o Group discussion (i.e., case study) o Structured assignments (i.e., essays and case study)
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 credits
Prerequisites	-
Intended learning outcomes	**Attitude** To internalize academic value, norm, and ethic, also to effectively communicate in community life. (ILO-01)
Course Learning Objective	1. Able to display behavior that supports the spirit of nationalism and love for the homeland. 2. Able to display behavior that supports civilized democracy. 3. Able to display behavior that supports legal awareness and diversity.
Module content	1. National identity 2. Constitutional System 3. National Politics and Strategy 4. Democracy 5. Human rights 6. Rule of Law 7. Rights and Obligations of Citizens 8. Geopolitics and Archipelago Insight 9. Geostrategy and National Resilience
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 70% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Exam: Power point presentation.
Forms of assessment	Assessment is carried out based on written examinations, assessment / evaluation of the learning process and performance with the following components: Presence: 5% Structured tasks: 10% Practical tasks: 10% Mid Test: 35% Final Test: 40%

Recommended literature	Nurwardani, dkk, (2016). Pendidikan Kewarganegaraan untuk Perguruan Tinggi. Jakarta: Direktorat Jenderal Pembelajaran dan Kemahasiswaan Kementerian Riset, Teknologi, dan Pendidikan Tinggi Republik Indonesia. Tim Dosen Pend. Kewarganegaraan, (2014), Modul Pembelajaran Penddikan Kewarganegaraan, UPT MKU Unhas. Sammy ferrijayan, dkk, (2014), Modul Wawasan Kebangsaan dan Nilai-Nilai Dasar Bela Negara, Lembaga Administarsi Negara RI.
Date of last amendment made	

Course Module **RELIGION**	
Module identification code	001U0032
Semester(s) in which the module is taught	2nd Semester
Person responsible for the module	Haeriyyah, S.Ag., M.Pd.I
Lecturer	1. Haeriyyah, S.Ag., M.Pd.I. 2. Muhammad Ridwan, S.S., M.A.
Type of teaching	Teaching methods used in this course are: o Interactive Lecture (i.e., group investigation, small group discussion, and case study), o Collaborative learning (i.e., group assignment and presentation), o Structured assignments and private study (i.e., homework)
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	-
Intended learning outcomes	**Attitudes** To internalize academic value, norm, and ethic, also to effectively communicate in community life. (ILO-01)
Course Learning Objective	1. Student are able to perform good attitude (humanity, tolerance, and pluralism) based on his/her religion. 2. Student are able to understand and obey the law and discipline in multi-religious society.
Module content	Godhead in Islam, Humans according to Islam, Islam Religion, The Concept of Law and Human Rights, Moral Ethics and Morals, Science and Technology in Islam, Islam and Plurality, Civil Society and Welfare Society, Islamic Culture, Political System and Democracy, and Islam for the Discipline of Science.
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 70% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Forms of assessment	Assessment is carried out based on written examinations, assessment / evaluation of the learning process and performance with the following components: Presence: 15% Structured and Practical tasks: 20%, Quiz:15%, Mid Test: 25% Final Test: 25%
Recommended literature	
Date of last amendment made	

Course Module **ENGLISH**	
Module identification code	010U0032
Semester(s) in which the module is taught	2nd Semester
Person responsible for the module	Dra. Fransisca Kapoyos, M.Hum.
Lecturer	Dra. Fransisca Kapoyos, M.Hum.
Type of teaching	Teaching methods used in this course are: o Lectures, Collaborative Learning, Small Groups, Contextual Teaching and Learning Discussion and Reviewing the results of each lecture; o Structured assignments (i.e., essays and case study).
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	-
Intended learning outcomes	**Attitude** To internalize academic value, norm, and ethic, also to effectively communicate in community life. (ILO-01)
Course Learning Objectives	1. Student are able to do oral communications effectively using English Language. 2. Students are able to read and write scientific literature.
Module content	Implementation of learning is dominated by direct practice in the form of reading and discussion exercises. Lecturers act as facilitators and guide the course of the learning process. Meetings 1 to 7 are filled with exercises on Scanning, Previewing and Predicting, Skimming, Topics, and Main Ideas. The 8th Meeting is the Midterm Exams. The 9th Meeting to 13 was filled with exercises and discussions about Patterns of Organization and Inferences. The 14-15 meeting was filled with a review of the overall material in the form of presentations and exercises. This is also a preparation for taking the Final Examination Semester at the 16th meeting.
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 70% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Forms of assessment	Assessment is carried out based on written examinations, assessment / evaluation of the learning process and performance with the following components: Presence: 5% Structured tasks: 10% Practical tasks: 10% Mid Test: 35% Final Test: 40%
Recommended literature	“More Reading Power” oleh Beatrice S. Mikulecky & Linda Jeffries
Date of last amendment made	

Course Module **PANCASILA**	
Module identification code	012U0032
Semester(s) in which the module is taught	2nd Semester
Person responsible for the module	Rahmatullah, S.IP, M.Si
Lecturer	1. Rahmatullah, S.IP, M.Si 2. Dr. Wahyudi, M.Si 3. Dr. Sakaria, M.Si 4. Dr. Safriadi, M.Si 5. Ashar Prawitno, S.IP, M.Si
Type of teaching	Teaching methods used in this course are: o Lecture (i.e., case study) o Group discussion (i.e., case study) o Structured assignments (i.e., essays and case study)
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	-
Intended learning outcomes	**Attitude** To internalize academic value, norm, and ethic, also to effectively communicate in community life. (ILO-1)
Course Learning Objectives	1. Able to implement the values of Pancasila in the life of the nation and state through the application of science and technology.
Module content	1. Pancasila education in college 2. Pancasila in the History of the Indonesian Nation 3. Pancasila as a Philosophy System 4. Pancasila as the State Foundation 5. Pancasila as the State Ideology 6. Pancasila in the Context of State Administration 7. Pancasila as the Ethics System 8. Pancasila as the Basis for the Development of Science
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 70% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Exam: Power point presentation
Forms of assessment	Assessment is carried out based on written examinations, assessment / evaluation of the learning process and performance with the following components: Presence: 5% Structured tasks: 10% Practical tasks: 10% Mid Test: 35% Final Test: 40%
Recommended literature	Direktorat Jenderal Pendidikan Tinggi, 2016. Materi Ajar Mata Kuliah Pendidikan Pancasila. Jakarta: Direktorat Pembelajaran dan Kemahasiswaan. Notonagoro. 1994. Pancasila Secara ilmiah Populer. Jakarta: Bumi Aksara.

	Kaelan. 2000. Pendidikan Pancasila. Yogyakarta: Paradigma. Yudi Latif. 2017. Negara Paripurna. Jakarta: Gramedia Anwar Arifin. 2018. Pancasila Ideologi Tengah tanpa Oposisi. Jakarta: Nufa Citra Mandiri.
Date of last amendment made	

Course Module

KNOWLEDGE, TECHNOLOGY, AND SOCIAL PERSPECTIVE

Module identification code	008U0032
Semester(s) in which the module is taught	1st Semester
Person responsible for the module	MKU course team
Lecturer	MKU course team
Type of teaching	Teaching methods used in this course are: o Lecture (i.e., group investigation, small group discussion, case study, and video-based learning) o Structured assignments (i.e., essays and case study) o Practice (i.e., computer simulation and case study in industry)
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	-
Intended learning outcomes	**Attitude** To internalize academic value, norm, and ethic, also to effectively communicate in community life. (ILO-01)
Course Learning Objectives	1. Able to explain problems related to the substance of science and technology according to the vision and mission of Unhas. 2. Able to present the right issues in the selection of alternative actions based on the science and technology code of ethics.
Module content	1. Introduction to Science and Technology Insights, 2. Humans and the Universe, 3. Science, 4. Development of Science, 5. Technology, 6. Relationship between Science and Technology, 7. Technology Development, 8. Impact of Science and Technology development in various fields, 9. Integrity and Ethics of Science and Technology
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 70% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay

Forms of assessment	Assessment is carried out based on written examinations, assessment/evaluation of the learning process and performance with the following components: Presence: 5% Structured tasks: 10% Practical tasks: 10% Mid Test: 35% Final Test: 40%
Recommended literature	Kasim, S. 2017. Filosofi Wawasan Ipteks (Buku Ajar Unhas). ISBN: 978-602-6332-12-7. Pustaka Pena Press. Makassar. Tim Dosen Wawasan Ipteks Unhas, 2013, Buku Ajar Wawasan Ipteks UPT MKU UNHAS, Edisi ke 6. Unhas, Makassar. Usman, H., dkk. 2014. Buku Ajar Wawasan Ipteks (Menggunakan Pendekatan Learning). UPT MKU UNHAS. ISBN: 978-602-99757-8-9. Percetakan Offset CV. Gelora. Makassar.
Date of last amendment made	

Course Module

SOCIAL AND CULTURE MARITIME PERSPECTIVE

Module identification code	007U0032
Semester(s) in which the module is taught	2nd Semester
Person responsible for the module	Dr. Munsi Lampe, M.A.
Lecturer	1. Dr. Munsi Lampe, M.A. 2. Dr. Safriadi, M.Si. 3. Ahmad Ismail, S.Sos., M.Si.
Type of teaching	Teaching methods used in this course are: o Lecture (i.e., case study) o Group discussion (i.e., case study) o Structured assignments (i.e., essays and case study)
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	-
Intended learning outcomes	**Attitude** To internalize academic value, norm, and ethic, also to effectively communicate in community life. (ILO-01)
Course Learning Objectives	1. Able to explain the geographical conditions of the archipelago (maritime) 2. Able to explain the living conditions of coastal residents and the type of maritime economy.
Module content	
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 70% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Exam: Power point presentation
Forms of assessment	Assessment is carried out based on written examinations, assessment / evaluation of the learning process and performance with the following components: Presence: 5% Structured tasks: 10% Practical tasks: 10% Mid Test: 35% Final Test: 40%
Recommended literature	
Date of last amendment made	

Course Module **BASIC PHYSICS I**	
Module identification code	020U0033
Semester(s) in which the module is taught	1st Semester
Person responsible for the module	MKU course team
Lecturer	MKU course team
Type of teaching	Teaching methods used in this course are: o Lecture (i.e., group investigation, small group discussion, case study, and video-based learning) o Structured assignments (i.e., essays and case study) o Practice
Workload	1. Lecture: o Class meeting; 16 x 3 x 50 minutes. o Structured assignments; 16 x 3 x 60 minutes. o Self-learning; 16 x 3 x 60 minutes. 2. Total workload = 8160 minutes.
Credit points	3 Credit
Prerequisites	-
Intended learning outcomes	**Knowledge and Competence** 1. To understand basic principles of geology, mathematics, physics, and chemistry, regarding the area of engineering. (ILO-02) 2. To be able to integrate principles of physics and mathematics in reviewing mining geomechanics. (ILO-08) 3. To be able to integrate concept of ecotechnology in developing technical design of coal and mineral. (ILO-10)
Course Learning Objectives	1. Able to complete the kinematics and dynamics of particles calculation 2. Able to complete fluid mechanics calculations.
Module content	1. Magnitude and Unit 2. Particle Kinematics 3. Particle Dynamics 4. Work and Energy 5. Linear momentum and collision 6. Angular Momentum and Inertia 7. Harmonic oscillator 8. Material Elasticity 9. Fluid Statistics 10. Fluid Dynamics 11. Temperature and Heat 12. The Law of Thermodynamics
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 70% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Forms of assessment	Assessment is carried out based on written examinations, assessment/evaluation of the learning process and performance with the following components: Presence: 5% Structured tasks: 10% Practical tasks: 10% Mid Test: 35% Final Test: 40%

Recommended literature	TIM Dosen Fisika-FMIPA, Fisika Dasar 1, Edisi Pertama, Makassar 2010 Halliday & Resnick, Fisika Jilid 1, Terjemahan (Erwin Sucippto & Pantur Silaban), Jakarta, Erlangga 1994
Date of last amendment made	

Course Module **BASIC PHYSICS II**	
Module identification code	022U0033
Semester(s) in which the module is taught	2nd Semester
Person responsible for the module	MKU course team
Lecturer	MKU course team
Type of teaching	Teaching methods used in this course are: o Lecture (i.e., group investigation, small group discussion, case study, and video-based learning) o Structured assignments (i.e., essays and case study) o Practice
Workload	1. Lecture: o Class meeting; 16 x 3 x 50 minutes. o Structured assignments; 16 x 3 x 60 minutes. o Self-learning; 16 x 3 x 60 minutes. 2. Total workload = 8160 minutes.
Credit points	3 Credit
Prerequisites	-
Intended learning outcomes	**Knowledge and Competence** 1. To understand basic principles of geology, mathematics, physics, and chemistry, regarding the area of engineering. (ILO-02) 2. To be able to integrate principles of physics and mathematics in reviewing mining geomechanics. (ILO-08) 3. To be able to integrate concept of ecotechnology in developing technical design of coal and mineral. (ILO-10)
Course Learning Obejctives	1. Able to understand Electrical and Magnetic Concept. 2. Able to demonstrate in laboratory Electrical and Magnetic.
Module content	1. Vector Analysis: Definition of vectors, addition, subtraction and vector multiplication 2. Coulomb's Law: Coulomb's Law, Electric Field, Gauss's Law and practice exercises 3. Electric potential: The general form of electrical potential, the electrical potential of various charge distributions, capacitance capacitors and exercises the questions 4. Electric Current and Ohm's Law: Force of electric current, electric current in metal, Ohm's law, Joule's law and practice questions 5. Direct Current Circuits: Series and parallel resistor circuits, Kirchoff's law and loop analysis, practice exercises 6. Magnetic Force and Field: Magnetic flux, magnetic force on moving charges, Biot-Savart law, Ampere's law, material properties magnets, practice questions 7. Electric Impact Force: Faraday and Lenz's induction laws, inductance, transformer, energy stored in a magnetic field, practice questions 8. Alternating current circuit: Sinusoidal voltage, R-C-L component in AC circuit, R-C-L series and parallel circuit, resonance in the R-C-L series circuit, problem practice 9. Waves: The propagation of waves on ropes, water waves, sound waves, electromagnetic waves, practice exercises 10. General Characteristics of Waves: The principle of superposition, interference, diffraction, interference with the thin film, question exercises 11. Geometry Optics: Reflections on mirrors, velocity of shadows on reflections on mirrors, refraction on lenses, practice questions 12. Introduction to Modern Physics: The consequences of special relativity, thermal radiation, the nature of dualism, the Compton effect, the photoelectric effect

Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 70% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Forms of assessment	Assessment is carried out based on written examinations, assessment / evaluation of the learning process and performance with the following components: Presence: 5% Structured tasks: 10% Practical tasks: 10% Mid Test : 35% Final Test: 40%
Recommended literature	Tim Pengajar Fisika Dasar II: Diktat Kuliah Fisika Dasar II , Jurusan fisika FMIPA UNHAS,Makassar Renreng.H. A,1985: Asas-asas Ilmu Alam Universitas Jilid II" LEPHAS, Makassar Halliday. D and Resnick. R, 1992:" Fisika Jilid II' (terjemahan : P. Silaban dan E.Sucipto),Ed.3 Erlangga, Surabaya
Date of last amendment made	

Course Module

BASIC MATHEMATICS I

Module identification code	016U0033
Semester(s) in which the module is taught	1st Semester
Person responsible for the module	A. Kresna Jaya, S.Si., M.Si.
Lecturer	1. A. Kresna Jaya, S.Si., M.Si. 2. Naimah Aris, S.Si., M.Math. 3. Dr. Erna Tri Herdiani, S.Si., M.Si.
Type of teaching	Teaching methods used in this course are: o Interactive Lecture, o Small Group Discussion, o Demonstration, o Collaborative Learning, o Project based Learning, o Practice, Presentation.
Workload	1. Lecture: o Class meeting; 16 x 3 x 50 minutes. o Structured assignments; 16 x 3 x 60 minutes. o Self-learning; 16 x 3 x 60 minutes. 2. Total workload = 8160 minutes.
Credit points	3 Credit
Prerequisites	-
Intended learning outcomes	**Knowledege and Competence** 1. To understand basic principles of geology, mathematics, physics, and chemistry, regarding the area of engineering. (ILO-02) 2. To be able to apply principles of economics, management and valuation techniques in planning and managing mineral and coal resources. (ILO-07)
Course Learning Objectives	1. Able to explain the basic concepts of calculus and algebra in real number systems, functions, limit functions, derivatives and integrals.
Module content	1. Real Numbers 2. Functions 3. Limits 4. The derivative 5. The definite integral 6. Applications of the integral
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 70% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Forms of assessment	Assessment is carried out based on written examinations, assessment/evaluation of the learning process and performance with the following components: Presence: 15% Structured and practical tasks: 20%, Quiz:15%, Mid Test: 25% Final Test: 25%
Recommended literature	” Calculus Early Transcendentals, Sixth edition”, Thomson Brooks/Cole, James Stewart, 2015. Calculus. 9th edition, Dale Varberg, Edwin Purcell, Steve Rigdon, 2011.
Date of last amendment made	

Course Module **BASIC MATHEMATICS II**	
Module identification code	017U0033
Semester(s) in which the module is taught	2nd Semester
Person responsible for the module	Andi Kresna Jaya, S.Si., M.Si
Lecturer	1. Andi Kresna Jaya, S.Si., M.Si 2. Naimah Aris, S.Si., M.Math 3. Supri Amir, S.Si., M.Eng 4. Dr. Erna Tri Herdiani, S.Si., M.Si 5. Dr. Muhammad Zakir, M.Si 6. Dra. Nasrah Sirajang, M.Si
Type of teaching	Teaching methods used in this course are: o Interactive Lecture, o Small Group Discussion, o Demonstration, o Collaborative Learning, o Project based Learning, o Practice, o Presentation
Workload	1. Lecture: o Class meeting; 16 x 3 x 50 minutes. o Structured assignments; 16 x 3 x 60 minutes. o Self-learning; 16 x 3 x 60 minutes. 2. Total workload = 8160 minutes.
Credit points	3 Credit
Prerequisites	-
Intended learning outcomes	**Knowledege and Competence** 1. To understand basic principles of geology, mathematics, physics, and chemistry, regarding the area of engineering. (ILO-02) 2. To be able to apply principles of economics, management and valuation techniques in planning and managing mineral and coal resources. (ILO-07)
Course Learning Objectives	1. Able to complete integral, vector, and matrix calculations.
Module content	1. Functions of several variables 2. Limit and continuity 3. Derivative and Integral in the n-dimensional space 4. Taylor series and Extreme Function 5. Double integral and Polar coordinate system 6. Triple Integral and Geometry on space 7. Vectors and Matrices 8. Linear Equations systems 9. Differential equations and Application of calculus in mining engineering
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 70% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay

Forms of assessment	Assessment is carried out based on written examinations, assessment / evaluation of the learning process and performance with the following components: Presence: 15% Structured and practical tasks: 20%, Quiz:15%, Mid Test : 25% Final Test: 25%
Recommended literature	James Stewart, 2008, Calculus Early Transcendentals, Thompson Brooks/Cole Dale Varberg, Edwin Purcell, Steve Rigdon, 2006, Calculus, Pearson
Date of last amendment made	

Course Module

BASIC CHEMISTRY

Module identification code	024U0033
Semester(s) in which the module is taught	1st Semester
Person responsible for the module	1. Dr. Rugaiyah A., M.Si. 2. Drs. Fredryk Mandey, M.Sc. 3. Abdur Rahman Arif, S.Si., M.Si.
Lecturer	1. Dr. Rugaiyah A., M.Si. 2. Drs. Fredryk Mandey, M.Sc. 3. Abdur Rahman Arif, S.Si., M.Si.
Type of teaching	Teaching methods used in this course are: o Lectures, Collaborative Learning, Small Groups, Contextual Teaching and Learning Discussion and Reviewing the results of each lecture; o Structured assignments (i.e., essays and case study).
Workload	1. Lecture: o Class meeting; 16 x 3 x 50 minutes. o Structured assignments; 16 x 3 x 60 minutes. o Self-learning; 16 x 3 x 60 minutes. 2. Total workload = 8160 minutes.
Credit points	3 Credit
Prerequisites	-
Intended learning outcomes	**Knowledge** To understand basic principles of geology, mathematics, physics, and chemistry, regarding the area of engineering. (ILO-02)
Course Learning Objectives	1. Able to understand and explain the atomic structure, periodic table, stoichiometry and chemical reaction. 2. Able to understand and explain the basic principles of chemical thermodynamics, chemical kinetics, and electrochemistry in chemical reaction. 3. Able to understand and explain the properties of organic compounds and their derivatives and biomolecular compounds.
Module content	Basic Chemistry is a compulsory course that provides students with knowledge and understanding of basic chemical concepts for thinking critically and analytically about atomic structure, periodic systems, chemical bonds, stoichiometry, solutions, chemical and acid-base equilibrium, chemical thermodynamics, chemical kinetics, electrochemistry, organic compounds, and biomolecular, as well as being able to apply the principles of chemistry in other fields.
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 70% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Forms of assessment	Assessment is carried out based on written examinations, assessment/evaluation of the learning process and performance with the following components: Presence: 5% Structured tasks: 10% Practical tasks: 10% Mid Test: 35% Final Test: 40%
Recommended literature	Brady, J., Jespersen, N., Hyslop J., 2015, Chemistry, Seventh Edition, Wiley, Singapore.

	Tim Dosen Kimia Universitas Hasanuddin, 2011, Kimia Dasar, Unit Pelaksana Teknis-MKU, Universitas Hasanuddin, Makassar. Tim Dosen Kimia, 2013, Kimia Organik, Unit Pelaksana Teknis-MKU, Universitas Hasanuddin, Makassar David L. Nelson, Michael M.Cox, 2005, Lehninger; Principles of Biochemistry, W.H. Freeman Company.
Date of last amendment made	

Course Module **PHYSICAL GEOLOGY**	
Module identification code	103D6212
Semester(s) in which the module is taught	1st Semester
Person responsible for the module	Dr. Ir. Irzal Nur, MT.
Lecturer	1. Dr. Ir. Irzal Nur, MT. 2. Dr. Sufriadin ST., MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., group investigation, small group discussion, case study, and video-based learning) o Structured assignments o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Practical; o Laboratory or field activity 3 x 100 minutes o Self-learning: 3 x 70 minutes- 3. Total workload = 5950 minutes.
Credit point	2 credits
Prerequisites	-
Intended learning outcomes	**Knowledge** To understand basic principles of geology, mathematics, physics, and chemistry, regarding the area of engineering. (ILO-02)
Course Learning Outcome	1. Able to describe theory of earth formation structure and composition as well as plate tectonic theory 2. Able to explain mechanism of earthquake, volcanism, and mountain formation 3. Able to describe the coastal process and ocean floor morphology 4. Able to explain weathering process and classification of mass movement
Module content	1. Earth formation theory. 2. Earth's structure and composition. 3. Plate tectonics theory. 4. Earth quake. 5. Volcano activity. 6. Mountain formation. 7. Costal and waves. 8. Ocean floor morphology. 9. Weathering and slope stability.
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 70% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written o Midterm exam – written

	○ Final exam – written and/or oral
Recommended literature	Borrero, F., Hess, F.S., 2008.Earth Science, Geology, The Environment and The Universe, The McGraw-Hill Companies, Inc. Hamblin, W.K., 1982. The Earth's Dynamic Systems; 3rd Edition. Minesotta. Monro, J.S., Wicander, R., Hazlett, R. 2007. Physical Geology Exploring the Earth, 9th Edition, Thomson BrooksUnited States of America
Date of last amendment made	

Course Module **MINERALOGY**	
Module identification code	104D6223
Semester(s) in which the module is taught	2nd Semester
Person responsible for the module	Dr. Ir. Irzal Nur, MT.
Lecturer	1. Dr. Ir. Irzal Nur, MT. 2. Dr. Sufriadin ST., MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., group investigation, small group discussion, case study, and video-based learning) o Structured assignments o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 3 x 50 minutes. o Structured assignments; 16 x 3 x 60 minutes. o Self-learning; 16 x 3 x 60 minutes. 2. Practical; o Laboratory or field activity 3 x 100 minutes o Self-learning: 3 x 70 minutes- 3. Total workload = 8670 minutes.
Credit point	3 credits
Prerequisites	Physical Geology
Intended learning outcomes	**Knowledge** To understand basic principles of geology, mathematics, physics, and chemistry, regarding the area of engineering. (ILO-02)
Course Learning Objectives	1. Able to describe crystal system 2. Able to describe physical properties of minerals and systematic of mineralogy
Module content	1. Cristallography. 2. Chemical bond. 3. Crystal growth. 4. Mineral physical properties. 5. Mineral analysis method. 6. Mineral classification (silicate and non silicate) 7. Application of mineralogy.
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 70% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written o Midterm exam – written o Final exam – written and/or oral
Recommended literature	Hibbard, M.J. 2002. Mineralogy, A Geologist point of view, McGraw-Hill Co. New York. Klein., C. And Hurlbut, Jr, C.S. 1993. Manual of Mineralogy, 21st Edition, John Wily & Sons, Inc. New York.

	Muhkerjee, S. 2011. Applied Mineralogy: Application in industry and environment, Springer, Heidelberg. Nesse, W.D. 2009. Introduction to Mineralogy, Oxford University Press, New York. Putnis, A. 1992. Introduction to Mineral Sciences. Cambridge University Press, Cambridge. Wenk, H.R & Bulakh, A. 2004. Minerals: Their Constitution and Origin. Cambrigde University Press, Cambridge.
Date of last amendment made	

Course Module **PETROLOGY**	
Module identification code	201D6213
Semester(s) in which the module is taught	3rd Semester
Person responsible for the module	Dr. Ir. Irzal Nur, MT.
Lecturer	1. Dr. Ir. Irzal Nur, MT. 2. Dr. Sufriadin ST., MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., group investigation, small group discussion, case study, and video-based learning) o Structured assignments o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 3 x 50 minutes. o Structured assignments; 16 x 3 x 60 minutes. o Self-learning; 16 x 3 x 60 minutes. 2. Practical; o Laboratory or field activity 3 x 100 minutes o Self-learning: 3 x 70 minutes- 3. Total workload = 8670 minutes.
Credit point	3 credits
Prerequisites	Mineralogy
Intended learning outcomes	**Knowledges and Competence** 1. To understand basic principles of geology, mathematics, physics, and chemistry, regarding the area of engineering. (ILO-02) 2. To be able to apply basic principles of geology, and engineering of physics, chemistry, mathematics, in analyzing and evaluating coal and mineral resources. (ILO-06)
Course Learning Objectives	1. Able to explain the types and genesis of igneous rock, and its application in the field of mining. 2. Able to explain the types and genesis of sedimentary rock, and its application in the field of mining. 3. Able to explain the types and genesis of metamorphic rock, and its application in the field of mining.
Module content	1. Type and characteristic of rock. 2. Igneous rock. 3. Sediment rock. 4. Metamorphic rock.
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 70% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written o Midterm exam – written o Final exam – written and/or oral

	○ Practicum
Recommended literature	Blatt, H., Tracy, R. J. and Owens, B. E., 2006, Petrology; Igneous, Sedimentary, and Metamorphic, Third Edition, W.H. Freeman and Co., USA, 530 p. Hall, A., 1989, Igneous Petrology, Longman Group, UK, 573 p. Kornprobst, J., 2003, Metamorphic Rocks and Their Geodynamic Significance, A Petrological Handbook, Kluwer Academic Publ., USA, 208 p. Raymond, L. A., 2002, Petrology; The Study of Igneous, Sedimentary, and Metamorphic Rocks, Second Edition, Waveland Press, Inc., USA, 720 p. Tucker, M. E., 2003, Sedimentary Rock in the Field, Third Edition, John Wiley & Sons Ltd., England, 237 p. Winter, J. D., 2001, An Introduction to Igneous and Metamorphic Petrology. Prentice Hall Inc., New Jersey, USA, 697 p
Date of last amendment made	

Course Module

STRUCTURAL GEOLOGY

Module identification code	202D6213
Semester(s) in which the module is taught	3rd Semester
Person responsible for the module	Dr.Eng. Purwanto, S.T., M.T.
Lecturer	1. Dr.Eng. Purwanto, S.T., M.T. 2. Asran Ilyas, S.T., M.T., Ph.D.
Type of teaching	Teaching methods used in this course are: o Lecture (i.e., group investigation, small group discussion, case study, and video-based learning) o Structured assignments o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 3 x 50 minutes. o Structured assignments; 16 x 3 x 60 minutes. o Self-learning; 16 x 3 x 60 minutes. 2. Practical; o Laboratory or field activity 3 x 100 minutes o Self-learning: 3 x 70 minutes- 3. Total workload = 8670 minutes.
Credit points	3 Credit
Prerequisites	Physical Geology
Intended learning outcomes	**Knowledge and Competence** 1. To understand basic principles of geology, mathematics, physics, and chemistry, regarding the area of engineering. (ILO-02) 2. To be able to apply basic principles of geology, and engineering of physics, chemistry, mathematics, in analyzing and evaluating coal and mineral resources. (ILO-06) 3. To be able to integrate principles of physics and mathematics in reviewing mining geomechanics. (ILO-08) 4. To be able to integrate concept of ecotechnology in developing technical design of mineral and coal. (ILO-10)
Course Learning Objectives	1. Able to explain the concept of geological structures and primary structures that occur in rocks in nature. 2. Able to explain the application of structural geology in the field of mining engineering.
Module content	1. Introductory concepts 2. Primary structures 3. Structural geology elements 4. Stress 5. Deformation 6. Rotation of structural elements 7. Geometry of Folds 8. Fracture and brittle deformation 9. Faults 10. Foliation and cleavage
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 80% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc.

	○ Students must submit all class assignments before the deadline. ○ Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Forms of assessment	Assessment is carried out based on: ○ Individual assignment—written ○ Midterm exam—written ○ Final exam—written
Recommended literature	Ghosh, S.K., 1993, Structural Geology Fundamentals and Modern Developments, Pergamon Press, Tokyo Haakon Fossen., 2010, Structural Geology, Cambridge University Press.
Date of last amendment made	

Course Module

INTRODUCTORY TO MINING ENGINEERING

Module identification code	101D6212
Semester(s) in which the module is taught	1st Semester
Person responsible for the module	Dr-Eng. Muhammad Ramli
Lecturer	1. Dr-Eng. Ir. Muhammad Ramli, M.T 2. Dr. Ir. Irzal Nur, M.T. 3. Dr. Sufriadin, S.T, M.T. 4. Dr-Eng. Purwanto, S.T., M.T. 5. Dr. Aryanti Virtanti Anas, S.T, M.T.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., group investigation, small group discussion, case study, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	-
Intended learning outcomes	**Knowledge** 1. To acquire concepts of technology of mining. (ILO-03) 2. To be able to apply principles of knowledge and technology in developing technical design of mining. (ILO-05)
Course Learning Objectives	1. Able to explain the contribution of mining in the existence and development of civilization. 2. Able to explain the stages of exploration in the mining industry. 3. Able to classify mining systems (surface and underground mine). 4. Able to explain general concepts of mineral processing. 5. Able to explain the interaction of mining and the environment.
Module content	1. History of the mining industry and stages of mining activities 2. Fundamental of exploration techniques 3. Introductory to the mining system 4. Basic of mine material processing 5. Environmental issues in the mining industry
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 70% from total lecture **Study and examination requirements**: o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written o Midterm exam – written o Final exam – written

Recommended literature	Hartman, H. L., 1987, Introductory Mining Engineering, John Wiley & Sons., New York. Kawatra, S.K., 2019, SME Mineral Processing and Extractive Metallurgy Handbook. Society for Mining, Metallurgy, and Exploration, Inc. Littleton, Colorado. Lewis., 1964, Elements of Mining, John Wiley & Sons, New York. Hartman H.L. (senior editor)., 1992, SME Mining Engineering Handbook, Society for Mining, Metallurgy, and Exploration, Inc. Littleton, Colorado
Date of last amendment made	

Course Module

ENGINEERING DRAWING

Module identification code	102D6212
Semester(s) in which the module is taught	1th semester
Person responsible for the module	Dr-Eng. Muhammad Ramli
Lecturer	1. Dr-Eng. Ir. Muhammad Ramli, M.T 2. Dr-Eng. Purwanto, S.T, M.T.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., group investigation, small group discussion, case study, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	-
Intended learning outcomes	**Skills and Competences** 1. To apply logic and innovative thinking in developing knowledge and technology and problem solving within the area of expertise. (ILO-04) 2. To be able to apply principles of knowledge and technology in developing technical design of mining. (ILO-05)
Course Learning Objectives	1. Able to create technical drawings using manual drawing tools. 2. Able to create technical drawings using Autocad software
Module content	1. Sheet layout and free-hand sketching 2. Dimension and scale 3. Geometry construction 4. Curve in engineering 5. Ortographic projection 6. Projection of point, line, and plane 7. Isometric projection 8. Perspective projection 9. Introduction to Autocad 10. Practical drawing of 2D 11. Practical drawaing of 3D 12. Application of autocad for topographic map, cross section, and block diagram.
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 70% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written o Midterm exam – written o Final exam – written and/or oral

Recommended literature	Bhatt N.D., 2011, Engineering Drawing, Plane and solid geometry, Charotar Publishing House PVT,Gujarat-India Simmons C.H., and Maguire D.E., 2004, Manual of Engineering Drawing, to British and International Standard, Elsevier Newnes Linacre House, Jordan Hill, Oxford. Reddy K.V., 2008, Text book of Engineering Drawing, BS Publication, Hyderabad. Sugianto M., 210, 123 Langkah Cepat Menguasai Autocad 2D, CV. Andi Offset, Yogyakarta. Sholeh M., 2008, Tutorial Autocad, Penerbit Informatika, Bandung
Date of last amendment made	

Course Module

MINING ENVIRONMENTAL SCIENCE

Module identification code	105D6222
Semester(s) in which the module is taught	2nd Semester
Person responsible for the module	Dr-Eng. Muhammad Ramli
Lecturer	1. Dr-Eng. Ir. Muhammad Ramli, M.T 2. Andi Arumansawang, S.T., M.Sc. 3. Asta Arjunoarwan Hatta, S.T., M.T.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., group investigation, small group discussion, case study, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	Introductory to Mining Engineering
Intended learning outcomes	**Knowledge** To acquire concepts of technology of mining. (ILO-03)
Course Learning Objectives	1. Able to explain the concept of ecosystem and its function in the environment. 2. Able to explain about various sources of pollution and their indications in the field. 3. Able to explain about environmental management documents and related government regulations.
Module content	1. Science of environmental 2. Environmental chemistry 3. Environmental biology 4. Materials and energy balance 5. Ecosystems 6. Environmental geology 7. Climate change 8. Air pollution 9. Noise pollution 10. Water pollution 11. Environmental documents 12. Mining industry and environmental issues.
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 70% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written o Midterm exam – written o Final exam – written and/or oral

Recommended literature	Davis M.L., and Masten S.J., 2014, Principle of Environmental Engineering and Science, McGraw Hill, New York. Keller E.A., 2012, Introduction to Environmental Geology, Prentice Hall, Boston Cunningham, W. P. dan Cunningham, M. A., 2009. Principles_of_Environmental Science Inquary And Application, Sixth Edition, Published by McGraw-Hill, New York. Strangeways, I., 2003, Measuring the Natural Environment, Cambridge University Press.
Date of last amendment made	

Course Module **MAPPING**	
Module identification code	106D6222
Semester(s) in which the module is taught	2nd Semester
Person responsible for the module	Dr. Ir. Irzal Nur, MT.
Lecturer	1. Dr. Ir. Irzal Nur, MT. 2. Dr. Ir. Amir Hamzah 3. H. Djamaluddin, M.T.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., group investigation, small group discussion, case study, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	Physical Geology
Intended learning outcomes	**Knowledge and Competences** 1. To apply logic and innovative thinking in developing knowledge and technology and problem solving within the area of expertise. (ILO-04) 2. To be able to apply principles of knowledge and technology in developing technical design of mining. (ILO-05) 3. To be able to apply basic principles of geology, and engineering of physics, chemistry, mathematics, in analyzing and evaluating coal and mineral resources. (ILO-06) 4. To be able to integrate principles of physics and mathematics in reviewing mining geomechanics. (ILO-08) 5. To be able to integrate concept of ecotechnology in developing technical design of coal and mineral. (ILO-10)
Course Learning Objectives	1. Able to explain the concept of cartography. 2. Capable of measuring, analyzing data, and creating topographic maps.
Module content	1. Maps and mapping. 2. Topographic mapping. 3. Coordinat and symbols in mapping. 4. Map reading. 5. Projection on the map. 6. Measurement and calculation method in mapping. 7. Application of compass and GPS. 8. Mapping data collection. 9. Countour line in topographic mapping. 10. Longitudinal and transverse in topographic mapping. 11. Application of theodolite.
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 70% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline.

	○ Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: ○ Individual assignment – written ○ Midterm exam – written ○ Final exam – written and/or oral ○ Practicum
Recommended literature	Sosrodarsono, S. dan Takasaki, M., 2005, Pengukuran Topografi dan Teknik Pemetaan, PT. Pradnya Paramita, Jakarta. Spalding, M.G.R, 1918, Training Manual in Topography, Map Reading and Reconaissance, Washinton Gov. Printing Off, Washington.
Date of last amendment made	

Course Module

ENGINEERING MECHANICS

Module identification code	204D6212
Semester(s) in which the module is taught	3rd Semester
Person responsible for the module	Dr.Eng. Purwanto, S.T., M.T.
Lecturer	1. Dr.Eng. Purwanto, S.T., M.T. 2. Nirmana Fiqra Qaidahiyani, S.T., M.T.
Type of teaching	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	Basic Physic II
Intended learning outcomes	**Competence** 1. To be able to integrate principles of physics and mathematics in reviewing mining geomechanics. (ILO-08) 2. To be able to integrate concept of ecotechnology in developing technical design of mineral and coal. (ILO-10)
Course learning objectives	1. Students are able to analyze force systems in two dimensions and three dimensions 2. Students are able to determine and calculate stress-strain.
Module content	1. Introduction to statics 2. Force systems 3. Equilibrium 4. Distributed forces 5. Normal force, shear force, bending moment, and torsion 6. Stress and strain 7. Properties of engineering materials
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 80% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Forms of assessment	Assessment is carried out based on: o Individual assignment – written o Midterm exam – written o Final exam – written and/or oral
Recommended literature	Meriam, J.L., Kraige, L.G., dan Bolton, J.N. 2018. Engineering Mechanics Vol. 1 Statics. Wiley.

	Megson, T.H.G. 2019. Structural and Stress Analysis 4th Edition. Elsevier. Hartsuijker, C., Welleman, J.W. 2007. Engineering Mechanics Vol. 2: Stresses, Strains, Displacements. Springer.
Date of last amendment made	

Course Module

MINING GIS (GEOGRAPHIC INFORMATION SYSTEM)

Module identification code	205D6212
Semester(s) in which the module is taught	3rd Semester
Person responsible for the module	Dr. Eng. Purwanto, ST. MT.
Lecturer	1. Dr. Eng. Purwanto, ST. MT. 2. Asran Ilyas, ST. MT. Ph.D.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	Mapping
Intended learning outcomes	**Knowledge and Skills** 1. To acquire concepts of technology of mining. (ILO-03) 2. To apply logic and innovative thinking in developing knowledge and technology and problem solving within the area of expertise. (ILO-04)
Course Learning Objectives	1. Able to create maps using GIS software 2. Able to create maps using Auto-CAD software
Module content	1. Defenition and use of GIS. 2. Mapping projection system and mapping registration. 3. Map layers, orientation and map zones. 4. Map digitizing. 5. Measurement process of map, view data, and output using GIS. 6. GIS computer software package in general. 7. GIS computer software package related in geology and mining cases.
Applicability	Compulsory in Bachelor Degree in Mining Engineering.
Admission and Examination requirement	Minimum attendance requirement 70% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Group assignment – written and presentation. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	ESRI, 1999. *ArcGIS 9 Building Geodatabase*, USA. Rolf, A. de Bay., 2001. *Principles of Geographic Information System, An Introductory Text Book*, The International Institute for Aerospace Survey and Earth Sciences (ITC), Netherland.
Date of last amendment made	

Course Module

MATRICES AND VECTOR SPACES

Module identification code	206D6212
Semester(s) in which the module is taught	3rd Semester
Person responsible for the module	Dr-Eng. Muhammad Ramli
Lecturer	1. Dr-Eng. Ir. Muhammad Ramli, M.T 2. Asran Ilyas, S.T, M.T, Ph.D.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	Basic Mathematics II
Intended learning outcomes	**Knowledges and Compentence** 1. To understand basic principles of geology, mathematics, physics, and chemistry, regarding the area of engineering. (ILO-02) 2. To be able to integrate principles of physics and mathematics in reviewing mining geomechanics. (ILO-08) 3. To be able to integrate concept of ecotechnology in developing technical design of mineral and coal. (ILO-10)
Course Learning Objectives	1. Able to explain the basic concepts of solving algebraic and transcendental equations 2. Able to explain the solution of force vectors in a system. 3. Able to explain various techniques and methods of solving simultaneous linear equations.
Module content	1. Vector a. Definision b. Vector operational c. Vector analysis for map d. Vector in engineering mechanics e. Vector application in mining case 2. Matrices a. Basic operation of matrices b. Gauss elemination method c. Gauss-Jordan elemination method d. LU decomposition method e. Iteration method f. Cholesky method
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 70% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline.

	○ Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: ○ Individual assignment – written ○ Midterm exam – written ○ Final exam – written and/or oral
Recommended literature	Kreyszig, E., 1993, Matematika Teknik Lanjutan, Edisi ke-6, Buku 1, PT. Gramedia Pustaka Utama, Jakarta. Nasution A., dan Zakaria H., 2001, Metode Numerik dalm Ilmu Rekayasa Sipil, Penerbit ITB, Bandung. Soemartojo, N., 1992, Analisa Vektor, Cetakan ketiga, Erlangga, Jakarta. Suryadi H. S., 1996, Pengantar Aljabar Linier dan Geometri Analitik, Gunadarma, Jakarta
Date of last amendment made	

Course Module

STATISTICS

Module identification code	D15D6202
Semester(s) in which the module is taught	3rd Semester
Person responsible for the module	Asran Ilyas, ST. MT. Ph.D.
Lecturer	1. Asran Ilyas, ST. MT. Ph.D. 2. Dr. Aryanti Virtanti Anas, ST. MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	Basic Mathematics II
Intended learning outcomes	**Knowledges and Competence** 1. To understand basic principles of geology, mathematics, physics, and chemistry, regarding the area of engineering. (ILO-02) 2. To be able to apply basic principles of geology, and engineering of physics, chemistry, mathematics, in analyzing and evaluating coal and mineral resources. (ILO-06) 3. To be able to integrate principles of physics and mathematics in reviewing mining geomechanics. (ILO-08) 4. To be able to integrate concept of ecotechnology in developing technical design of mineral and coal. (ILO-10)
Course Learning Objectives	1. Able to analyze data using descriptive statistical methods 2. Able to analyze data using inferential statistical methods
Module content	1. Background and understanding of statistics and statistical analysis. 2. Types of statistical data, population and sample concepts, techniques of data collection, and techniques of data sampling. 3. Data processing techniques and data presentation in descrptive statistics. 4. Techniques of data analysis and conclution analysis in descriptive and inferential statistics. 5. Statistical analysis of parametric and non-parametric.
Applicability	Compulsory in Bachelor Degree in Mining Engineering.
Admission and Examination requirement	Minimum attendance requirement 70% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Group assignment – written and presentation. o Midterm exam – written.

	○ Final exam – written and/or oral.
Recommended literature	Turmudi and Harini, S., 2008. *Statistical Methods: Theoretical and Applicative Approaches*, 1st Printing, UIN-Malang Press, Malang. Riduwan, 2009. *Basic Statistics*, 7th Printing, Alfabeta, Bandung. Hasan, M. I., 2008. *Principals of Statistics 2 (Inferential Statistics)*, 2nd Edition, 5th Printing, Bumi Aksara, Jakarta. Kurniawan, R., Sohibien, G. M. D., Rahani, R., 2019. *Easy Ways to Learn Statistical Analysis (Data and Exploration)*, Prenadamedia Group, Jakarta. Sutopo, Y. and Slamet, A., 2017. *Inferential Statistics*, ANDI Publisher, Yogyakarta. International journals and proceedings related to statistics and statistical analysis.
Date of last amendment made	

Course Module **Physical Chemistry**	
Module identification code	218D6203
Semester(s) in which the module is taught	4th
Person responsible for the module	Dr. Sufriadin, ST., MT
Lecturer	1. Dr. Sufriadin, ST., MT 2. Andi Arumansawang ST., M.Sc.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 3 x 50 minutes. o Structured assignments; 16 x 3 x 60 minutes. o Self-learning; 16 x 3 x 60 minutes. 2. Practical; o Laboratory or field activity 3 x 100 minutes o Self-learning: 3 x 70 minutes- 3. Total workload = 8670 minutes.
Credit points	3 Credit
Prerequisites	Basic Chemistry
Intended learning outcomes	**Knowledge and Competences** 1. To apply logic and innovative thinking in developing knowledge and technology and problem solving within the area of expertise. (ILO-02) 2. To be able to study and take advantage of knowledge and technology in engineering of coal and mineral processing. (ILO-09)
Course Learning Objectives	1. Able to describe properties of matters 2. Able to explain the principles of thermodynamics and chemical equilibrium 3. Able to explain the principles of chemical kinetics, electrochemistry, and surface chemistry.
Module content	1. Material characteristic. 2. Chemical bond. 3. The law of thermodynamic 4. Chemical equilibrium. 5. Chemical kinetics. 6. Electrochemistry. 7. Colloids and Surface Chemistry. 8. Core Chemistry.
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written o Midterm exam – written

	○ Final exam – written and/or oral
Recommended literature	Atkins, P and de Paula, J., 2009, Element of Physical Chemistry, W.H, Freeman & Co. New York. Gill, R., 1996, Chemical Fundamentals of Geology, Chapman and Hall, London. Rogers, D.W., 2011, Concise Physical Chemistry, Wiley and Son, New York. Sugiyarto,K.H. dan Suyanti, R.D., 2010, Kimia Anorganik Logam, Graha Ilmu, Yogyakarta. Tony Bird, 1993, Kimia Fisika Untuk Universitas, PT. Gramedia Pustaka Utama, Jakarta
Date of last amendment made	

Course Module

NUMERICAL METHOD

Module identification code	210D6223
Semester(s) in which the module is taught	4th Semester
Person responsible for the module	Dr-Eng. Muhammad Ramli
Lecturer	1. Dr-Eng. Ir. Muhammad Ramli, M.T 2. Asran Ilyas, S.T, M.T, Ph.D.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture: o Class meeting; 16 x 3 x 50 minutes. o Structured assignments; 16 x 3 x 60 minutes. o Self-learning; 16 x 3 x 60 minutes. 2. Total workload = 8160 minutes.
Credit point	3 credits
Prerequisites	Matrices and Vector Spaces
Intended learning outcomes	**Competences** 1. To be able to integrate principles of physics and mathematics in reviewing mining geomechanics. (ILO-08) 2. To be able to integrate concept of ecotechnology in developing technical design of coal and mineral. (ILO-10)
Course learning objectives	1. Able to solve linear and non-linear equations system with numerical computation in Fortran Language. 2. Able to perform numerical interpolation and extrapolation calculations and their application in Fortran Language. 3. Able to apply numerical differentiation and integration methods and their application in Fortran Language.
Module content	1. Numerical Method 2. Mathematic Model 3. Numerical Erorr 4. Flow chart 5. Application of Linear Equation System in Mining Industry 6. Application of Non-Linear Equation System in Mining Industry 7. Numerical Interpolation and Extrapolation 8. Numerical Difrentiation 9. Numerical Integration Method 10. Fortran Programming Language
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 70% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written

	○ Midterm exam – written ○ Attendance – summary from presence list ○ Final exam – written and/or oral
Recommended literature	Nyhoff, L., and Lestma, S., 1995, Fortran 77 and Numerical Methods for Engineers and Scienties, Prentice Hall, Englewood Cliffs, New Jersey. Munir, R., 2003, Metode Numerik, Cetakan Pertama, Informatika, Bandung. Djojodihardjo, H., 2000, Metode Numerik, PT Gramedia Pustaka Utama, Jakarta. Naam, J., 2006, Teori Pemrograman Terstruktur Bahasa Fortran, Universitas Putra Indonesia, YPTK, Padang, https://www.researchgate.net/publication/318722209. Nasution A., dan Zakaria H., 2001, Metode Numerik dalm Ilmu Rekayasa Sipil, Penerbit ITB, Bandung. Suryadi H. S., 1995, Pengantar Metode Numerik, Gunadarma, Jakarta
Date of last amendment made	

Course Module

Genesis of Coal and Mineral Deposit

Module identification code	213D6223
Semester(s) in which the module is taught	4th Semester
Person responsible for the module	Dr. Ir. Irzal Nur, MT.
Lecturer	1. Dr. Ir. Irzal Nur, MT. 2. Dr. phil. nat. Sri Widodo, ST, MT
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture: o Class meeting; 16 x 3 x 50 minutes. o Structured assignments; 16 x 3 x 60 minutes. o Self-learning; 16 x 3 x 60 minutes. 2. Total workload = 8160 minutes.
Credit points	3 Credit
Prerequisites	General Petrology, Structural Geology.
Intended learning outcomes	**Competence** To be able to apply basic principles of geology, and engineering of physics, chemistry, mathematics, in analyzing and evaluating coal and mineral resources. (ILO-06)
Course Learning Objectives	1. Able to explain the genesis of mineral deposits. 2. Able to explain the formation of peat and coal; 3. Able to explain about maceral and coal deposition environment
Module content	1. Mineral deposit classification. 2. Genesis of mineral deposit. 3. Genesis of coal deposit.
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written o Midterm exam – written o Final exam – written and/or oral
Recommended literature	Anggayana, K., 2002, Eksplorasi Batubara, Departemen Teknik Pertambangan, Fakultas Ilmu Kebumian dan Teknologi Mineral, Institut Teknologi Bandung. Anggayana, K., Darijanto, T., Widodo, S., 2003, Studi Mineral Pirit Sebagai Salah Satu Sumber Sulfur pada Batubara: Kasus Batubara dari Kabupaten Barru, Sulawesi Selatan, Journal Teknologi Mineral-FIKTM-Institut Teknologi Bandung, Vol. X (1), 3-14. Cox, D.P. and Singer, D.A, 1987, Mineral Deposit Models, U.S. Geological Survey Bulletin 1693.

	Diessel, C.F.K., 1993, Coal Bearing Depositional Systems, Gebrueder Berntraeger, Berlin-Stuttgart. Evans, A. M., 1993, Ore Geology and Industrial Minerals, an Introduction, Third Edition, Blackwell Publ. Co., USA, UK, Australia, 389 p. Foster, R. P., 1993, Gold Metallogeny and Exploration, Chapman & Hall, London, Great Britain, 432 p. Hedenquist, J. W., Izawa, E., Arribas, A. and White, N. C., 1996, Epitermal Gold Deposits: Styles, Characteristics, and Exploration. Resource Geology Special Publication, 1, Tokyo. Kalkreuth, W., 1998, Introduction to Organic Petrology, Institut fuer Geologie, Freie Universitaet Berlin, Germany. Kesler, S. E., 1994, Mineral Resources, Economics and the Environment, Macmillan College Publ. Co. Inc., USA, 391 p. Laznicka, P., 2006, Giant Metallic Deposits, Springer-Verlag Berlin Heidelberg, Germany, 732 p. Misra, K.C., 1999, Understanding Mineral Deposits, Kluwer Academic Publ., 758 p. Notosiswoyo, S., Syafrizal, Heriawan, M. N., 2000, Teknik Eksplorasi, Buku Ajar Jurusan Teknik Pertambangan, Fakultas Ilmu Kebumian dan Teknologi Mineral, Institut Teknologi Bandung, Bandung. Pirajno, F., 2009, Hydrothermal Processes and Mineral Systems, Springer Science+Business-Verlag Media B. V., Australia, 1250 p. Robb, L., 2005, Introduction to Ore-Forming Processes, Blackwell Publ. Co., USA, UK, Australia, 373 p. Sawkins, F. J., 1990, Metal Deposits in Relation to Plate Tectonics, Second Revised and Enlarged Edition, Springer-Verlag, Berlin, 461 p. Stach, E. Mackowsky, M.Th., Teichmueller, M., Taylor, G.H., Chandra, D., Teichmueller R., 1982, Stach's Textbook of Coal Petrology, Gebrueder Borntaeger, BerlinStuttgart. Taylor G.H., Teichmueller, M., Davis, A., Diessel, C.F.K., Littke, R., Robert, P., 1998, Organic Petrology, Gebrueder Borntaeger, Berlin- Stuttgart. Teichmueller, M., 1989, The Genesis of Coal from the View Point of Coal Petrology, Int. Journal of Coal Geology,12. Van Krevelen, D.W., 1993, Coal Typology-Chemistry-Physics Constitution, 3rd Comp. Rev. ed. Elsevier, Amsterdam. Widodo, S., 2001, Analisis Perilaku Pirit pada Endapan Batubara di Kabupaten Barru Sulawesi Selatan, Thesis Magister, Program Studi Rekayasa Pertambangan, Program Pascasarjana, Institut Teknologi Bandung. Widodo, S., 2008, Rekonstruksi Fasies Pengendapan Batubara Berdasarkan Komposisi Maseral Pada Endapan Batubara di Kabupaten Barru, Sulawesi Selatan, Jurnal Faqih-Fakultas Teknologi Industri-Universitas Muslim Indonesia, ISSN 1412-4165, Vol. 6 (2). Widodo, S., 2008, Organic Petrology and Geochemistry of Miocene Coals from Kutai Basin, Mahakam Delta, East Kalimantan, Indonesia: Genesis of Coal and Depositional Environment, Dissertation, Institute of Geoscience, Johann Wolfgang Goethe Universitaet, Frankfurt am Main, Germany, 173 pp
Date of last amendment made	

Course Module **GEOSTATISTIC**	
Module identification code	223D6202
Semester(s) in which the module is taught	5th Semester
Person responsible for the module	Asran Ilyas, ST. MT. Ph.D.
Lecturer	1. Asran Ilyas, ST. MT. Ph.D. 2. Dr. Ir. Irzal Nur, MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning o Practice (i.e., real data modeling using software package).
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	Numerical Method.
Intended learning outcomes	**Competence** To be able to apply basic principles of geology, and engineering of physics, chemistry, mathematics, in analyzing and evaluating coal and mineral resources. (ILO-06)
Course learning Objectives	1. Able to explain the concepts of random and stationarity functions, regional variables, semi variograms, areas of influence, sills, and semi variogram functions. 2. Able to explain the meaning of dispersion variance and estimation variance as well as their application in geostatistics. 3. Able to apply the Kriging system to both regular and irregular drilling grids.
Module content	1. Background and understanding of geostatistic and the history of its development. 2. Statistical foundations that are very important for geostatistical spatial analysis. 3. Regionalized variables, stationarity, regularization, and spatial correlation. 4. Variogram, variogram function, experimental variogram, area of influence (range), sill, nugget effect, and model variogram. 5. Dispersion variance, estimation variance, Kriging, and data modeling. 6. Application of geostatistical software (i.e.: SGeMS, ArcGIS, Surfer).
Applicability	Compulsory in Bachelor Degree in Mining Engineering.
Admission and Examination requirement	Minimum attendance requirement 70% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Group assignment – written and presentation.

	○ Midterm exam – written. ○ Final exam – written and/or oral.
Recommended literature	Davis, J. C., 1986. *Statistics and Data Analysis in Geology, Second Edition*, Kansas Geological Survey, New York, USA. Isaaks, E. H., and Srivastava, R. M., 1989. *An Introduction to Applied Geostatistics*, Oxford University Press, Oxford, USA. International journals and proceedings related to geostatistic.
Date of last amendment made	

Course Module

EXPLORATION TECHNIQUES

Module identification code	301D6213
Semester(s) in which the module is taught	5th semester
Person responsible for the module	Dr. Ir. Irzal Nur, MT.
Lecturer	1. Dr. Ir. Irzal Nur, MT. 2. Asran Ilyas, ST. MT. Ph.D. 3. Dr.phil.nat. Sri Widodo, ST. MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning o Practice (i.e., real data modeling using software package).
Workload	1. Lecture: o Class meeting; 16 x 3 x 50 minutes. o Structured assignments; 16 x 3 x 60 minutes. o Self-learning; 16 x 3 x 60 minutes. 2. Total workload = 8160 minutes.
Credit point	3 credits
Prerequisites	1. Genesis of Mineral Deposit. 2. Structural Geology. 3. Mineralogy. 4. Physical Geology. 5. Introduction to Mining Engineering.
Intended learning outcomes	**Competences** 1. To be able to apply principles of knowledge and technology in developing technical design of mining (ILO-05). 2. To be able to apply basic principles of geology, and engineering of physics, chemistry, mathematics, in analyzing and evaluating coal and mineral resources. (ILO-06)
Course Learning Objectives	1. Able to design plans, explain types, methods, equipment, and compile reports on an exploration of mineral and coal resources. 2. Able to estimate and evaluate resources/reserves
Module content	1. Introduction (objectives and methods of exploration). 2. Concept of exploration. 3. Relationship between geological conditions and the genesis of minerals with exploration techniques. 4. Model of mineral deposits. 5. Remote Sensing. 6. Geological/Exploration Mapping. 7. Geochemical Exploration. 8. Geophysical Exploration. 9. Geological/Exploration Mapping. 10. Tracing floats, trenching, and test pitting. 11. Sampling methods. 12. Exploration Drilling. 13. Interpretation and Compilation of Exploratory Data. 14. Exploration Design and Planning. 15. Geotechnical and Hydrogeological Data Collection.
Applicability	Compulsory in Bachelor Degree in Mining Engineering.
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:**

	○ Students must attend 15 minutes before the class starts. ○ Students must switch off all electronic devices. ○ Students must inform the lecturer if they will not attend the class due to sickness, etc. ○ Students must submit all class assignments before the deadline. ○ Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: ○ Individual assignment – written ○ Midterm exam – written ○ Final exam – written and/or oral Individual assignment – written. ○ Group assignment – written and presentation. ○ Midterm exam – written. ○ Final exam – written and/or oral. ○ Fieldtrip report – written.
Recommended literature	Evans, A. M., 1995. *Introduction to Mineral Exploration*, Blackwell Science Ltd., Oxford, UK., 396 p. Kuzvart, M. and Bohmer, M., 1986. *Prospecting and Exploration of Mineral Deposits, Development in Economic Geology*, 21, Elsevier, Amsterdam-Oxford-New York-Tokyo, 508 p. Peters, W. C., 1978. *Exploration and Mining Geology, 2nd Edition*, John Wiley & Sons, Canada, 685 p.
Date of last amendment made	

Course Module

MODELING AND RESERVE EVALUATION

Module identification code	321D6202
Semester(s) in which the module is taught	6th semester
Person responsible for the module	Asran Ilyas, ST. MT. Ph.D.
Lecturer	1. Asran Ilyas, ST. MT. Ph.D. 2. Dr. Ir. Irzal Nur, MT. 3. Dr.phil.nat. Sri Widodo, ST. MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning o Practice (i.e., real data modeling using software package).
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	Exploration Techniques
Intended learning outcomes	**Competence** To be able to apply basic principles of geology, and engineering of physics, chemistry, mathematics, in analyzing and evaluating coal and mineral resources. (ILO-06)
Course Learning Obejctives	1. Able to explain the definition, classification, and modifier factors of resources and reserves, as well as basic concepts of reserves modelling and evaluation. 2. Able to explain the units used, basic calculation formulas, various terms and limitations in reserves modelling and evaluation. 3. Able to distinguish between deterministic and stochastic modelling techniques in reserve modelling and evaluation.
Module content	1. Background, basic concepts, and main requirements for modeling and evaluating of mineral and coal deposits. 2. Important factors, sequence of work, and units used in modeling and evaluating of mineral and coal deposits. 3. Modeling and reserve evaluation techniques and methods : o Conventional methods : - Polygon method. - Cross-section method. - Isoline method. o Modern methods : - Block modeling method (deterministic method). - Block modeling method (stochastic method). 4. Application of computer software in modeling and reserve evaluation (ArcGIS, Surfer, Surpac, and SGeMS). 5. Fieldwork, data processing, and analysis.
Applicability	Compulsory in Bachelor Degree in Mining Engineering.
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline.

	○ Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: ○ Individual assignment – written. ○ Group assignment – written and presentation. ○ Midterm exam – written. ○ Final exam – written and/or oral.
Recommended literature	Hartman, H. L., 1987. *Introductory Mining Engineering*, John Wiley & Sons, Inc. United States of America. Annels, A. E., 1991. *Mineral Deposit Evaluation. A Practical Approach, First Edition*, Chapman & Hall, London, UK. Rossi, M. E., and Deutch, C. V., 2014. *Mineral Resource Estimation*, Springer, New York.
Date of last amendment made	

Course Module

BLASTING ENGINEERING

Module identification code	212D6222
Semester(s) in which the module is taught	4th semester
Person responsible for the module	Dr.Eng. Purwanto, S.T., M.T.
Lecturer	1. Dr.Eng. Purwanto, S.T., M.T. 2. Nirmana Fiqra Qaidahiyani, S.T., M.T.
Type of teaching	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	Rock Mechanics
Intended learning outcomes	**Skill and Competence** 1. To apply logic and innovative thinking in developing knowledge and technology and problem solving within the area of expertise. (ILO-04) 2. To be able to integrate principles of physics and mathematics in reviewing mining geomechanics. (ILO-08)
Course learning objectives	1. Able to explain the basic theory of blasting and identify blasting patterns correctly. 2. Able to design bench blasting and underground blasting and predict the results of fragmentation systematically.
Module content	1. Theory of blasting 2. Properties of explosives 3. Use forms of explosives 4. Explosive selection criteria 5. Blasting accessories 6. Rock properties and their influence on the results of blasting 7. Fracture mechanism in blasting of rock 8. Initiation and priming systems 9. Blast design 10. Bench blasting 11. Blasting in underground 12. Evaluation of blast results
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Forms of assessment	Assessment is carried out based on:

	○ Individual assignment – written. ○ Group assignment – written and presentation. ○ Midterm exam – written. ○ Final exam – written and/or oral.
Recommended literature	Calvin, J., Konya., and Walter, E. J. 1991. Rock Blasting and Overbreak Control. Federal Highway Administration, United States. Persson, Holmberg, and Lee, 1992, Rock Blasting and Explosives Engineering. Richard A, et.al. -. Explosives and Blasting Procedures Manual. Bureau of Mines, US. Jimeno, C. L. et.al. 1995. Drilling and Blasting of Rocks. AA. Balkema, Rotterdam. Singh, B., Pal Roy, P., 1993, Blasting in Ground Excavations and Mines, AA. Balkema, Rotterdam. Hustrulid, W. 1999. Blasting Principles for Open Pit Mining. AA. Balkema, Rotterdam. Cooper, P. W., 1996. Explosives Engineering. Wiley, Canada. Rustan, A. 1998. Rock Blasting Terms and Symbols. AA. Balkema, Rotterdam.
Date of last amendment made	

Course Module

ROCK MECHANICS

Module identification code	303D6213
Semester(s) in which the module is taught	5th Semester
Person responsible for the module	Dr.Eng. Purwanto, S.T., M.T.
Lecturer	1. Dr.Eng. Purwanto, S.T., M.T. 2. Nirmana Fiqra Qaidahiyani, S.T., M.T.
Type of teaching	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 3 x 50 minutes. o Structured assignments; 16 x 3 x 60 minutes. o Self-learning; 16 x 3 x 60 minutes. 2. Practical; o Laboratory or field activity 3 x 100 minutes o Self-learning: 3 x 70 minutes- 3. Total workload = 8670minutes.
Credit points	3 Credit
Prerequisites	Engineering Mechanics
Intended learning outcomes	**Competence** 1. To be able to apply principles of knowledge and technology in developing technical design of mining. (ILO-05) 2. To be able to integrate principles of physics and mathematics in reviewing mining geomechanics. (ILO-08)
Course Learning Objectives	1. Able to determine normal stresses and shear stresses and obtain the physical properties of rocks systematically. 2. Able to determine the mechanical properties of rock and classify rock mass systematically.
Module content	1. Introduction to rock mechanics 2. Analysis of stress and strain 3. Properties of rocks 4. Initial stresses in rocks 5. Rock mass classification
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Forms of assessment	Assessment is carried out based on: o Individual assignment – written. o Group assignment – written and presentation. o Midterm exam – written. o Final exam – written and/or oral.

Recommended literature	Rai, M.A. Kramadibrata, S. dan Watimena, R.K. 2011. Mekanika Batuan. Institut Teknologi Bandung, Bandung. Goodman, R.E. 1989. Introduction to Rock Mechanics. Jaeger, J.C. Cook, N. G.W. Zimmerman, R. W. 2007. Fundamentals of Rock Mechanics. Hoek, E. 2006. Practical Rock Engineering. Ulusay, R. 2014. The ISRM Suggested Methods for Rock Characterization, Testing and Monitoring: 2007-2014. ISRM: Springer. Bieniawski, Z. T. 1989. Engineering Rock Mass Classifications. NGI. 2015. Using The Q-System.
Date of last amendment made	

Course Module

MINE VENTILATION

Module identification code	308D6212
Semester(s) in which the module is taught	5th
Person responsible for the module	Nirmana Fiqra Qaidahiyani, S.T., M.T.
Lecturer	1. Nirmana Fiqra Qaidahiyani, S.T., M.T. 2. Andi Arumansawang, S.T., M.Sc.
Type of teaching	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	
Intended learning outcomes	**Competence** To be able to apply principles of knowledge and technology in developing technical design of mining. (ILO-05)
Course learning objectives	1. Students are able to identify mine air properties and quality control, and properly explain underground mine ventilation systems. 2. Students are able to calculate the quantity of ventilation air and plan mine ventilation properly.
Module content	1. Basic principles of fluid mechanics and physical thermodynamics 2. Mine-Air quality control 3. Mine ventilation systems 4. Ventilation measurements and surveys 5. Natural ventilation 6. Estimation of ventilation air quantity 7. Gases in the subsurface 8. Mine air conditioning
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Forms of assessment	Assessment is carried out based on: o Individual assignment – written. o Group assignment – written and presentation. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	H. L. Hartman, et al, "Mine Ventilation and Air Conditioning," John Wiley & Sons, Inc., Canada, 1997.

	M. J. McPherson, "Subsurface Ventilation and Environmental Engineering," Springer, New Delhi, 1993. P. Darling, "SME Mining Engineering Handbook," SME Inc., United States, 2011. P. Thakur, "Advanced Mine Ventilation: Respirable Coal Dust, Combustible Gas and Mine Fire Control," Elsevier, United Kingdom, 2019.
Date of last amendment made	

Course Module

MINE GEOTECHNICS

Module identification code	310D6222
Semester(s) in which the module is taught	6th Semester
Person responsible for the module	Dr.Eng. Purwanto, S.T., M.T.
Lecturer	1. Dr.Eng. Purwanto, S.T., M.T. 2. Nirmana Fiqra Qaidahiyani, S.T., M.T.
Type of teaching	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	Rock Mechanics Blasting Engineering
Intended learning outcomes	**Skill and Competence** 1. To apply logic and innovative thinking in developing knowledge and technology and problem solving within the area of expertise. (ILO-04) 2. To be able to apply principles of knowledge and technology in developing technical design of mining. (ILO-05) 3. To be able to integrate principles of physics and mathematics in reviewing mining geomechanics. (ILO-08)
Course learning objectives	1. Students are able to conclude the basic principles and methods of rock slope design as well as identify types of mine slope failure systematically. 2. Students are able to analyse slope stability, classify slope monitoring instruments, and apply mining geotechnical theories properly.
Module content	1. Principles and methods of rock slope design 2. Structural geology and data interpretation 3. Site investigation and geological data collection 4. Rock properties 5. Identification of modes of slope instability 6. Plane failure 7. Wedge failure 8. Toppling failure 9. Circular failure 10. Rock mass model 11. Numerical analysis 12. Stabilisation of rock slopes 13. Movement monitoring 14. Mining applications
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline.

	○ Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Forms of assessment	Assessment is carried out based on: ○ Individual assignment – written. ○ Group assignment – written and presentation. ○ Midterm exam – written. ○ Final exam – written and/or oral.
Recommended literature	I. Arif, "Geoteknik Tambang," PT Gramedia Pustaka Utama, 2016. D. C. Wyllie and C. W. Mah, "Rock Slope Engineering: Civil and Mining 4th Edition," Taylor & Francis Group, 2004. J. Read and P. Stacey, "Guidelines for Open Pit Slope Design," CSIRO, 2009. S. Wang, P. C. Hagan, and C. Cao, "Advances in Rock-Support and Geotechnical Engineering," Elsevier, 2016. The Ministry of Energy and Mineral Resources of the Republic of Indonesia (2018). Decree of the Ministry of Energy and Mineral Resources of the Republic of Indonesia Number 1827 K/30/MEM/2018 concerning Guidelines for the Implementation of Good Mining Engineering Rules.
Date of last amendment made	

Course Module

ENGINEERING ECONOMICS

Module identification code	209D6212
Semester(s) in which the module is taught	3rd Semester
Person responsible for the module	Dr. Aryanti Virtanti Anas, ST., MT.
Lecturer	1. Dr. Aryanti Virtanti Anas, ST., MT. 2. Dr. Eng. Rini Novriyanti Sutardjo Tui, ST., M, BA., MT. 3. Rizki Amalia, ST., MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	-
Intended learning outcomes	**Competences** 1. To be able to apply principles of knowledge and technology in developing technical design of mining. (ILO-05) 2. To be able to apply principles of economics, management and valuation techniques in planning and managing mineral and coal resources. (ILO-07)
Course Learning Objectives	1. Able to apply the concept of time value of money 2. Able to perform project investment selection analysis.
Module content	1. Basic concept of engineering economics 2. Interest and time value of money 3. Present worth analysis 4. Future worth analysis and capitalized cost 5. Annual worth analysis 6. Rate of return analysis 7. Benefit/cost analysis
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assesment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	De Garmo, E. Paul. 1984. *Engineering Economy.* 7th Edition. Mc.Millan Publishing Company, New York.

	D.G. Newnan, T.G. Eschenbach, J.P. Lavelle. 2004. *Engineering Economy Analysis*. 9th Edition, Oxford University Press. Fraser, N.M., Jewkes, E.M. 2013. *Engineering Economics: Financial Decision Making for Engineers*. 5th Edition. Pearson, Toronto. Grant, E.L., G.W.Ireson. 1990. *Principles of Engineering Economy*. 8th Edition. Roland Press, New York. Kodoatie, R.J. 2005. *Analisis Ekonomi Teknik*; Penerbit Andi Yogyakarta. Ristono A., Puryani. 2010. *Ekonomi Teknik*. Graha Ilmu. Thuessen, G.J., W.J. Fabrycky. 1993. *Engineering Economy*. 8th Edition. Prentice Hall, New Jersey
Date of last amendment made	

Course Module **MINERAL ECONOMICS**	
Module identification code	214D6223
Semester(s) in which the module is taught	4th Semester
Person responsible for the module	Dr. Eng. Rini Novriyanti Sutardjo Tui, ST., M, BA., MT.
Lecturer	1. Dr. Aryanti Virtanti Anas, ST., MT. 2. Dr. Eng. Rini Novriyanti Sutardjo Tui, ST., M, BA., MT. 3. Rizki Amalia, ST., MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture: o Class meeting; 16 x 3 x 50 minutes. o Structured assignments; 16 x 3 x 60 minutes. o Self-learning; 16 x 3 x 60 minutes. 2. Total workload = 8160 minutes.
Credit points	3 Credit
Prerequisites	Engineering Economics
Intended learning outcomes	**Competences** To be able to apply principles of economics, management and valuation techniques in planning and managing mineral and coal resources. (ILO-07)
Course Learning Objectives	1. Able to analyze the demand and supply of minerals. 2. Able to analyze mineral market 3. Able to perform input-output analysis.
Module content	1. Mining industry and basic concept of mineral economics 2. Scarcity of mineral resources 3. Mineral's supply and demand 4. Market equilibrium 5. Elasticity 6. Market types 7. Mineral's market and trading 8. Economics system 9. Input-Output Analysis
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.

Recommended literature	Gocht, W. R., Zantop, H, and Eggert, R. G., 1988. International Mineral Economics. Springer-Verlag, Berlin. Rudawsky, O. 1986. Mineral Economics. Development and Management of Natural Resources. Elsevier Science Publisher B.V., New York. Rahardja, P., Manurung, M. 2004. Pengantar Ilmu Ekonomi (Mikroekonomi & Makroekonomi). Penerbit Fakultas Ekonomi Universitas Indonesia. Assauri, S. 2005. *Matematika Ekonomi*. PT Raja Grafindo Persada. Jakarta. Biro Pusat Statistik. 1995. *Kerangka Teori dan Analisis Tabel Input-Output*. Penerbit Biro Pusat Statistik. Chiang, A.C., Wainwright, K. *Dasar-Dasar Matematika Ekonomi, Edisi Keempat, Jilid 1*. Penerbit Erlangga. Jakarta. Mudd, 1985. *Economics of the Mineral Industries, 4th Edition*. American Institute of Mining, Metallurgical, and Petroleum Engineers Inc., USA.
Date of last amendment made	

Course Module

MINE INVESTMENT ANALYSIS

Module identification code	304D6213
Semester(s) in which the module is taught	5th Semester
Person responsible for the module	Dr. Aryanti Virtanti Anas, ST., MT.
Lecturer	1. Dr. Aryanti Virtanti Anas, ST., MT. 2. Dr. Eng. Rini Novriyanti Sutardjo Tui, ST., M, BA., MT. 3. Rizki Amalia, ST., MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture: o Class meeting; 16 x 3 x 50 minutes. o Structured assignments; 16 x 3 x 60 minutes. o Self-learning; 16 x 3 x 60 minutes. 2. Total workload = 8160 minutes.
Credit points	3 Credit
Prerequisites	Mining System, Engineering Economics
Intended learning outcomes	**Competences** 1. To be able to apply principles of knowledge and technology in developing technical design of mining. (ILO-05) 2. To be able to apply principles of economics, management and valuation techniques in planning and managing mineral and coal resources. (ILO-07)
Course Learning Objectives	1. Able to calculate the components of the cash flow statement. 2. Able to analyze cash flow statement.
Module content	1. Basic concept of mine investment 2. Cash flow statement 3. Capital cost 4. Production cost 5. Depreciation and depletion 6. Mine tax and royalty 7. Investment feasibility 8. Inflation 9. Sensitivity analysis 10. Balance sheet 11. Income statement
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Final exam – written and/or oral.

Recommended literature	Gentry, D. W., O'Neil, T. J., 1984. *Mine Investment Analysis*. SME, New York. Ittelson, T.R. 2009. *Financial Statements, Revised and Expanded Edition*. Career Press, USA. Blank, L., Tarquin, A. 2012. Engineering Economy 7th Edition. The McGraw-Hill Companies, New York. Rewu, O. 2015. Panduan Praktis Analisis Kelayakan Investasi Batubara. Teknosain, Yogyakarta. Rudenno, V. 2012. The Mining Valuation Handbook. Mining and Energy Valuation for Investors and Management 4th Edition. John Wiley & Sons Australia, Ltd, Melbourne. Stermole, F. J., Stermole, J., 1987. Economic Evaluation and Investment Decision Methods. Colorado. Von Wahl, S., 1983. Investment Appraisal and Economic Evaluation of Mining Enterprise. Trans Tech. Publications, Germany.
Date of last amendment made	

Course Module **MINE MANAGEMENT**	
Module identification code	313D6222
Semester(s) in which the module is taught	6th Semester
Person responsible for the module	Dr. Aryanti Virtanti Anas, ST., MT.
Lecturer	1. Dr. Aryanti Virtanti Anas, ST., MT. 2. Dr. Eng. Rini Novriyanti Sutardjo Tui, ST., M, BA., MT. 3. Rizki Amalia, ST., MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	Mine Investment Analysis, Mine Equipment and Material Handling
Intended learning outcomes	**Skill and Competence** 1. To apply logic and innovative thinking in developing knowledge and technology and problem solving within the area of expertise. (ILO-04) 2. To be able to apply principles of economics, management and valuation techniques in planning and managing mineral and coal resources. (ILO-07)
Course Learning Objectives	1. Able to describe aspects related to human resource management 2. Able to calculate aspects related to financial management 3. Able to examine aspects of operational management
Module content	1. Basic concept of management and management function 2. Corporate planning 3. Organization 4. The performance appraisal management 5. Education, Training and Development 6. Accounting management 7. Labour standard costing 8. Incentive bonus systems 9. Maintenance management 10. Material management 11. Compensation management 12. Industrial relation 13. Risk Management
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assesment	Assessment is carried out based on:

	○ Individual assignment – written. ○ Midterm exam – written. ○ Final exam – written and/or oral.
Recommended literature	Sloan, D.A.1983. Mine Management. Chapman and Hall Ltd. New York, USA. Camus, J.P. 2009. Management of Mineral Resources: Creating Value in the Mining Bussiness. Society for Mining, Metallurgy, and Exploration, Inc. (SME). Colorado, USA. Fahmi, I. 2011. Manajemen (Teori, Kasus dan Solusi). Alfabeta. Bandung. Hanafi, M.M. 2011. Manajemen. Sekolah Tinggi Ilmu Manajemen YKPN. Yogyakarta. Roberts, L. 1997. Risk Management Handbook for the Mining Industry. NSW Department of Primary Industries. Australia. Subkhi, A., Jauhar, M. 2013. Pengantar Teori dan Perilaku Organisasi. Prestasi Pustaka. Jakarta. Wanless, R. M., 1983. Finance for Mine Management. Chapman and Hall Ltd., USA.
Date of last amendment made	

Course Module

MATERIALS CHARACTERIZATION

Module identification code	215D6223
Semester(s) in which the module is taught	4th Semester
Person responsible for the module	Dr. Sufriadin, ST., MT
Lecturer	1. Dr. Sufriadin, ST., MT 2. Dr.phil.nat. Sri Widodo, ST., MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture: o Class meeting; 16 x 3 x 50 minutes. o Structured assignments; 16 x 3 x 60 minutes. o Self-learning; 16 x 3 x 60 minutes. 2. Total workload = 8160 minutes.
Credit points	3 Credits
Prerequisites	Physical Chemistry, Petrology
Intended learning outcomes	**Competence** To be able to study and take advantage of knowledge and technology in engineering of coal and mineral processing. ILO-09)
Course learning outcomes	1. To be able to describe and analyze some the physical methods in material characterization. 2. To be able to explain the chemical methods in material analysis.
Module content	1. Atomic absorption spectrometry 2. Polarizing microscope 3. X-Ray Diffractometry 4. X-Ray fluorescence spectrometry. 5. SEM-EDX 6. Electron probe microanalysis (EPMA) 7. Thermal analysis 8. Fourier Transform Infrared/Raman Spectrometry 9. Gas chromatography 10. Inductively Coupled-Plasma (ICP)
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Dean, J.R., 2019, Practical Inductively Coupled Plasma Spectrometry, 2nd Edition, John Wiley & Sons Ltd.

	Jenkin, R, 1999, X-Ray Fluorescence Spectrometry, 2nd Edition, John Wiley & Sons, Inc. New York. Leng, Y., 2008, Material Characterization; Introduction to Microscopic and Spectroscopic Method, John Wiley & Sons, Singapore. Welz, B & Sperling, M., 2005, Atomic Absorption Spectrometry, 3rd Edition, Wiley-VCH, New York.
Date of last amendment made	

Course Module **MINERAL PROCESSING**	
Module identification code	305D6213
Semester(s) in which the module is taught	5th Semester
Person responsible for the module	Dr. Sufriadin, ST., MT
Lecturer	1. Dr. Sufriadin, ST., MT 2. Dr.phil.nat. Sri Widodo, ST., MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 3 x 50 minutes. o Structured assignments; 16 x 3 x 60 minutes. o Self-learning; 16 x 3 x 60 minutes. 2. Practical; o Laboratory or field activity 3 x 100 minutes o Self-learning: 3 x 70 minutes- 3. Total workload = 8670minutes.
Credit points	3 Credit
Prerequisites	Material characterization
Intended learning outcomes	**Competences** To be able to study and take advantage of knowledge and technology in engineering of coal and mineral processing. (ILO-09)
Course learning objectives	1. Able to explain terminology and calculate the simple material/metallurgical accounting in mineral processing 2. Able to describe the stage of size reduction and classification in mineral processing 3. Able to explain technology development of separation method in mineral processing
Module content	1. Terminology in mineral processing and material/metallurgical accounting 2. Comminution 3. Sizing and Classification 4. Gravity concentration technology 5. Magnetic and electrostatic separation 6. Flotation
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assesment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.

Recommended literature	Fuerstenau, M.C. & Han, K.N., 2003, Principles of Mineral Processing, SME Inc. Littleton. Gupta A., Yan, D.S., 2016, Mineral Processing Design and Operation, Elsevier, Amsterdam Kelly, E.G. & Spottiswood, D.J., 1982, Introduction to Mineral Processing, John Wiley & Sons, Inc. New York. Wills, B.A. & Munn, T.J.N, 2006, Mineral processing Technology (7th Edition), Elsevier Ltd. Amsterdam
Date of last amendment made	

Course Module

COAL PROCESSING AND UTILIZATION

Module identification code	311D6222
Semester(s) in which the module is taught	6th Semester
Person responsible for the module	Dr.phil.nat. Sri Widodo, ST., MT.
Lecturer	1. Dr. Sufriadin, ST., MT 2. Dr.phil.nat. Sri Widodo, ST., MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	Mineral Processing
Intended learning outcomes	**Competences** To be able to study and take advantage of knowledge and technology in engineering of coal and mineral processing. (ILO-09)
Course learning outcomes	1. To be able to review the characteristics and utilization of Indonesian coal. 2. To be able to explain technologies in coal beneficiation 3. To be able to explain coal combustion and conversion technologies.
Module content	1. History of coal processing and utilization in Indonesia 2. Distribution, quality and proportion of coal in Indonesia 3. Coal classification 4. Coal quality parameters 5. Coal beneficiation technologies 6. Coal combustion technology 7. Coal liquefaction 8. Coal gasification
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Anggayana, K., Darijanto, T., Widodo, S., 2003.Studi Mineral PiritSebagai Salah SatuSumberSulfurPada Batubara: Kasus Batubara Dari KabupatenBarru, Sulawesi Selatan, Journal Teknologi Mineral-FIKTM-InstitutTeknologi Bandung, Vol. X (1), 3-14.

	Basyuni, Suprapto, S., Sumaryono dan Suganal, 1993. Pembuatan Briket Batubara Tak Berasap Untuk Rumah Tangga, Berita PPTM., Bandung, No. 54, th. 17, Daulay, B., Umar, D. F., Suprapto, S., Soemaryono, Ningrum, N. S., Huda, M., Suganal, Monika, I., Sodikin, I., Hudaya, G. K., Nurhadi, Supriatna, W., 2012. Teknologi Pemanfaatan Batubara Indonesia. Pusat Penelitian dan Pengembangan Teknologi Mineral dan Batubara. Kalkreuth, W., 1998.Introduction to Organic Petrology, InstitutfuerGeologie, FreieUniversitaet Berlin, Germany. Komarudin dan Umar, D.F., 1992. Pengkajian pembuatan Coal Water Fuel dari batubara Bukit Asam, Buletin PPTM, vol. 14, no. 7,9 – 17. Roesland, K., 1986. Coal Oil Mixture, Berita Dit. Batubara, Bandung, No. 3, th. 1, 9-11. Stach, E. Mackowsky, M.Th., Teichmueller, M., Taylor, G.H., Chandra, D., Teichmueller R., Stach's Textbook of Coal Petrology, GebruederBorntaeger, BerlinStuttgart, 1982. Sudadijo dan Akmal, F., 1988. Peranan Kualitas Batubara Terhadap Operasi PLTU, WEC, Jakarta.243-26.
Date of last amendment made	

Course Module

ROCKS AND NON-METALLIC MINERALS

Module identification code	312D6222
Semester(s) in which the module is taught	6th Semester
Person responsible for the module	Dr. Sufriadin, ST., MT
Lecturer	1. Dr. Sufriadin, ST., MT 2. Dr.phil.nat. Sri Widodo, ST., MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	Mineral Processing
Intended learning outcomes	**Competences** To be able to study and take advantage of knowledge and technology in engineering of coal and mineral processing. (ILO-09)
Course learning outcomes	1. To be able to describe processing and utilization of clay deposits. 2. To be able to explain the processing and utilization of oxides, sulphate and phosphate deposits. 3. To be able to explain the utilization of precious stones and construction materials.
Module content	1. The policy and regulation in the processing and utilization of rocks and non-metallic minerals in Indonesia. 2. Processing and utilization of clay deposits (talc, kaolinite, bentonite, zeolite, and sepiolite). 3. Processing and utilization of oxide minerals (quartz sand). 4. Processing and utilization of barite and phosphate 5. Processing and utilization of precious stone and construction materials
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assesment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Manning, D.A.C., 1995. Introduction to Industrial Minerals., Chapman & Hall.,London Sahala, S dan Arifin, M. 1997., Bahan Galian Industri., PPPTM – Bandung Stanley J. Leford., 1987. Industrial Mineral and Rock., USA
Date of last amendment made	

Course Module

SOIL MECHANICS

Module identification code	211D6223
Semester(s) in which the module is taught	4th semester
Person responsible for the module	Ir. Djamaluddin, MT
Lecturer	1. Ir. Djamaluddin, M.T. 2. Andi Arumansawang, S.T, M.Sc. 3. Asta Arjunoarwan Hatta, S.T., M. T
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 3 x 50 minutes. o Structured assignments; 16 x 3 x 60 minutes. o Self-learning; 16 x 3 x 60 minutes. 2. Total workload = 8160 minutes.
Credit point	3 credits
Prerequisites	Structural Geology
Intended learning outcomes	**Competences** 1. To be able to integrate principles of physics and mathematics in reviewing mining geomechanics. (ILO-08) 2. To be able to integrate concept of ecotechnology in developing technical design of coal and mineral (ILO-10)
Course learning objectives	1. Able to describe the physical and mechanical properties of a soil 2. Able to arrange a soil mechanics investigation plan 3. Able to analyze the problems of soil mechanics in mining
Module content	1. Physical properties of soil o Soil description o Water content o Unit weight, spesific weight o Grain size o Plasticity index o Soil classification 2. Mechanical properties of soil o Soil permeability o Compaction o Direct shear test o Consolidation test o Uniaxial and triaxial test 3. Soil investigation 4. Application in mining engineering o Soil improvement o Lateral pressure o Soil stability
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc.

	○ Students must submit all class assignments before the deadline. ○ Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: ○ Individual assignment – written. ○ Midterm exam – written. ○ Final exam – written and/or oral.
Recommended literature	Das B.M., and Sobhan K., 2014, Principles of Geotechnical Engineering, 8th Edition, Cengage Learning, Stamford. Clayton C.I., Matthews M.C., and Simons N.E., 1995, Site Investigation, Blackwell Science Ltd. Abramson L.W., Lee T.S., Sharma S., and Boyce G.M., 2002, Slope Stability and Stabilization Methods, John Wiley and Sons, New York. Raj P., 2005, Ground Improvement Techniques, Laxmi Publications, New Delhi
Date of last amendment made	

Course Module **HYDROGEOLOGY**	
Module identification code	216D6223
Semester(s) in which the module is taught	4th semester
Person responsible for the module	Dr-Eng. Muhammad Ramli
Lecturer	1. Dr-Eng. Ir. Muhammad Ramli, M.T 2. Andi Arumansawang, S.T, M.Sc. 3. Asta Arjunoarwan Hatta, S.T., M.T
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture: o Class meeting; 16 x 3 x 50 minutes. o Structured assignments; 16 x 3 x 60 minutes. o Self-learning; 16 x 3 x 60 minutes. 2. Total workload = 8160 minutes.
Credit point	3 credits
Prerequisites	Structural Geology
Intended learning outcomes	**Competence** To be able to integrate concept of ecotechnology in developing technical design of coal and mineral (ILO-10)
Course learning objectives	1. Able to explain the basic concepts of hydrogeology and groundwater flow equations. 2. Able to explain the methods and stages in the exploration and exploitation of groundwater 3. Able to analyze the quality and sources of groundwater pollution
Module content	1. Basic concepts of hydrogeological science and systems 2. Groundwater flow equation 3. Groundwater exploration methods o Surface mapping o Geophysical investigation o Drilling method o Geophysical logging o Water well construction o Pumping test 4. Environmental effect to groundwater fluctuation 5. Groundwater quality and pollution
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written.

	○ Midterm exam – written. ○ Final exam – written and/or oral.
Recommended literature	Fetter, C.W. 2014. *Applied Hydrogeology*. *Fourth Edition.* Prentice-Hall Inc. Englewood Cliffs, New Jersey. Todd, D.K. 2005. *Groundwater Hydrology*. *Third Edition.* John Wiley & Sons, New York.
Date of last amendment made	

Course Module

MINE HYDROLOGY

Module identification code	3076223
Semester(s) in which the module is taught	5th semester
Person responsible for the module	Dr-Eng. Muhammad Ramli
Lecturer	1. Dr-Eng. Ir. Muhammad Ramli, M.T 2. Asta Arjunoarwan Hatta, S.T., M.T
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture: o Class meeting; 16 x 3 x 50 minutes. o Structured assignments; 16 x 3 x 60 minutes. o Self-learning; 16 x 3 x 60 minutes. 2. Total workload = 8160 minutes.
Credit point	3 credits
Prerequisites	Hydrogeology
Intended learning outcomes	**Competences** 1. To be able to apply principles of knowledge and technology in developing technical design of mining. (ILO-05) 2. To be able to integrate concept of ecotechnology in developing technical design of coal and mineral (ILO-10)
Course Learning Objectives	1. Able to explain and process hydrological data that affects mining activities 2. Able to analyze hydrological data for mine drainage and dewatering system design 3. Able to design mine water treatment systems.
Module content	1. Water balance parameters 2. Basin hydrology / catchment area 3. Precipitation forecasting 4. Pumping system 5. Mine water management
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Sri Harto, B., 1993, *Analisis Hidrologi*, PT. Gramedia Pustaka Utama, Jakarta. Charlton R., 2008, Fundamental of Fluvia Geomorphology, Routledge, London Viessman W., and Lewis G.J., 2003, Introduction to Hydrology, Prentice Hall,

	Ragunath H.M., 2006, Hydrology- Principles, Analysis, Design, New Age International, New Delhi. Gupta R.S., 2017, Hydrology and Hydraulic Systems, Waveland Press Inc, Illinois. Cegel A Yunus, 2006, Fluid Mechanics Fundamental and Application, McGraw-Hill, a business unit of The McGraw-Hill Companies, Inc, New York.
Date of last amendment made	

Course Module

MINE ENVIRONMENTAL ENGINEERING

Module identification code	316D6222
Semester(s) in which the module is taught	6th semester
Person responsible for the module	Dr-Eng. Muhammad Ramli
Lecturer	1. Dr-Eng. Ir. Muhammad Ramli, M.T 2. Andi Arumansawang, S.T., M.Sc
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture: o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	Mine Hydrology
Intended learning outcomes	**Competences** To be able to integrate concept of ecotechnology in developing technical design of coal and mineral (ILO-10)
Course learning objectives	1. Able to identify environmental impacts at the stages of mining activities 2. Able to design mine waste management 3. Able to create reclamation and mine closure plans
Module content	1. Air quality, water, soil 2. Waste management 3. Acid mine water 4. Mine reclamation and mine closure
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Kissel F.N., 2003, *Handbook for Dust Control in Mining*, National Institute for Occupational Safety and Health. Technical Guidance 3 Environmental Management Act.2015, *Developing A Mining Erosion and Sediment Control Plan,* Ministry of Environment – British Columbia. Europian Commission, 2009, Management of Tailings and Waste-Rock in Mining
Date of last amendment made	

Course Module **MINING SYSTEM**	
Module identification code	203D6212
Semester(s) in which the module is taught	3th Semester
Person responsible for the module	Dr.phil.nat. Sri Widodo, S.T., M.T.
Lecturer	1. Dr.phil.nat. Sri Widodo, S.T., M.T. 2. Nirmana Fiqra Qaidahiyani, S.T., M.T.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	Introductory to Mining Engineering
Intended learning outcomes	**Knowledges and Competence** 1. To acquire concepts of technology of mining. (ILO-03) 2. To be able to apply principles of knowledge and technology in developing technical design of mining. (ILO-05)
Course Learning Objectives	1. Able to explain mining methods in an open surface mining system. 2. Able to explain mining methods in underwater mining systems. 3. Able to explain mining methods in underground mining systems.
Module content	1. Basic of mine-planning. 2. Mining system selection. 3. Open pit mining method. 4. Underground mining method.
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Hartman, H.L., 1990, S. M. E. Mining Engineering Handbook, 2nd Edition, Volume 2b, Society For Mining, Metallurgical, and exploration, Inc., Littleton, Colllorado. Kennedy, B.A.,1990, Surface Mining, 2nd Edition, Society For Mining, Metallurgical, and exploration, Inc., Littleton, Colllorado. Caterpillar Inc., 1995, Caterpillar Performance Handbook, Illiomis, US
Date of last amendment made	

Course Module

MINE EQUIPMENT AND MATERIAL HANDLING

Module identification code	306D6212
Semester(s) in which the module is taught	5th Semester
Person responsible for the module	Dr. Aryanti Virtanti Anas, ST., MT.
Lecturer	1. Dr. Aryanti Virtanti Anas, ST., MT. 2. Dr. Eng. Rini Novriyanti Sutardjo Tui, ST., M, BA., MT. 3. Rizki Amalia, ST., MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	Mining System
Intended learning outcomes	**Skill and Competence** 1. To apply logic and innovative thinking in developing knowledge and technology and problem solving within the area of expertise. (ILO-04) 2. To be able to apply principles of knowledge and technology in developing technical design of mining. (ILO-05)
Course Learning Objectives	1. Able to explain the specifications of mining equipment and its functions. 2. Able to calculate productivity and work efficiency of mining equipment. 3. Able to calculate maintainability, reliability, and safety of mine equipment.
Module content	1. Materials characteristic. 2. Mining equipment application. 3. Productivity and efficiency. 4. Reliability and maintainability. 5. Mining equipment maintenance. 6. Material handling management and cost. 7. Safety analysis of mining equipment.
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:**Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Dhillon, B.S., Mining Equipment Reability, Maintainability, and Safety, Springer Series in Reliability Engineering, London, 2008. SME., Mining Engineering Handbook, John Wiley & Sons, New York, 1973.
Date of last amendment made	

Course Module

HSE AND MINING POLICY

Module identification code	314D6222
Semester(s) in which the module is taught	6th Semester
Person responsible for the module	Dr.Eng. Purwanto, S.T., M.T.
Lecturer	1. Dr.Eng. Purwanto, S.T., M.T. 2. Dr. Eng. Rini Novrianti Sutardjo Tui, ST., MT.
Type of teaching	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	-
Intended learning outcomes	**Attitude and Competence** 1. To internalize academic value, norm, and ethic, also to effectively communicate in community life. (ILO-01) 2. To be able to apply principles of knowledge and technology in developing technical design of mining. (ILO-05) 3. To be able to integrate principles of physics and mathematics in reviewing mining geomechanics. (ILO-08) 4. To be able to integrate concept of ecotechnology in developing technical design of coal and mineral. (ILO-10)
Course Learning Objectives	1. Able to explain the regulations and the application of HSE in the mining industry. 2. Able to explain government policies related to the mining industry
Module content	1. Legal basis of HSE in mining environment. 2. SOP of mining activity. 3. HSE management system. 4. Job Safety Analysis. 5. Frequency rate and Severity rate analysis. 6. Emergency management. 7. Mining industry law and regulation. 8. Mining policies. 9. Coal management policies in Indonesia. 10. Small-scale mining existence and management in Indonesia. 11. Mining policies and other related sectors relations
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay

Forms of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Michael Karmis , Mine Health and Safety Management-Society for Mining B.S Dhillon Mine Safety A Modern Approach Springer_Series in Reliability Engineering William A. Sullivan, Mining Law & Regulatory Practice in Indonesia_ A Primary Reference Source-Wiley (2013) Undang-undang Mineral dan Batubara No. 4/2009.
Date of last amendment made	

Course Module **MINE PLANNING**	
Module identification code	315D6233
Semester(s) in which the module is taught	6th semester
Person responsible for the module	Dr-Eng. Muhammad Ramli
Lecturer	1. Dr-Eng. Muhammad Ramli 2. Dr. Ir. Irzal Nur, M.T 3. Dr. Aryanti Virtanti Anas, S.T, M.T. 4. Nirmana Fiqra Qaidahiyani, S.T., M.T. 5. Rizki Amalia, S.T., M.T.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 3 x 50 minutes. o Structured assignments; 16 x 3 x 60 minutes. o Self-learning; 16 x 3 x 60 minutes. 2. Practical; o Laboratory or field activity 3 x 100 minutes o Self-learning: 3 x 70 minutes- 3. Total workload = 8670 minutes.
Credit point	3 credits
Prerequisites	Mining System, Mine Equipment and Material Handling
Intended learning outcomes	**Knowledge, Skill, and Competence** 1. To acquire concepts of technology of mining (ILO-03) 2. To apply logic and innovative thinking in developing knowledge and technology and problem solving within the area of expertise (ILO-04) 3. To be able to apply principles of knowledge and technology in developing technical design of mining (ILO-05)
Course Learning Objectives	1. Able to create block model for mineral deposits 2. Able to create mining technical design 3. Able to arrange production scheduling 4. Able to perform financial evaluation of the mining plan design
Module content	1. Resources block model 2. Pit limit design 3. Production scheduling 4. Financial analysis
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture.
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Practicum
Recommended literature	Hustrulid W., and Kuchta, M., 2004, *Open Pit Mine Planning and Design*, Volume 1 – Fundamentals, A.A. Balkema Publishers, New York. Hartman H.L. (senior editor)., 1992, SME Mining Engineering Handbook, Society for Mining, Metallurgy, and Exploration, Inc. Littleton, Colorado. Read J., and Stace P (ed)., 2009, Guideline for Open Pit Slope Design, Csiro Publishing, Australia.
Date of last amendment made	

Course Module

FIELD WORK/SPECIAL TOPIC

Module identification code	401D6232
Semester(s) in which the module is taught	7th and 8th Semester
Person responsible for the module	Head of Department
Lecturer	Head of The Laboratory
Type of teaching,	Teaching methods used in this course are: o Project based learning o Problem based learning o Presentation
Workload	106.67 hour
Credit point	2 credits
Prerequisites	-
Intended learning outcomes	**Attitude and Skill** 1. To internalize academic value, norm, and ethic, also to effectively communicate in community life. (ILO-01) 2. To apply logic and innovative thinking in developing knowledge and technology and problem solving within the area of expertise. (ILO-04)
Course learning objectives	1. Able to describe profiles and management systems in the mining industry 2. Able to identify problems that occur in the mining industry 3. Able to explain the application of technology from mining industry companies/agencies.
Module content	1. Field work/special topik proposal 2. Field work/special topic report 3. Presentation of field work/special topic report
Applicability	Compulsory in Bachelor Degree in Mining Engineering.
Admission and Examination requirement	1. Complete the field work and obtain a certificate. 2. Finished the field work/special topic final report
Form of assessment	Assessment is carried out based on: o Final report o Presentation
Recommended literature	Anomim, 2007, Mining Safety and Healt Research at NIOSH, The National Academic Press, Washington. Zegong, L., Kicki, J., and Sobczyk, 2010, Mine Safety and Efficient Exploitation Facing Challenges of the 21st Century, CRC Press.
Date of last amendment made	

Course Module

STUDENT COMMUNITY SERVICE

Module identification code	499U004
Semester(s) in which the module is taught	7th and 8th Semester
Person responsible for the module	P2KKN
Lecturer	P2KKN
Type of teaching,	Teaching methods used in this course are: o Project based learning o Field Work o Presentation
Workload	213.33 hours
Credit point	4 credits
Prerequisites	-
Intended learning outcomes	**Attitude** To internalize academic value, norm, and ethic, also to effectively communicate in community life. (ILO-01)
Course learning objectives	1. Able to apply the concept of science in teamwork and interdisciplinary. 2. Able to instill personality values, tenacity, work ethic and responsibility, independence, leadership, and entrepreneurship.
Module content	This module covers the process of work learning process, research, professional, local government, participation, and partnership. Work learning process: student community service acts as a media for appliance of theories/concept/ideas from all of knowledge/theory that have been gained by participants in the colleges. o Research: learning process in the location of student community service can become an inspiration to do the research. o Professional: work interdisciplinary and interdependently of mathematics and natural sciences. o Local government: integration program with local government activity. o Participation: increasing the independency of society so they can achieve their increasing of health and wealth. o Partnership: teamwork with all of another field of study.
Applicability	Compulsory in Bachelor Degree in Mining Engineering.
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture.
Form of assessment	Assessment is carried out based on: o Individual assignment o Group assignment o Attendance – summary from presence list. o Final report
Recommended literature	Anomim, 2007, Mining Safety and Healt Research at NIOSH, The National Academic Press, Washington. Zegong, L., Kicki, J., and Sobczyk, 2010, Mine Safety and Efficient Exploitation Facing Challenges of the 21st Century, CRC Press.
Date of last amendment made	

Course Module

SCIENTIFIC COMMUNICATION TECHNIQUE

Module identification code	317D6222
Semester(s) in which the module is taught	6th Semester
Person responsible for the module	Dr. Aryanti Virtanti Anas, ST., MT.
Lecturer	1. Dr. Aryanti Virtanti Anas, ST., MT. 2. Dr.Eng. Rini Novrianti Stutardjo Tui, ST., MT.
Type of teaching	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	-
Intended learning outcomes	**Attitude** To internalize academic value, norm, and ethic, also to effectively communicate in community life. (ILO-01)
Course Learning Objectives	1. Able to explain research methods 2. Able to write research proposal 3. Able to present research proposal
Module content	1. Stages of scientific research process. 2. Formulation of research problem. 3. Research hypothesis. 4. Data collection technique. 5. Processing and data analysis. 6. References. 7. Research proposal. 8. Research reports. 9. Scientific article.
Applicability	Compulsory in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Oral exam: Research proposal presentation
Forms of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Dajan, A., 1995, Pengantar Metode Statistik, Jilid I, Cetakan ke-18, LP3ES, Jakarta. Gulo, W., 2002, Metodologi Penelitian, Grasindo, Jakarta Hall, G.M., 2003, How to Write a Paper, BMJ Publishing Group (3rd Edition), London.

	Sukandarrumidi, R., 2006, Metode Penelitian, Gadjah Mada University Press. Yogyakarta Supranto, J., 2004, Proposal Penelitian, Penerbit Universitas Indonesia, Jakarta.
Date of last amendment made	

Course Module **BACHELOR THESIS**	
Module identification code	403D6234
Semester(s) in which the module is taught	7th and 8th Semester
Person responsible for the module	Head of Department
Lecturer	Head of Laboratory
Type of teaching,	Teaching methods used in this course are: o Bachelor thesis counseling o Self-learning o Presentation
Workload	170 minutes/week/semester that equivalent to 16 weeks meeting.
Credit point	4 credits
Prerequisites	-
Intended learning outcomes	**Attitude and Skill** 1. To internalize academic value, norm, and ethic, also to effectively communicate in community life. (ILO-01) 2. To acquire concepts of technology of mining. (ILO-03) 3. To apply logic and innovative thinking in developing knowledge and technology and problem solving within the area of expertise. (ILO-04)
Course learning objectives	1. Able to compile research reports systematically 2. Able to present the results of the research 3. Able to defend the argument of the research results
Module content	1. Bachelor thesis proposal 2. Bachelor thesis counseling 3. Bachelor thesis presentation
Applicability	Compulsory in Bachelor Degree in Mining Engineering.
Admission and Examination requirement	1. Complete the bachelor thesis 2. Carry out bachelor thesis counseling at least 8 times 3. Attended another student's bachelor thesis seminar at least 10 times
Form of assessment	Assessment is carried out based on: o Bachelor thesis o Presentation
Recommended literature	Anomim, 2007, Mining Safety and Healt Research at NIOSH, The National Academic Press, Washington. Zegong, L., Kicki, J., and Sobczyk, 2010, Mine Safety and Efficient Exploitation Facing Challenges of the 21st Century, CRC Press.
Date of last amendment made	

Course Module

HYDROTHERMAL ALTERATION

Module identification code	410D6212
Semester(s) in which the module is taught	1st Semester of Academic Year
Person responsible for the module	Dr. Ir. Irzal Nur, MT.
Lecturer	Dr. Ir. Irzal Nur, MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	Exploration Engineering
Intended learning outcomes	**Competence** 1. To be able to apply basic principles of geology, and engineering of physics, chemistry, mathematics, in analyzing and evaluating coal and mineral resources. (ILO-06)
Course learning objective	1. Able to describe hydrothermal alteration minerals 2. Able to do hydrothermal alteration minerals mapping 3. Able to interpret the results of hydrothermal alteration mineral mapping for the benefit of mineral deposit exploration.
Module content	1. Mineral alteration and the importance of the role of hydrothermal alteration. 2. Types of hydrothermal ore mineral deposits and their alteration mineral associations. 3. Hydrothermal alteration minerals macroscopically, both in hand specimen samples and core samples. 4. Mapping and sampling of mineral alteration. 5. Hydrothermal alteration sampling preparation for pertrographic (microscopic) analysis and XRD analysis. 6. Petrographic analysis for hydrothermal alteration studies. 7. XRD diffractograms for hydrothermal alteration studies. 8. Grouping alteration mineral assemblages and describing hydrothermal alteration zoning maps. 9. Interpreting the physico-chemical conditions of hydrothermal alteration formation.
Applicability	Elective Subject in Bachelor Degree in Mining Engineering.
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:**

	○ Students must attend 15 minutes before the class starts. ○ Students must switch off all electronic devices. ○ Students must inform the lecturer if they will not attend the class due to sickness, etc. ○ Students must submit all class assignments before the deadline. ○ Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: ○ Individual assignment – written. ○ Midterm exam – written. ○ Final exam – written and/or oral.
Recommended literature	Corbett, G. J., and Leach, T. M., 1998. *Southwest Pacific Rim Gold Copper Systems: Structure, Alteration, and Mineralization*, Society of Economic Geologists, Special Publication, 6, 237 p. Cox, D. P., and Singer, D. A., 1987. Mineral Deposit Models,U. S. Geological Survey Bulletin 1693. Gemmel, J. B., 2007. *Hydrothermal Alteration Associated with The Gosowong Epithermal Au-Ag Deposit, Halmahera, Indonesia*; Mineralogy, Geochemistry, and Exploration Implications, Economic Geology, 102, 893-922. Grant, J. A., 1986. *The Isocon Diagram – A Simple Solution to Gresens' Equation for Metasomatic Alteration*, Economic Geology, 81, 1976-1982. Gresens, R. L., 1967. *Composition-Volume Relationships of Metasomatism*, Chemical Geology, 2, 47-65. Hedenquist, J. W., Izawa, E., Ambas, A., and White, N. C., 1996. *Epithermal Gold Deposits: Styles, Characteristics, and Exploration*, Resource Geology, Special Publication, 1, Tokyo. Hedenquist, J. W., Arribas, R. A., and Gonzales-Unen, E., 2000. *Exploration for Epithermal Gold Deposits*, Reviews in Economic Geology, 13, 245-277. Misra, K. C., 1999. *Understanding Mineral Deposits*. Kluwer Academic Publ., 758 p. Pirajno, F., 2009. *Hydrothermal Processes and Mineral Systems*, Springer Science+Business-Verlag Media B. V., Australia, 1250 p. Robb, L., 2005. *Introduction to Ore-Forming Processes*, Blackwell Publ., Co., USA, UK, Australia, 373 p. Thompson, A. J. B., and Thompson, J. F. H., 1996. *Atlas of Alteration, A Field and Petrographic Guide to Hydrothermal Alteration Minerals*, Geological Association of Canada, Mineral Deposits Division, 118 p.
Date of last amendment made	

Course Module **MINERAGRAPHY**	
Module identification code	411D6212
Semester(s) in which the module is taught	1st Semester of Academic Year
Person responsible for the module	Dr. Ir. Irzal Nur, MT.
Lecturer	Dr. Ir. Irzal Nur, MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	Exploration Engineering
Intended learning outcomes	**Knowledge and Competence** 1. To understand basic principles of geology, mathematics, physics, and chemistry, regarding the area of engineering. (ILO-02) 2. To be able to apply basic principles of geology, and engineering of physics, chemistry, mathematics, in analyzing and evaluating coal and mineral resources. (ILO-06)
Course learning objectives	1. Able to identify ore minerals (metals) using an ore microscope. 2. Able to interpret the textural and genetic relationships of ore minerals.
Module content	1. Parts of polarizing microscope and binoculer microscope. 2. Defenition and principles of optical mineralogy, isotropic and anisotropic lights. 3. Stages of sample preparation of thin sections and polished sections. 4. Types of hydrothermal alteration minerals under a microscope. 5. Optical properties and mineral characteristics under a microscope in parallel-nicol conditions (color, pleochroism, shape, cleavage, fraction, relief, and refractive index). 6. Optical properties and mineral characteristics under a microscope in cross-nicol conditions (double refraction, type and angle of extinction, mineral orientation, and determination of plagioclase type). 7. Ore minerals under a microscope in parallel-nicol conditions based on color, reflectance, bireflectance, and reflection, as well as pleochroism. 8. Ore minerals under a microscope in cross-nicol conditions based on anisotropism and internal reflection. 9. Primary growth textures (magmatic textures and open-space textures). 10. Replacement textures and cooling-related textures (exsolution, inversion, and thermal stress). 11. Deformation-related textures (twinning, curvature) and metamorphic-related recrystallization. 12. Paragenetic sequence of minerals under a microscope. 13. Ore mineral assemblages in igneous and volcanic rocks. 14. Ore mineral assemblages in sedimentary and metamorphic rocks.
Applicability	Elective Subject in Bachelor Degree in Mining Engineering.
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices.

	○ Students must inform the lecturer if they will not attend the class due to sickness, etc. ○ Students must submit all class assignments before the deadline. ○ Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: ○ Individual assignment – written. ○ Midterm exam – written. ○ Final exam – written and/or oral.
Recommended literature	Craig, J. R., and Vaughan, D. J., 1981. *Ore microscopy and Ore Petrography*, John Wiley and Sons, Inc., Canada, 406 p. Gribble, C. D., and Hall, A. J., 1985. *A Practical Introduction to Optical Mineralogy*, George Allen & Unwin (Publ.) Ltd., London, UK, 249 p. Hurlbut, C. S., and Clein, C., 1977. *Manual of Mineralogy*, John Wiley & Sons, Inc., USA. Kerr, . F., 1982. *Optical Mineralogy*, Third Edition, Mc-Graw-Hill, New York, USA. Peckett, A., Phillips, R., and Henry, N. F. M., 1992. *The Colour of Opaque Minerals*, John Wiley & Sons, Inc., England. Pracejus, B., 2008. *The Ore Minerals Under The Microscope, an Optical Guide*. Atlases in Geoscience 3, Elsevier, Netherlands, 875 p. Thompson, A. J. B., and Thompson, J. F. H., 1996. *Atlas of Alteration, A Field and Petrographic Guide to Hydrothermal Alteration Minerals*, Geological Association of Canada, Mineral Deposits Division, 118 p. Uytenbogaardt, W., and Burke, E. A. J., 1971. *Tables for Microscopic Identification of Ore Minerals*, Elsevier Sc. Publ. Co., New York.
Date of last amendment made	

Course Module

TUNNEL ENGINEERING

Module identification code	412D6212
Semester(s) in which the module is taught	1st Semester of Academic Year
Person responsible for the module	Dr.Eng. Purwanto, S.T., M.T.
Lecturer	1. Dr.Eng. Purwanto, S.T., M.T. 2. Nirmana Fiqra Qaidahiyani, S.T., M.T.
Type of teaching	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	Mine Geotechnics
Intended learning outcomes	**Skill and Competence** 1. To apply logic and innovative thinking in developing knowledge and technology and problem solving within the area of expertise. (ILO-04) 2. To be able to integrate principles of physics and mathematics in reviewing mining geomechanics. (ILO-08)
Course learning objectives	1. Students are able to systematically describe methods of investigation and analysis of geotechnical data related to tunnel construction work. 2. Students are able to design tunnel and support modelling properly.
Module content	1. General principles for the design of the cross-section 2. Engineering geology aspects for design and classification 3. Site investigation 4. Tunnel construction techniques 5. Ground improvement techniques and lining systems 6. Health and safety, and risk management in tunnelling
Applicability	Elective in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Forms of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Maidl, B., Thewes, M., Maidl, U., 2014, Handbook of Tunnel Engineering II, Basics and Additional Services for Design and Construction, Ernst and Son, Berlin, Germany. Maidl, B., Thewes, M., Maidl, U., 2014, Handbook of Tunnel Engineering Volume I: Structures and Methods, Ernst and Son, Berlin, Germany.
Date of last amendment made	

Course Module

SLOPE STABILITY

Module identification code	413D6212
Semester(s) in which the module is taught	1st Semester of Academic Year
Person responsible for the module	Dr.Eng. Purwanto, S.T., M.T.
Lecturer	1. Dr.Eng. Purwanto, S.T., M.T. 2. Nirmana Fiqra Qaidahiyani, S.T., M.T.
Type of teaching	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	Mine Geotechnics
Intended learning outcomes	**Skill and Competence** 1. To apply logic and innovative thinking in developing knowledge and technology and problem solving within the area of expertise. (ILO-04) 2. To be able to integrate principles of physics and mathematics in reviewing mining geomechanics. (ILO-08)
Course learning objectives	1. Able to identify the factors of mining activity related to mine slope stability 2. Able to implement the slope stabilisation in mining industry.
Module content	1. Principles and methods of rock slope design 2. Structural geology and data interpretation 3. Site investigation and geological data collection 4. Rock properties 5. Identification of modes of slope instability 6. Plane failure 7. Wedge failure 8. Toppling failure 9. Circular failure
Applicability	Elective in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Forms of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	I. Arif, “Geoteknik Tambang,” PT Gramedia Pustaka Utama, 2016. D. C. Wyllie and C. W. Mah, “Rock Slope Engineering: Civil and Mining 4th Edition,” Taylor & Francis Group, 2004.

	J. Read and P. Stacey, “Guidelines for Open Pit Slope Design,” CSIRO, 2009. S. Wang, P. C. Hagan, and C. Cao, “Advances in Rock-Support and Geotechnical Engineering,” Elsevier, 2016. The Ministry of Energy and Mineral Resources of the Republic of Indonesia (2018). Decree of the Ministry of Energy and Mineral Resources of the Republic of Indonesia Number 1827 K/30/MEM/2018 concerning Guidelines for the Implementation of Good Mining Engineering Rules.
Date of last amendment made	

Course Module

CARBONATE ROCKS UTILIZATION

Module identification code	414D6212
Semester(s) in which the module is taught	1st Semester of Academic Year
Person responsible for the module	Dr. Sufriadin, ST., MT
Lecturer	1. Dr. Sufriadin, ST., MT 2. Dr.phil.nat. Sri Widodo, ST., MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credits
Prerequisites	Mineral Processing
Intended learning outcomes	**Competence** To be able to study and take advantage of knowledge and technology in engineering of coal and mineral processing. (ILO-09)
Course learning outcomes	1. To be able to describe characteristics of carbonate rocks and their analytical methods. 2. To be able to explain the processing and utilization of carbonate rocks in various industries.
Module content	1. Basic concept of carbonate rock utilization 2. Mineralogy and chemical composition of carbonate rocks 3. Carbonate rock analysis method 4. Carbonate rock distribution in Indonesia 5. Processing and utilization of carbonate rock in cement industry 6. Utilization of carbonate rocks as construction materials 7. Utilization of carbonate rocks in agriculture sector. 8. Utilization of carbonate rocks in environmental sector.
Applicability	Elective in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Chang, L. L. Y., Howie, R. A., dan Zussman, J., 1994, Rock-Forming Minerals: Non silicates, Vol. 5B (2nd edition), Geological Society, London. Chatterjee, K. K., 2009, The Use of Industrial Minerals, Rocks and Freshwater, Nova Science Publisher, New York.

	Manning, D. A. C., 1995, Introduction to Industrial Minerals, Chapmann & Hall, London. Oates, J.A.H., 1998, Lime and Limestone: Chemistry, Technology, Production and Uses, Wiley-VCH, New York. Sahala, S. and Arifin, M., 1997, Bahan Galian Industri, Pusat Penelitian dan Pengembangan Teknologi Mineral (PPTM), Bandung
Date of last amendment made	

Course Module

ORGANIC GEOCHEMICAL ANALYSIS

Module identification code	415D6212
Semester(s) in which the module is taught	1st Semester of Academic Year
Person responsible for the module	Dr. Sufriadin, ST., MT
Lecturer	1. Dr. Sufriadin, ST., MT 2. Dr.phil.nat. Sri Widodo, ST., MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	-
Intended learning outcomes	**Competence** To be able to study and take advantage of knowledge and technology in engineering of coal and mineral processing. (ILO-09)
Course learning objectives	1. Able to explain the concept, genesis, and characteristics of mineral resources derived from organic compounds. 2. Able to analyze mining materials derived from organic materials and their utilization for human and industrial needs. 3. Able to apply natural science related to organic geochemical analysis.
Module content	1. Genesis and availability of coal, petroleum, and oil shale 2. Physical and chemical properties of coal, petroleum and oil shale 3. Sample handling and preparation 4. Ultrasonic and soxhlet extraction method 5. Chromatography gas
Applicability	Elective in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assesment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Anggayana, K., 2002. eksplorasi Batubara, Departemen Teknik Pertambangan, Fakultas Ilmu Kebumian dan Teknologi Mineral, Institut Teknologi Bandung. Anggayana, K., Darijanto, T., Widodo, S., 2003. Studi Mineral Pirit Sebagai Salah Satu Sumber Sulfur Pada Batubara: Kasus Batubara Dari Kabupaten Barru, Sulawesi Selatan, Journal Teknologi Mineral-FIKTM-Institut Teknologi Bandung, Vol. X (1), 3-14.

	Diessel, C.F.K., 1993. Coal Bearing Depositional Systems, Gebrueder Berntraeger, Berlin-Stuttgart. Kalkreuth, W., 1998. Introduction to Organic Petrology, Institut fuer Geologie, Freie Universitaet Berlin, Germany. Stach, E. Mackowsky, M.Th., Teichmueller, M., Taylor, G.H., Chandra, D., Teichmueller R., 1982. Stach's Textbook of Coal Petrology, Gebrueder Borntaeger, Berlin-Stuttgart. Taylor G.H., Teichmueller, M., Davis, A., Diessel, C.F.K., Littke, R., Robert, P., 1998. Organic Petrology, Gebrueder Borntaeger, Berlin- Stuttgart. Teichmueller, M., 1989. The Genesis of Coal from the View Point of Coal Petrology, Int. Journal of Coal Geology,12. Van Krevelen, D.W., 1993. Coal Typology-Chemistry-Physics Constitution, 3rd Comp. Rev. ed. Elsevier, Amsterdam. Tissot, B.R., and Welte, D.H., 1984. Petroleum formation and occurrence. Second revised and enlarger edition.Springer-Verlag Berlin Heidelberg New York Tokyo. Peters, K.E., Walters, C.C., Moldowan J.M., 2005. The biomarker guide volume 1 Biomarkers and isotopes in the environment and human history, Carbridge University Press.
Date of last amendment made	

Course Module **MINE RECLAMATION**	
Module identification code	416D6212
Semester(s) in which the module is taught	1th semester of academic year
Person responsible for the module	Dr-Eng. Ir. Muhammad Ramli, MT
Lecturer	1. Dr-Eng. Ir. Muhammad Ramli, MT 2. Andi Arumansawang, S.T, M.Sc.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	Structural Geology
Intended learning outcomes	**Competence** To be able to integrate concept of ecotechnology in developing technical design of coal and mineral (ILO-10)
Course learning objectives	1. Able to compile a mine reclamation plan document 2. Able to compile a mine closure plan document
Module content	1. Government regulation of mine reclamtion and mine closure 2. Reclamation plan 3. Reclamation strategy 4. Reclamation of mine waste dump 5. Revegetation 6. Evalution of mine reclamation implementation 7. Integrated mine closure concept 8. Integration mine closure in mine planning 9. Risk identificationin mine closure 10. Land use of mine closure 11. Evalution of mine closure implementation
Applicability	Elective in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Botin J.A., 2009, Sustainable Management of Mining Operations, Society for Mining, Metallurgy, and Exploration, Inc, Colorado. Jain, A., 2020, A Handbook on Mine Recalamation, Indian Council of Forestry

	Research and Education Hu Z., 2015, Legislation, Technology and Practice of Mine Land Reclamation, CRC Press, Leiden Groninger, J.W., Angel, P., Skouseh, J.G., and Barton C.D., 2007, Mine reclamation practices to enhance forest development through natural succession, www.researchgate.net/publication/237234342 Butler, T., 2018, Integrated Mine Closure, International Council on Mining and Metals. Morgan, R.P.C., 2005 Soil Erosion and Conservation, Blackwell Publishing Kuter, N., 2013, Reclamation of Degraded Landscapes due to Opencast Mining, Intech, http://dx.doi.org/10.5772/55796 Yu, X., Mu, C., and Zhang, D., 2020, Assessment of Land Reclamation Benefits in Mining Areas Using Fuzzy Comprehensive Evaluation, Sustainability 2020, 12, 2015; doi:10.3390/su12052015. Wang, J., Zhao F., Yang J., and Li X., 2017, Sustainability Analysis and Ecosystem Services Evaluation, Sustainability 2017, 9, 890; doi:10.3390/su9060890
Date of last amendment made	

Course Module

GROUNDWATER MODELLING

Module identification code	417D6212
Semester(s) in which the module is taught	1th semester of academic year
Person responsible for the module	Dr-Eng. Muhammad Ramli
Lecturer	1. Dr-Eng. Ir. Muhammad Ramli, M.T 2. Asta Arjunoarwan Hatta, S.T., M.T
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	Hydrogeology, Numerical Method
Intended learning outcomes	**Competence** To be able to integrate concept of ecotechnology in developing technical design of coal and mineral. (ILO-10)
Course Learning Objectives	1. Able to run groundwater model simulation using groundwater modeling software 2. Able to make reports on groundwater modeling results
Module content	1. Introduction to groundwater model 2. Conceptual mode 3. Boundary and Initial condition 4. Numerical simulation 5. Calibration and sensitivity analysis 6. Model calibration
Applicability	Elective in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Anderson MP., and Woessner MW., 2015, Applied Groundwater Modeling, Simulation of flow and advective transport (second edition). Academic Press, INC, New York. Harbaugh, A.W., 2005, MODFLOW-2005, The U.S. Geological Survey Modular Ground-Water Model—the Ground-Water Flow Process, US. Geological Survey, Virginia

	Randolf Rauch., 2010. Groundwater Modelling, An Introduction to groundwater flow and solute transport modelling with applications. Technishce Universitat Darmstadt: Germany Thomas E.Reily., 2001. System and Boundary Conceptualization in Ground-Water Flow Simulation. Techniques of Water-Resources Investigations of the United States Geological Survey. Book 3: Applications of Hydraulics, Chapter B8. Reston, Virginia Guidebook Groundwater Modeling using Visual Modflow Flex. 2019. Waterloo Hydrogeologic Inc. Canada
Date of last amendment made	

Course Module **ECONOMETRICS**	
Module identification code	418D6212
Semester(s) in which the module is taught	1st Semester of academic year
Person responsible for the module	Dr. Aryanti Virtanti Anas, ST., MT.
Lecturer	1. Dr. Aryanti Virtanti Anas, ST., MT. 2. Dr. Eng. Rini Novriyanti Sutardjo Tui, ST., M, BA., MT. 3. Rizki Amalia, ST., MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	-
Intended learning outcomes	**Skill and Competences** 1. To apply logic and innovative thinking in developing knowledge and technology and problem solving within the area of expertise. (ILO-04) 2. To be able to apply principles of economics, management and valuation techniques in planning and managing mineral and coal resources. (ILO-07)
Course Learning Objectives	1. Able to perform linear analysis using statistics software. 2. Able to forecast supply and demand of minerals. 3. Able to estimate the simultaneous equation model in mining industry.
Module content	1. Basic concept of econometrics 2. Linear regression 3. Hypothesis testing 4. BLUE assumption 5. Non-linear regression 6. Basic concept of time series 7. Autoregressive and distributed-lag model 8. Time series forecasting 9. Simultaneous equation model
Applicability	Elective in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assesment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Firdaus, M. 2011. Ekonometrika Suatu Pendekatan Aplikatif. Bumi Aksara. Jakarta.

	Gujarati, Damodar N., dan Porter, Dawn C. 2010. *Basic Econometric, 5th Edition*. Penerbit Salemba Empat, Jakarta. Supranto, J. 2005. Ekonometri Buku Satu. Ghalia Indonesia. Bogor.
Date of last amendment made	

Course Module

MODELLING SYSTEMS

Module identification code	419D6212
Semester(s) in which the module is taught	1st Semester of academic year
Person responsible for the module	Dr. Aryanti Virtanti Anas, ST., MT.
Lecturer	1. Dr. Aryanti Virtanti Anas, ST., MT. 2. Dr. Eng. Rini Novriyanti Sutardjo Tui, ST., M, BA., MT. 3. Rizki Amalia, ST., MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	-
Intended learning outcomes	**Skill and Competence** 1. To apply logic and innovative thinking in developing knowledge and technology and problem solving within the area of expertise. (ILO-04) 2. To be able to apply principles of economics, management and valuation techniques in planning and managing mineral and coal resources. (ILO-07)
Course Learning Objectives	1. Able to operate system dynamics software. 2. Able to create system dynamics models. 3. Able to simulate and analyze system dynamics models.
Module content	1. Basic concept of system dynamics 2. Model behavior 3. Application of system dynamics 4. Simulation and validation model 5. Policy analysis using system dynamics
Applicability	Elective in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assesment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Muhammadi, Aminullah, E., Soesilo, B. 2001. *Analisis Sistem Dinamis*. UMJ Press. Jakarta. Sterman, J.D. 2006. *Business Dynamics-Systems Thinking and Modeling for a Complex Word*. McGraw-Hill Companies, Inc. United States of America.
Date of last amendment made	

Course Module **ENTREPRENEURSHIP**	
Module identification code	421D6212
Semester(s) in which the module is taught	1st Semester of Academic Year
Person responsible for the module	Dr. Ir. Sufriadin, MT.
Lecturer	1. Dr. Ir. Sufriadin, MT. 2. Rini Novrianti, ST, MT
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	-
Intended learning outcomes	Skill and Competence 1. To apply logic and innovative thinking in developing knowledge and technology and problem solving within the area of expertise. (ILO-04) 2. To be able to apply principles of economics, management and valuation techniques in planning and managing mineral and coal resources. (ILO-07)
Course learning objectives	1. Students are able to analyze business strategy. 2. Students are able to design business plan proposals independently and creatively.
Module content	1. Personal Branding 2. Managing Ideas/Brain Storming 3. Components of a business plan 4. Market Survey 5. Positioning Business 6. Customer satisfaction 7. Writing a business case 8. SME's sources of capital 9. SME Financial Management 10. SME Proposal
Applicability	Elective in Bachelor Degree in Mining Engineering.
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.

Recommended literature	Butler, D., 2006, Enterprise Planning and Development: Small Business Start-Up, Survival and Development, Elsevier Modul Pelatihan UKM (SEDS), 2013 -2014, CIDA-UNHAS Whiteling, I, 2009, Start your own business, Crimson Publishing.
Date of last amendment made	

Course Module

GEOPHYSICS EXPLORATION

Module identification code	430D6202
Semester(s) in which the module is taught	2nd Semester of Academic Year
Person responsible for the module	Asran Ilyas, ST. MT. Ph.D.
Lecturer	1. Asran Ilyas, ST. MT. Ph.D. 2. Dr.phil.nat. Sri Widodo, ST. MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	Exploration Engineering.
Intended learning outcomes	**Knowledge and Competence** 1. To understand basic principles of geology, mathematics, physics, and chemistry, regarding the area of engineering. (ILO-02) 2. To be able to apply basic principles of geology, and engineering of physics, chemistry, mathematics, in analyzing and evaluating coal and mineral resources. (ILO-06)
Course learning objectives	1. Able to explain the basic understanding of geophysics and the scope of geophysics in geophysical surveys of mineral deposits. 2. Students are able to distinguish types of geophysical methods in mineral deposit exploration surveys. 3. Students are able to apply geophysical methods in the field of exploration.
Module content	1. Background and understanding of exploration geophysics and mineral deposits. 2. Physical and chemical properties of matter and mineral deposits, 3. Measured physical properties. 4. Geophysical methods in mineral deposit exploration. 5. Exploration geophysical survey equipments.
Applicability	Elective in Bachelor Degree in Mining Engineering.
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Meju, A. M., 1994. *Geophysical Data Analysis: Understanding Inverse Problem Theory and Practice*, Society of Exploration Geophysicists (SEG).

	Haldar, S. K., 2013. *Mineral Exploration: Principles and Applications*, Elsevier, United States of America. International journals and proceedings related to exploration geophysics.
Date of last amendment made	

Course Module

GEOCHEMISTRY EXPLORATION

Module identification code	422D6222
Semester(s) in which the module is taught	2nd Semester of Academic Year
Person responsible for the module	Dr. Ir. Irzal Nur, MT.
Lecturer	1. Dr. Ir. Irzal Nur, MT. 2. Asran Ilyas, ST. MT. Ph.D.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	Exploration Engineering
Intended learning outcomes	**Knowledge and Competence** 1. To understand basic principles of geology, mathematics, physics, and chemistry, regarding the area of engineering. (ILO-02) 2. To be able to apply basic principles of geology, and engineering of physics, chemistry, mathematics, in analyzing and evaluating coal and mineral resources. (ILO-06)
Course learning objective	1. Able to plan geochemical exploration activities. 2. Able to apply geochemical exploration sampling method. 3. Able to process and interpret geochemical exploration data.
Module content	1. Conceptual model of geochemical prospecting. 2. Principles of works, objectives, and stages of rock geochemical prospecting activities. 3. Principles of works, objectives, and stages of soil geochemical prospecting activities. 4. Principles of works, objectives, and stages of river sediments prospecting activities. 5. Principles of works, objectives, and stages of heavy minerals prospecting activities. 6. Principles of works, objectives, and stages of hidrogeochemical prospecting activities. 7. Principles of works, objectives, and stages of biochemistry and geobotany prospecting activities. 8. Principles of works, objectives, and stages of atmogeochemistry prospecting activities. 9. Types of chemical analysis and sample preparation. 10. Types of geochemical data processing. 11. Exploration geochemical anomaly maps.
Applicability	Elective in Bachelor Degree in Mining Engineering.
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc.

	○ Students must submit all class assignments before the deadline. ○ Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: ○ Individual assignment – written. ○ Midterm exam – written. ○ Final exam – written and/or oral.
Recommended literature	Albarede, F., 2003. *Geochemistry, An Introduction*, Cambridge University Press, Cambridge, UK, 248 p. Chaussier, J. B., and Morer, J., 1987. *Mineral Prospecting Manual*, North Oxford Academic Publishers Ltd. Evans, A. M., 1995. *Introduction to Mineral Exploration*, Blackwell Science Ltd., Oxford and Northampton, Great Britain, 396 p. Foster, R. P., 1993. *Gold Metallogeny and Exploration*, Chapman & Hall, London, Great Britain, 432 p. Faure, G., 1991. *Principles and Applications of Geochemistry, Second Edition*, Prentice-Hall, Inc., USA, 600 p. Gill, R., 1996. *Chemical Fundamentals of Geology, Second Edition*, Chapman & Hall, London, UK, 290 p. Gocht, W. R., Zantop, H., and Eggert, R. G., 1988. *International Mineral Economics – Mineral Exploration, Mine Evaluation, Mineral Markets*, International Mineral Policies, Springer-Verlag. Howarth, R. J., 1985. *Statistics and Data Analysis in Geochemical Prospecting, Handbook of Exploration Geochemistry, Volume 2*, Elsevier Science Publishing Company, Inc., Netherlands, 437 p. Kuzvart, M., and Bohmer, M., 1986. *Prospecting and Exploration of Mineral Deposits*, *Second Completed Revised Edition*, Elsevier Science Publishing Company, Inc., Prague, Czechoslovakia, 508 p. Moon, C. J., Whateley, M. K. G, Evans, A. M., 2006. *Introduction to Mineral Exploration,* Second Edition, Blackwell Publishing, USA, UK, Australia, 481 p. Peters, W. C., 1978. *Exploration and Mining Geology*, Second Edition, John Wiley & Sons, Canada, 685 p. Rollinson, H., 1993. *Using Geochemical Data: Evaluation, Presentation, Interpretation*, Longman Group, UK, 351 p. Rose, A. W., Hawkes, H. E., and Webb, J. S., 1979. *Geochemistry in Mineral Exploration, Second Edition*, Academic Press Ltd., London, Great Britain, 637 p.
Date of last amendment made	

Course Module

UNDERGROUND STABILITY

Module identification code	424D6222
Semester(s) in which the module is taught	2nd Semester of Academic Year
Person responsible for the module	Dr.Eng. Purwanto, S.T., M.T.
Lecturer	1. Dr.Eng. Purwanto, S.T., M.T. 2. Nirmana Fiqra Qaidahiyani, S.T., M.T.
Type of teaching	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	Mine Geotechnics
Intended learning outcomes	**Competence** To be able to integrate principles of physics and mathematics in reviewing mining geomechanics. (ILO-08)
Course learning objectives	1. Students are able to explain stress analysis methods and excavation principles in underground mines properly. 2. Students are able to analyze and design underground stability model systematically.
Module content	1. Rock mass structure and characterization 2. Rock mass properties 3. In situ and induced stress 4. Excavation design in massive elastic rock 5. Excavation design in stratified rock 6. Excavation design in blocky rock 7. Underground mine stability 8. Monitoring systems and Numerical modelling
Applicability	Elective in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Forms of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Brady, B.H.G., Brwon, E.T., 2004, Rock mechanics for underground mining, Kluver academic publishers, London Zhu, W, Zhao J., 2004, Stability analysis and modelling of underground excavations in fractured rocks, Elsevier, London
Date of last amendment made	

Course Module

TECHNOLOGY OF ROCK SUPPORT AND REINFORCEMENT

Module identification code	425D6222
Semester(s) in which the module is taught	2nd Semester of Academic Year
Person responsible for the module	Dr.Eng. Purwanto, S.T., M.T.
Lecturer	1. Dr.Eng. Purwanto, S.T., M.T. 2. Nirmana Fiqra Qaidahiyani, S.T., M.T.
Type of teaching	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	Mine Geotechnics
Intended learning outcomes	**Competence** To be able to integrate principles of physics and mathematics in reviewing mining geomechanics. (ILO-08)
Course learning objectives	1. Students are able to describe methodologies in the design of rock support and reinforcement systematically. 2. Students are able to explain various applications of technology of rock support and reinforcement properly.
Module content	1. Modes of instability of underground openings 2. Philosophy of rock support and reinforcement 3. Rock bolts (rock anchors) 4. Support members 5. Numerical modelling
Applicability	Elective in Bachelor Degree in Mining Engineering
Admission and examination requirements	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Forms of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Omer Aydan; 2018, Rock Reinforcement and Rock Support, ISRM Book Series, CRC Press, London. Tatiya, R.R, 2013, Surface and Underground Excavations – Methods, Techniques and Equipment, A.A. Balkema Publishers Leiden. Brady, B. H. and Brown, E. T., 1993, Rock Mechanics for Underground Mining, Kluwer Academic Publishers, Inc., New York.

	Szwilski, A. B. and Richards, M. J. 1987. Underground Mining Methods and Technology. Elsevier, Amsterdam. Hutchinson, D.J., and Diederichs, M.S., 1996, Cablebolting in underground mines, Bitech publishers, Canada.
Date of last amendment made	

Course Module

EXTRACTIVE METALLURGY

Module identification code	427D6222
Semester(s) in which the module is taught	2nd Semester of Academic Year
Person responsible for the module	Dr. Sufriadin, ST., MT
Lecturer	1. Dr. Sufriadin, ST., MT 2. Dr.phil.nat. Sri Widodo, ST., MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	Mineral Processing
Intended learning outcomes	**Competences** To be able to study and take advantage of knowledge and technology in engineering of coal and mineral processing. (ILO-09)
Course learning outcomes	1. To be able to describe recent development in technology and basic processes in extractive metallurgy. 2. To be able to explain technological options in extractive metallurgy.
Module content	1. Metallurgical Extraction Technology Development 2. Metallurgical Thermodynamics And Kinetics 3. Material Transport In Metallurgy 4. Pyrometallurgy, Hydrometallurgy, Dan Electrometallurgy
Applicability	Elective in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assesment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Habashi, F., 1993, A Textbook of Hydrometallurgy, Metallurgie Extractive, Enr. Quebec. Habashi, F., 1997, Handbook of Extractive Metallurgy (4 Volumes), Vignes, A., 2011, Extractive Metallurgi-1: Basic Thermodynamics and Kinetics, Wiley, London. Vignes, A, 2011, Extractive Metallurgy-2: Metallurgical Extraction Process, Wiley, London. Vignes, A, 2011, Extractive Metallurgy-3: Process Operation and Routes, Wiley, London
Date of last amendment made	

Course Module

LATERITIC ORE PROCESSING

Module identification code	415D6212
Semester(s) in which the module is taught	2nd Semester of Academic Year
Person responsible for the module	Dr. Sufriadin, ST., MT
Lecturer	1. Dr. Sufriadin, ST., MT 2. Dr.phil.nat. Sri Widodo, ST., MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	Mineral Processing
Intended learning outcomes	**Competences** To be able to study and take advantage of knowledge and technology in engineering of coal and mineral processing. (ILO-09)
Courses learning outcomes	1. To be able to describe classification and factors controlling lateritic ore formation. 2. To be able to explain the methods for beneficiation of lateritic ores 3. To be able to explain the recent technologies for the extraction of main metals and by-products from lateritic ores.
Module content	1. Classification and factors controlling of lateritic ore formation. 2. Mineralogy and geochemistry of lateritic ores. 3. Methods of analyses of ore quality 4. Beneficiation methods to increase the valuable metals in low grade laterite ores. 4. Technologies for extraction methods of main metals from lateritic ores (Al, Ni, Fe). 5. Recovery of by-product (eg. Co, Sc and REE) from waste and tailing.
Applicability	Elective in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assesment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Crundwell, F.C., Moats, M.S., Ramachandran, V., Robinson, T.G., and Davenport, W.G., 2011, Extractive Metallurgy of Nickel, Cobalt and Platinum-Group Metals., Elsevier, Amsterdam.

	Freyssinet PH. Butt, C.R.M. Morris, R.C. Piantone, P., 2005, Ore forming processes related to lateritic weathering. Economic Geology 100th Anniversary Volume pp. 681 – 722. Nahon, D.B. Boulange, B. and Colin, F., 1992, Metallogeny of weathering: an Introduction, In Martini and Chesworth, Editors: Weathering, Soils & Paleosols Elsevier, Amsterdam, 445-471.
Date of last amendment made	

Course Module

GROUNDWATER POLLUTION

Module identification code	428D6222
Semester(s) in which the module is taught	2th semester of academic year
Person responsible for the module	Dr-Eng. Muhammad Ramli
Lecturer	1. Dr-Eng. Ir. Muhammad Ramli, M.T 2. Asta Arjunoarwan Hatta, S.T., M. T
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	Hydrogeology, Mine Hydrology
Intended learning outcomes	**Competence** To be able to integrate concept of ecotechnology in developing technical design of coal and mineral. (ILO-10)
Course learning objectives	1. Able to explain sources of groundwater contaminant. 2. Able to simulate groundwater pollution using software.
Module content	1. Groundwater quality analysis 2. Contaminant sources 3. Groundwater flow equation 4. Mass Transport o Molecular diffusion o Advection o Mechanical dispersion o Hydrodynamic dispersion 5. Numerical modeling
Applicability	Elective in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Fetter, C.W. Boving, T., and Kreamer D., 2018. *Contaminant Hydrogeology*. *Third Edition.* Wave Land Inc. Long Grove, Illinois. Todd, D.K. 2005. *Groundwater Hydrology*. *Third Edition.* John Wiley & Sons, New York. Anderson MP., and Woessner MW., 2015, *Applied Groundwater Modeling*,

	Simulation of flow and advective transport (second edition). Academic Press, INC, New York. Harbaugh, A.W., 2005*, MODFLOW-2005, The U.S. Geological Survey Modular Ground-Water Model—the Ground-Water Flow Process*, US. Geological Survey, Virginia Randolf Rauch., 2010. *Groundwater Modelling, An Introduction to groundwater flow and solute transport modelling with applications*. Technishce Universitat Darmstadt: Germany
Date of last amendment made	

Course Module

MINE ACID WATER MANAGEMENT

Module identification code	429D6222
Semester(s) in which the module is taught	2th semester of academic year
Person responsible for the module	Dr-Eng. Muhammad Ramli
Lecturer	1. Dr-Eng. Ir. Muhammad Ramli, M.T 2. Andi Arumansawang, S.T., M.Sc.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	Hydrogeology, Mine Hydrology
Intended learning outcomes	**Competence** To be able to integrate concept of ecotechnology in developing technical design of coal and mineral. (ILO-10)
Course learning objectives	1. Able to identify formation process of acid mine drainage and its effect on the environment. 2. Able to explain various treatments of acid mine drainage.
Module content	1. Source of AMD 2. Characterization 3. Classification 4. Process 5. Prediction of mine water composition 6. Field indicatiors of AMD 7. AMD from sulfidic waste rock dumps 8. Environmental impacts 9. AMD Management strategis 10. Treatment of AMD
Applicability	Elective in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Lottermoser. B.G>Technical Guidance 3 Environmental Management Act.2015, *Developing A Mining Erosion and Sediment Control Plan,* Ministry of Environment – British Columbia.

	Europian Commission, 2009, Management of Tailings and Waste-Rock in Mining Blight G., 2010, Geotechnical Engineering for Mine Waste Storage Facilities, CRC Press, London.
Date of last amendment made	

Course Module

RESEARCH OPERATION

Module identification code	430D6222
Semester(s) in which the module is taught	2nd Semester of academic year
Person responsible for the module	Dr. Aryanti Virtanti Anas, ST., MT.
Lecturer	1. Dr. Aryanti Virtanti Anas, ST., MT. 2. Dr. Eng. Rini Novriyanti Sutardjo Tui, ST., M, BA., MT. 3. Rizki Amalia, ST., MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	-
Intended learning outcomes	**Skill and Competence** 1. To apply logic and innovative thinking in developing knowledge and technology and problem solving within the area of expertise. (ILO-04) 2. To be able to apply principles of economics, management and valuation techniques in planning and managing mineral and coal resources. (ILO-07)
Course Learning Objectives	1. To be able to optimize resources in mining activities. 2. To be able to perform network analysis on mining activities.
Module content	1. Basic concept of operation research 2. Linear programming 3. Inventory control 4. Transportation model 5. Assignment method 6. Network theory
Applicability	Elective in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assesment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Antunes, C.H., Alves, M.J., Climaco, J. 2016. *Multiobjective Linear and Integer Programming*. Springer International Publishing AG. Switzerland Siang, J.J. 2014. *Riset Operasi Dalam Pendekatan Algoritmis*. Penerbit ANDI. Yogyakarta.

	Soeharto, I. 1999. *Manajemen Proyek* (*Dari Konseptual Sampai Operasional*). Penerbit Erlangga. Jakarta. Taha, H.A. 2017. *Operation Research An Introduction*. Tenth Edition. Pearson Education Limited. England. Luenberger, D.G., Yinyu, Y. 2016. *Linear and Non Linear Programming*. Fourth Edition. Springer International Publishing AG. Switzerland.
Date of last amendment made	

Course Module

DECISION MAKING ANALYSIS

Module identification code	431D6222
Semester(s) in which the module is taught	2nd Semester of academic year
Person responsible for the module	Dr. Aryanti Virtanti Anas, ST., MT.
Lecturer	1. Dr. Aryanti Virtanti Anas, ST., MT. 2. Dr. Eng. Rini Novriyanti Sutardjo Tui, ST., M, BA., MT. 3. Rizki Amalia, ST., MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit points	2 Credit
Prerequisites	-
Intended learning outcomes	**Skill and Competence** 1. To apply logic and innovative thinking in developing knowledge and technology and problem solving within the area of expertise. (ILO-04) 2. To be able to apply principles of economics, management and valuation techniques in planning and managing mineral and coal resources. (ILO-07)
Course Learning Objectives	1. Students are able to analyze decision-making in various decision-making environments 2. Students are able to perform multi-criteria decision-making analysis.
Module content	1. Basic concept of decision making 2. Decision making model and technique 3. Group decision 4. Decision making environment 5. Game Theory 6. Decision Tree 7. Monte Carlo Simulation 8. Analytical Hierarchy Process 9. Analytical Network Process
Applicability	Elective in Bachelor Degree in Mining Engineering
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assesment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.

Recommended literature	Brandimarte, P. 2014. *Handbook in Monte Carlo Simulation*. John Wiley & Sons, Inc. New Jersey. Chaniago, A. 2017. *Teknik Pengambilan Keputusan*. Penerbit Lentera Ilmu Cendekia. Jakarta Pusat. Saaty, T.L. 1991. *Pengambilan Keputusan Bagi Para Pemimpin-Proses Hirarki Analitik Untuk Pengambilan Keputusan dalam Situasi yang Kompleks*. PT Pustaka Binaman Pressindo. Jakarta Pusat. Saaty, T.L., Vargas, L.G., 2012. *Models, Methods, Concepts & Applications of the Analytic Hierarchy Process*. Second Edition. Springer Science+Business Media. New York. Saaty, T.L., Vargas, L.G., 2013. *Decision Making with the Analytic Network Process*. Second Edition. Springer Science+Business Media. New York. Gupta, P.K., Hira, D.S. 2014. Operations Research. Seventh Revised Edition. S. Chand & Company, Pvt. Ltd., New Delhi. Marimin. 2004. Teori dan Aplikasi Pengambilan Keputusan Kriteria Majemuk. Institut Pertanian Bogor. Bogor. Mu, E., Rojas, M.P. 2018. Practical Decision Making using Super Decisions v3-An Introduction to the Analytic Hierarchy Process. Springer International Publishing AG. Switzerland. Rusydiana, A.S., Devi, A. 2013. Analytic Network Process: Pengantar Teori dan Aplikasi. SMART Publishing. Bogor.
Date of last amendment made	

Course Module

MINING CAD (COMPUTER AIDED DESIGN)

Module identification code	432D6222
Semester(s) in which the module is taught	2nd Semester of Academic Year
Person responsible for the module	Asran Ilyas, ST. MT. Ph.D.
Lecturer	Asran Ilyas, ST. MT. Ph.D.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	Mining GIS (Geographic Information System).
Intended learning outcomes	**Skill And Competence** 1. To apply logic and innovative thinking in developing knowledge and technology and problem solving within the area of expertise. (ILO-04) 2. To be able to apply principles of knowledge and technology in developing technical design of mining. (ILO-05)
Course learning objectives	Able to operate Computer Aided Design for mining application
Module content	1. Defenition and function of AutoCAD in mining cases. 2. 2D drawing techniques with AutoCAD and its apploications in geology and mining. 3. 3D drawing techniques with AutoCAD and its applications in geology and mining.
Applicability	Elective in Bachelor Degree in Mining Engineering.
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:** Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Ansori, S., 2000. *Overview of AutoCAD Release 14*, Elex Media Computindo, Jakarta. Abdi, M. Z., 2019. *AutoCAD for Engineering*, 2nd Edition, Modula, Bandung.
Date of last amendment made	

Course Module

REGIONAL DEVELOPMENT

Module identification code	433D6202
Semester(s) in which the module is taught	2nd Semester of Academic Year
Person responsible for the module	Dr-Eng. Muhammad Ramli
Lecturer	1. Dr-Eng. Muhammad Ramli 2. Asran Ilyas, ST. MT. Ph.D. 3. Meinarni Thamrin, ST. MT.
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	-
Intended learning outcomes	**Competence** To be able to integrate concept of ecotechnology in developing technical design of coal and mineral. (ILO-10)
Course learning objectives	Able to plan and design regional development in mine surrounding area
Module content	1. Region and spatial analysis 2. Location theory and spatial organization 3. Area Development 4. Sector and production system 5. Development planning and spatial planning 6. Mining area development in the context of MP3EI 7. Strategic Environmental Studies 8. Design/framework of planning and development of mining areas
Applicability	Elective in Bachelor Degree in Mining Engineering.
Admission and Examination requirement	Minimum attendance requirement 80% from total lecture. **Study and examination requirements:** o Students must attend 15 minutes before the class starts. o Students must switch off all electronic devices. o Students must inform the lecturer if they will not attend the class due to sickness, etc. o Students must submit all class assignments before the deadline. o Students must attend the exam to get final grade. **Form of examination:**Written exam: Essay
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Midterm exam – written. o Final exam – written and/or oral.
Recommended literature	Arnold, E., 1979, Territory and Function, The Evolution of Regional Planning, John Friedman and Clyde Weaver, Fletcher & Son, Ltd., Norwich. Djoyohadikusumo, S.,1994, Dasar Teori Ekonomi Pertumbuhan dan Ekonomi Pembangunan, LP3ES, Jakarta. Rustiadi, E., Saefulhakim, S., dan Panuju, D. R., 2006, Perencanaan dan Pengembangan Wilayah, IPB.
Date of last amendment made	

Course Module **MINE EXCURSION**	
Module identification code	420D6212
Semester(s) in which the module is taught	2nd Semester of Academic Year
Person responsible for the module	Head of Mining Department
Lecturer	Head of Mining Department
Type of teaching,	Teaching methods used in this course are: o Lecture (i.e., simulation, small group discussion, case study, collaborative, cooperating learning, and video-based learning) o Structured assignments (i.e., essays and case study) o Self-learning
Workload	1. Lecture; o Class meeting; 16 x 2 x 50 minutes. o Structured assignments; 16 x 2 x 60 minutes. o Self-learning; 16 x 2 x 60 minutes. 2. Total workload = 5440 minutes.
Credit point	2 credits
Prerequisites	-
Intended learning outcomes	**Skill** To apply logic and innovative thinking in developing knowledge and technology and problem solving within the area of expertise. (ILO-04)
Course learning objectives	Able to make the mine excursion report related to the stages of mine and mining methodology.
Module content	1. Mining company development review 2. Mining company information search 3. Direct observation in the field 4. Data and documentation 5. Report generation
Applicability	Elective in Bachelor Degree in Mining Engineering.
Admission and Examination requirement	Minimum attendance requirement 70% from total lecture.
Form of assessment	Assessment is carried out based on: o Individual assignment – written. o Attendance – summary from presence list. o Final report
Recommended literature	Anomim, 2007, Mining Safety and Healt Research at NIOSH, The National Academic Press, Washington. Zegong, L., Kicki, J., and Sobczyk, 2010, Mine Safety and Efficient Exploitation Facing Challenges of the 21st Century, CRC Press.
Date of last amendment made	

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