DEPARTMENT OF MINING AND PETROLEUM ENGINEERING

The Department of Mining and Petroleum Engineering currently offers two undergraduate programs namely Georesources Engineering and Petroleum Engineering. Mining Engineering program is replaced by Georesources Engineering Program where two majors mining, and resources engineering are conducted. These two existing programs are designed to prepare graduates for mining, resources, petroleum, and related industries both in Thailand and abroad. These programs also facilitate graduates to carry on to higher education.

Courses are designed to give students basic knowledge in both sciences and engineering fundamentals as well as professional subjects of the fields. Optional courses are also offered as electives to accommodate special interest of students or special need of the industry. Practical training are compulsory to familiarize students with industry. English, humanities, and social sciences courses are also requirement of the programs so that students have opportunity to broaden their views as well as English skill.

- **Georesources Engineering Program**

The undergraduate georesources engineering program provides foundation knowledge in all aspects of georesources development. After having broad background in sciences and basic engineering during the first and the second year, students will receive a thorough background in georesources engineering in the first semester of the third year, which will support advance georesources engineering courses in the third and fourth year. A broad interdisciplinary coverage of georesources development principles including mining geology, mineral exploration, ore reserve estimation, mine development, mining methods of both surface and underground operations, rock mechanics, geostatistics, georesources economics and management, mineral processing and utilization and environmental aspects of mining operation and recycling will be provided for junior and senior level.

- **Petroleum Engineering Program**

The Petroleum Engineering curriculum for undergraduate study provides core courses in all aspects of petroleum engineering including rock and fluid properties, reservoir engineering, well logging, drilling engineering, production engineering, production operations, natural gas processing, and petroleum economics. The Department also offers a master's degree program in petroleum engineering. The program is specially designed for Thai and foreign students using English as a program language. It is designed for students who graduate with B.Eng. or B.Sc. in petroleum engineering or other related disciplines.

The graduate study curriculum provides an extensive study in petroleum engineering which emphasizes on upstream activities, oil and gas exploration and production. This program will serve industrial demand of highly competent petroleum engineers who are able to conduct both scientific and engineering investigations to solve various problems related to exploration and production of oil and natural gas.

Due to the rapid progress in engineering and trend toward interdiscipline environment in industries, the department also emphasizes on learning and communication skills of students. In addition, awareness in environmental problems related to engineering work is also an important element in the programs.

HEAD:

Thitisak	Boonpramote,	Ph.D. (Colorado school at Mines)

ASSOCIATE PROFESSORS:

Dawan	Wiwattanadate,	Ph.D. (Osaka)
Somsak	Saisinchai,	M.Eng. (Chula)

ASSISTANT PROFESSORS:

Jirawat	Chewaroungroaj,	Ph.D. (Texas at Austin)
Sunthorn	Pumjan,	Ph.D. (Michigan Tech)
Suwat	Athichanagorn,	Ph.D. (Stanford)
Kreangkrai	Maheeintr	Ph.D. (Regina)

LECTURERS:

Pipat	Laowattanabandit	Ph.D.(Colorado School of Mines)
Falan	Srisuriyachai	Ph.D. (Bologna)
Apisit	Numprasanthai	Ph.D. (Griffith)
Raphael	Bissen	Dr.rer.nat (Freiburg)

GEORESOURCES ENGINEERING UNDERGRADUATE CURRICULUM
FIRST YEAR CURRICULUM
COMMON TO ALL ENGINEERING STUDENTS

COURSENO.	SUBJECT	CREDITS
	THIRD SEMESTER	
2103213	ENG MECHANICS I	3
2301207	CALCULUS III	3
2106251	GENERAL GEOLOGY	3
2106208	CHEM MAT	3
2106209	CHEM MAT LAB	1
2106222	FUND GE	1
5500208	COM PRES SKIL	3
xxxxxxxx	GENERAL EDUCATION	3
		20
	FOURTH SEMESTER	
2101202	MECH MAT I	3
2108298	SURVEYING I	3
2106458	MINING GEOLOGY	3
2106316	SUR MIN	3
2106315	MIN ENG LAB	1
2104253	ENG STAT I	3
xxxxxxx	GENERAL EDUCATION	3
		19
	FIFTH SEMESTER	
2100311	ENG ESSENTIALS	3
	HYDRAULICS I	3
2103295	BASIC THERM	3
2106310	MINERAL PROCESS ENG	3
2106332	RES PROC LAB I	1
2106445	UNDERGROUND MIN	3
2106444	ENG EXP ROCK BLAST	3
		19

COURSE NO.	SUBJECT	CREDITS
	SIXTH SEMESTER	
2103393	ME LAB NON ME	1
2108302	FIELD PRACTICE I	1
2106441	GEOTECH	3
2106442	GEOTECH LAB	1
2106412	RES ECON MGT	3
2106432	SEPARATION TECHNOLOGY	3
2106333	RES PROC LAB II	1
5500308	TECH WRIT ENG	3
xxxxxxxx	GENERAL EDUCATION	3
		19
	SUMMER SEMESTER	
2100301	ENG PRACTICE	2
	SEVENTH SEMESTER	
2102391	ELEC ENG I	3
2102392	ELEC ENG LAB I	1
2106489	GEO-RES ENG PROJ	3
	OR	
2100499	ENG PROJ	
xxxxxxx	GENERAL EDUCATION	3
xxxxxxx	FREE ELECTIVES	3
xxxxxxx	FREE ELECTIVES	3
		16
	EIGHTH SEMESTER	
2106446	MIN PLAN DSGN	3
2106413	RES ENV POLL PRVNT	3
xxxxxxx	ELECTIVE COURSE	3
xxxxxxx	ELECTIVE COURSE	3
xxxxxxx	ELECTIVE COURSE	3
		15

TOTAL CREDITS FOR GRADUATION = 146

PETROLEUM ENGINEERING UNDERGRADUATE CURRICULUM
FIRST YEAR CURRICULUM
COMMON TO ALL ENGINEERING STUDENTS

COURSE NO.	SUBJECT	CREDITS
	THIRD SEMESTER	
2103213	ENG MECHANICS I	3
2301207	CALCULUS III	3
2103295	BASIC THERMO	3
2106261	PETROLEUM GEOLOGY	3
2106263	FUND PE	3
xxxxxxx	GENERAL EDUCATION	3
		18
	FOURTH SEMESTER	
2103231	MECH OF MAT I	3
2103351	FLUID MECHANICS I	3
2104253	ENG STAT I	3
2106266	PETROPHYSICS	3
2106267	PET FLUID PROP	3
5500208	COM PRES SKIL	3
		18
	FIFTH SEMESTER	
2100311	ENG ESSENTIALS	3
2106268	PET DRILL FLUID LAB	3
2106362	DRILLING ENG	3
2106367	RESERVOIR ENG I	3
2106464	PRODUCTION ENG	3
2301312	DIFF QUATIONS	1
xxxxxxx	GENERAL EDUCATION	3
		19

COURSE NO.	SUBJECT	CREDITS
	SIXTH SEMESTER	
2103393	ME LAB NON ME	1
2106361	WELL LOGGING	3
2106368	RESERVOIR ENG II	3
2106369	PROD TECH	3
5500308	TECH WRIT ENG	3
xxxxxxx	ELECTIVE COURSE	6
		19
	SUMMER SEMESTER	
2100301	ENG PRACTICE	**2**
	SEVENTH SEMESTER	
2102391	ELEC ENG I	3
2102392	ELEC ENG LAB I	1
2106462	PET PROC ENG	3
2106465	PETROL ECONOMICS	3
xxxxxxx	ELECTIVE COURSE	3
xxxxxxx	GENERAL EDUCATION	3
		16
	EIGHTH SEMESTER	
2106474	PETRO RES DEV	3
2106479	PETROLEUM PROJECT	3
OR		
2100499	ENG PROJ	
xxxxxxx	FREE ELECTIVES	6
xxxxxxx	GENERAL EDUCATION	3
		15

TOTAL CREDITS FOR GRADUATION = 143

STUDY PROGRAM FOR MASTER DEGREE IN GEORESOURCES AND PETROLEUM ENGINEERING
(MINING ENGINEERING)

First Semester

2186532	Geomechanics	3	Credits
2186608	Resources Environment and Life Cycle Pollution Prevention	3	Credits
2186670	Sustainable Mineral and Petroleum Resources Development	3	Credits
		9	

Second Semester

2186533	Mine Planning and Design	3	Credits
2186642	Resources Economics	3	Credits
	Elective Courses	3	Credits
		9	

Third Semester

2186756	Research Seminar	S/U	Credits
	Elective Courses	6	Credits
2186811	Thesis	3	Credits
		9	

Fourth Semesters

2186811	Thesis	9	Credits
		9	

Graduate students with no mining engineering background must complete the following courses within the first year of study.

2186524	Basic Georesources Engineering	3	Credits
2186534	Basic Geology	3	Credits
		6	

(RESOURCES RECYCLING ENGINEERING)

First Semester

2186509	Resources Process Technology and Utilization	3	Credits
2186608	Resources Environment and Life Cycle Pollution Prevention	3	Credits
2186670	Sustainable Mineral and Petroleum Resources Development	3	Credits
		9	

Second Semester

2186623	Process Separation for Resources Recovery	3	Credits
2186642	Resources Economics	3	Credits
	Elective Courses	3	Credits
		9	

Third Semester

2186756	Research Seminar	S/U	Credits	
	Elective Courses	6		Credits
2186811	Thesis	3		Credits
		9		

Fourth Semesters

2186811	Thesis	9	Credits
		9	

Graduate students with no resources recycling engineering background must complete the following courses within the first year of study.

2186524	Basic Georesources Engineering	3	Credits
2186535	Basic Minerals and Rocks	3	Credits
		6	

STUDY PROGRAM FOR MASTER DEGREE IN GEORESOURCES AND PETROLEUM ENGINEERING
(PETROLEUM ENGINEERING)

First Semester

2186651	Advanced Reservoir Engineering	3	Credits
2186667	Production System Analysis	3	Credits
2186670	Sustainable Mineral and Petroleum Resources Development	3	Credits
		9	

Second Semester

2186671	Advanced Natural Gas Engineering	3	Credits
	Elective Courses	6	Credits
		9	

Third Semester

2186756	Research Seminar	S/U	Credits
2186664	Petroleum Well Construction	3	Credits
	Elective Courses	3	Credits
2186811	Thesis	3	Credits
		9	

Fourth Semester

2186811	Thesis	9	Credits
		9	

Graduate students with no petroleum engineering background must complete the following courses within the first year of study.

2186565	Basic Petroleum Geology	3	Credits
2186566	Petrophysics	3	Credits
2186567	Basic Reservoir Engineering	3	Credits
2186568	Basic Drilling Engineering	3	Credits
2186569	Basic Production Engineering	3	Credits
		15	

COURSE DESCRIPTION INS GEORESOURCES ENGINEERING (B.ENG.)

2106208 Chemical for Materials 3(3-0-6)
Condition: Concurrent 2106209

Phase equilibria and physical properties of matter; and heterogeneous mixture; colligative properties of solution; colloid and surface chemistry; surface chemistry and application in materials separation; electrochemistry and corrosion; ore sampling and dissolution foranalysis; separation and analysis of metal ions in solution.

2106209 Chemical for Materials Lab 1(0-3-0)
Condition: Concurrent 2106208

Effects of temperature on liquid viscosity; effects of temperature and/or surfactant on liquid surface tension molecular weight determination via colligative properties of solution; preparation of standard solution and standardization; Ore dissolution and fusion; analysis of metal ion in solution oy redox titration; potentiometric titration; and spectrometry.

2106222 Fundamental of Georesources Engineering 1(1-0-2)

Introduction to mining industry and georesousces development. exploration , evaluation and mineral deposit development; Environment , health and safety considerations in mine operations.

2106251 General Geology 3(2-3-4)

Scope of geology; the universe and the earth; surface features of the earth's crust and the geological processes; deformation of the earth's crust; rock structures; problems of dip and strike, vein intersection, faulting and folding; geological maps and sections; field techniques in geological mapping; collection of field specimens; well logging and drill core; preparation of geological maps and reports.

2106252 Minerals and Rocks 3(2-3-4)

Basic knowledge of mineralogy; crystallography ; crystal system; physical properties; identification of rock-forming and economic minerals; origin of igneous; sedimentary and metamorphic rocks; geological and engineering classification rocks.

2106296 Engineering Geology 3(2-3-4)
Condition : Prerequisite 2103105 and 2108205 or 2108291

A general survey of geology with particular reference to civil engineering; common rockforming minerals; general characteristics and origins of rocks; features of the earth and geological process; structural features of the earth's crust; geology of water supply, reservoirs and dam sites, erosion and flood control; river and habour improvement; geological, factors affecting quarrying, tunnelling, landslide, land subsidence, foundations, and building materials.

2106310 Mineral Processing Engineering 3(3-0-6)
Condition: Concurrent 2106332

Theory of Physical methods of mineral processing. Fundamental of mineral processing including sampling, cominution and liberation, screening, classification, size determination, gravity concentration, magnetic separation, electrostatic separation, introduction to flotation. Construction of simple flow sheets for mineral processing plants.

2106315 Mining Engineering Laboratory 1(0-3-0)
Condition: Consent of Faculty

Laboratory experiments in mining development and mining operation.

2106316 Surface Mining 3(3-0-6)

Exploration, evaluation and development of mineral deposits, classification and selection of various mining methods; mine planning and design concept; earth and rock excavation; drilling and bench blasting ; mine loading and haulage; environmental protection; mine welfare and safety.

2106331 Mineral and Process Engineering 3(3-0-6)
Condition: Concurrent 2106332

Theory of Physical methods of mineral processing. Fundamental of mineral processing including sampling, cominution and liberation, screening, classification, size determination, gravity concentration, magnetic separation, electrostatic separation, introduction to flotation. Construction of simple flow sheets for mineral processing plants.

2106332 Resources Process Laboratory I 1(0-3-0)
Condition: Concurrent 2106331

Laboratory experiments in resources separation and recovery.

2106333 Resources Process Laboratory II 1(0-3-0)
Condition: Concurrent 2106331

Laboratory experiments in resources separation and recovery.

2106412 Resources Economics and Management 3(3-0-6)

Mineral demand and supply; mineral trade and markets; mineral market forecasting techniques; government regulations and taxation; resources evaluation; economics of resources development; project management.

2106413 Resources Environment and Pollution Prevention 3(3-0-6)

Major environmental problems from production and utilization of resources; environmental technology to manage and control the problems; waste minimization and waste disposal, environmental planning for the development and utilization of resources.

2106414 Resources Process Technology and Utilization 3(3-0-6)

Extraction, processing and utilization of resources; review of fundamental principles of process technology and utilization of resources; concepts of technology application; processes of extraction and improvement of material quality; review of principles of process design.

2106415 Resources Recovery and Recycling 3(3-0-6)

Recyclable resources; recycling of non-metal, recycling of ferrous and non-ferrous metals; principles of recycling; criteria for recovery and recycling; potential benefits of recycling; recycling technology; limitation of recycling; markets for recycle, factors affecting recycle rates; environmental aspects of recycling.

2106428 Geostatistics 3(3-0-6)

Introduction to geostatistics; spatial data and geostatistical approach; problems and geostatistical solution; structure of regionalized variable and its applications on sampling analysis and optimization; kriging system and characteristic features; estimator and estimation variance; and use of computer codes.

2106432 Separation Technology 3(3-0-6)

Condition: Concurrent 2106333

General description of separation and classification efficiency; hydrocyclones, screens, electrostatic precipitators; mixing, granulation, crystallisation; comminution matrix description of size reduction, milling circuit simulation, size enlargement and agglomeration; motion of particles in fluids; flow of fluids through granular beds; incompressible and compressible cake filtration; gravity sedimentation and clarification; pneumatic and hydraulic transport of solids; surface chemistry and thermodynamics of particles-bubbles attachment; mechanisms of mineral flotation; kinetics of mineral flotation and mechanics; flotation processes of minerals and materials.

2106433 Material Characterization 3(3-0-6)

Theories and use of techniques in material analysis including mineralogy, microscopic techniques, differential thermal analysis, thermogravimetric analysis, x-ray refraction, x-ray fluorescence, atomic absorption spectrometry, inductively coupled electron analysis and chemical analysis.

2106434 Material Handling Engineering 3(3-0-6)

Theories and design of material handling processes; belt conveyor, chain, and bucket elevator; bin and bunker design; stock piling; blending and homogenizing; feed control of bulk solids; slurry pipeline transportation, tailing disposal.

2106438 Clean Coal Technologies 3(3-0-6)

Coal utilization; coal reserve; coal gasification; coal dust explosion; coal storage; combustion; pollution management; carbon capture and storage.

2106439 Particle Technologies for Georesources Engineering 3(3-0-6)

Particle characterization, grinding; powder separation; mixing; agglomeration; transport of powder; storage of powder; safety in operation; dust explosion; dust collection.

2106441 Geotechniques 3(3-0-6)

Engineering properties of soil and rock measurements and classification: stress-strain analysis : failure criteria : stability analysis : geotechnical application to soil and rock excavation.

2106442 Geotechniques Laboratory 1(0-3-0)

Laboratory experiments in rook properties.

2106443 Rock Engineering 3(3-0-6)

Basic rock mechanics; discontinuities; rock and rock mass; strength and failure criteria; in-situ stress; site investigation; rock mass classification; rock testing, in-situ testing; rock mechanics and engineering works; rock slope stability; rock excavation; geotechnical instrumentation and monitoring

2106444 Engineering Explosives and Rock Blasting 3(3-0-6)

Concepts of rock fragmentation, drilling and blasting; type of explosives and accessories; characteristics and roperties of explosives; safety in the transportation, storage, and handling of explosives; rock blasting practices, delay blasting; bench blasting design; controlled blasting techniques; the control of ground vibration, airblast, fly rock, drilling and blasting cost evaluation,

2106445 Underground Mining 3(3-0-6)

Basic soil and rock mechanics; discontinuities; geological factors for underground excavation Site investigation for underground excavation; underground excavation in mining and civil engineering; underground mining methods, underground monitoring, explosive and blasting in underground excavation, rock support and rock reinforcement; underground mine planning and design, equipment and machine used in underground mining; basic mine ventilation, underground mine safety.

2106446 Mine Planning and Design 3(3-0-6)

Concepts of mine planning and design; application of relevant knowledge in mining on mine design; computer application and simulation in mine planning design; selection of heavy equipment;case studies on mine planning and design.

2106458 Mining Geology 3(3-0-6)

Condition : Prerequisite 2106252

Origin and Occurrence of mineral deposits; mineral associations, alterations and classification, geologic factors controlling characteristics of ore-body; surface and underground geological mapping principles and application of geological, geochemical and geophysical prospecting; planning for exploration drilling, sampling techniques; ore reserve estimation; grade control; and fundamental of geostatistics.

2106481 Advanced Topics in Geo-Resources Engineering I 3(3-0-6)

Topics of current interest and/or new development in various fields of Geo-Resources Engineering.

2106482 Advanced Topics in Geo-Resources Engineering II 3(3-0-6)

Condition: Consent of Faculty

Topics of current interest and/or new development in various fields of Geo-Resources Engineering.

2106483 Special Problems in Geo-Resources Engineering I 3(2-3-4)

Condition: Consent of Faculty

Special problems in Geo-Resources Engineering and their solutions.

2106484 Special Problems in Geo-Resources Engineering II 3(2-3-4)

Condition: Consent of Faculty

Special problems in Geo-Resources Engineering and their solutions.

2106488 Practical Education for Resources Engineering 3(2-3-4)

Practical interesting projects/topics for resources and petroleum engineering.

2106489 Geo-Resources Engineering Project 3(3-0-6)

Condition : Consent of Faculty

Practical interesting projects of problems in various fields of Geo-Resource Engineering.

COURSES DESCRIPTIONS IN PETROLEUM ENGINEERING (B.ENG.)

2106261 Petroleum Geology 3(3-0-6)

Fundamental principles of petroleum regarding its origin, migration, and accumulation; chemical composition of petroleum; nature of source rocks, reservoirs, and traps; sedimentary environment and facies; geological field methods; characteristics of natural gas and oil fields of Thailand.

2106263 Fundamental of Petroleum Engineering 3(3-0-6)

Introduction to petroleum industry; economics and structure of petroleum industry; petroleum prospecting; drilling operation; petroleum production system; reservoir performance; oil and gas separation; oil and gas transportation; utilization of oil and natural gas.

2106266 Petrophysics 3(3-0-6)

Porosity, Permeability, Fluid Saturation, Resistivity, Wettability, Capillary Pressure, Relative Permeability, Application of Darcy's equation, Measurement of Particle Size Distribution, Measurement of Porosity and Permeability, Measurement of Formation Resistivity, Measurement of Fluid Saturation, Measurement of Wettability and Measurement of Relative Permeability.

2106267 Petroleum Fluid Properties 3(3-0-6)

Phase behavior; equations of state; and PVT properties and determination.

2106268 Petroleum and Drilling Fluid Laboratory 3(3-0-6)

Viscosity; specific gravity; composition analysis; pressure, volume, and temperature (PVT) analysis of petroleum fluids; physical and chemical properties of drilling fluids.

2106361 Well Logging 3(3-0-6)

Condition: Prerequisite 2106265

Principles, applications, and interpretation of openhole logs as used in petroleum exploration and reservoir evaluation.

2106362 Drilling Engineering 3(3-0-6)

Drilling fluids, drilling hydraulics; drilling bit and drill string; directional drilling; casing and cementing, and drilling well control.

2106367 Reservoir Engineering I 3(3-0-6)

Condition: Prerequisite 2106265

Petroleum reserves; reservoir drive mechanism; volumetric calculation; material balance; decline curve analysis; fluid flow in porous media; well performance; water and gas coning; and water influx.

2106368 Reservoir Engineering II 3(3-0-6)

Condition: Prerequisite 2106367

Oil and gas well tests; and numerical reservoir simulation.

2106369 Production Technology 3(3-0-6)

Condition: Prerequisite 2106362

Well completion; wireline and coiled tubing operation; perforating; formation damage mechanism and migration; sand production and its control; well stimulation; well surveillance and workover.

2106462 Petroleum Process Engineering 3(3-0-6)

Prerequisite: 2106267

Handling, separating of oil, natural gas and water from petroleum production; acid gas treating; gas dehydration; LNG; transmission and natural gas.

2106464 Production Engineering 3(3-0-6)

Condition : Prerequisite 2106265

Multiphase flow in pipe; inflow performance; restricted flow into a wellbore; artifical lift; and oil and gas production system and facilities.

2106465 Petroleum Economics 3(3-0-6)

Economic evaluation of petroleum projects, generating forecasts of key technical and economic parameters for the discounted cash flow(DCF) model of petroleum development projects, world oil markets and price mechanisms, petroleum fiscal system analysis; expected value and decision tree analysis for petroleum exploration projects, Baysian analysis and value of information.

2106466 Improved Oil Recovery 3(3-0-6)
Condition : Prerequisite 2106367
Secondary recovery; mobility-control processes; miscible displacement; chemical flooding; and thermal recovery; microbial flooding; screening criteria for improved oil recovery.

2106472 Well Design and Operations Planning 3(3-0-6)
Condition: Prerequisite 2106362
Petroleum well design and construction; drilling procedures and well completion practices; well cost estimation; drilling program; wellsite operation and logistics; well operation planning and reporting.

2106473 Reservoir Management 3(3-0-6)
Condition: Prerequisite 2106367
Numerical reservoir simulation; enhanced oil recovery techniques; field development planning; reservoir management procedures.

2106474 Petroleum Resources Development 3(2-3-4)
Condition : Prerequisite 2106361, 2106367, 2106464
Integrated approaches to petroleum resources exploration and development; application of geological and petroleum engineering methods in designing petroleum production / injection wells with emphasis on teamwork.

2106475 Advanced Topics in Petroleum Engineering I 3(3-0-6)
Topics of current interest and/or new development in various fields of petroleum engineering.

2106477 Special Problems in Petroleum Engineering I 3(2-3-4)
Study or investigation of special problems in petroleum engineering.

2106479 Petroleum Engineering Project 3(0-6-3)
Practical interesting projects or problems in various fields of petroleum engineering.

2106488 Practical Education for Resources Engineering 3(2-3-4)
Practical interesting projects/topics for resources and petroleum engineering.

COURSE DESCRIPTIONS IN GEORESOURCES AND PETROLEUM ENGINEERING (M.ENG.)

2186509 Resources Process Technology and Utilization 3(3-0-9)
Extraction, separation and utilization of resources; review of fundamental principles of process technology and utilization of resources; concepts of technology application; processes of extraction and improvement of material quality; review of principles of process design.

2186510 Materials Handling 3(3-0-9)
Materials handling involving storage and stockpiling; theory of flow solids in bins and bankers; design of bins and bankers; conveyors and feeders; homogenization; hydraulic transport in pipe, pneumatic transport and waste sorting and disposal.

2186512 Chemical Process Separation 3(3-0-9)
Chemical separation of materials; solid state and solution chemistry; thermodynamics and kinetics; stability of compounds; oxidation and reduction; roasting; calcination and sintering; dissolution and mechanisms; effects of thermal treatment; leaching reactions, including halogenation and cyanidation; leaching process variables; recovery from solution and purification; ion exchange and solvent extraction applications; chemical process flowsheets and case studies.

2186522 Materials Characterization 3(3-0-9)
Theories and techniques in material analysis, including mineralogy, microscopy, differential thermal analysis, x-ray diffraction, x-ray fluorescence, spectrometry, electron microanalysis.

2186524 Basic Georesources Engineering 3(3-0-9)
Basic principles in mining industry and georesousces development; exploration, evaluation of mineral deposits; mining method; mineral processing and recycling; development of mineral resources; environment, health and safety considerations in mine operation.

2186531 Advanced Geostatistics 3(3-0-9)
Geostatistics principle, non-linear geostatisics; cokriging and cross validation; indicator kriging; principle of stochastic simulation; simution with Gaussian-related algorithms and indicator based approaches.

2186532 Geomechanics 3(3-0-9)
Engineering properties of rock; rock measurement and classification; stress – strain analysis; in-situ stresse; failure criteria; rock stability and well bore stability analysis; geomechanics application to rock excavation; hydraulic fracturing; geomechanical monitoring.

2186533 Mine Planning and Design 3(3-0-9)
Review of surface and underground mining methods; stages of mining activities; ore modeling and reserve estimation; concept of mine planning and design to maximize profit with less environmental impact; various elements in mine planning and design processes; planning and design by using a mining software.

2186534 Basic Geology 3(3-0-9)
The universe and the earth; surface feature of the earth 's crust and the geological processes; plate tectonic; structural geology, including problems of dip and srike, vein intersection, faulting and folding; minerals and rocks; geological maps and sections; hydrogeology and geophysical prospecting.

2186535 Basic Minerals and Rocks 3(3-0-9)

Basic knowledge in mineralogy; crystallography; crystal system; physical properties; identification of rock-forming and economic minerals; origin of igneous, sedimentary and metamorphic rocks; geological and engineering classification of rocks.

2186550 Numerical Methods for Georesources Engineer 3(3-0-9)

Cases of mathematical calculation and modeling in georesources engineering; error analysis; various approaches to numerical methods; application of finite element method (FEM), finite difference method (FDM), and boundary element method (BEM) to solve problems in geo-engineering works.

2186565 Basic Petroleum Geology 3(3-0-9)

Surface features of the earth's crust and the geological processes; deformation of the earth's crust; rock structures, dip and strike, faulting and folding, geological maps and sections; petroleum origin, migration, and accumulation; chemical composition of petroleum; stratigraphy; nature of source rocks; reservoirs and traps; geological field methods.

2186566 Petrophysics 3(3-0-9)

Rock mineralogy; porosity; permeability; rock-fluid properties; spontaneous potential logs; resistivity logs; gamma ray logs; porosity logs; porosity crossplots.

2186567 Basic Reservoir Engineering 3(2-3-7)

Reservoir drive mechanisms; classification of petroleum reserves; volumetric reserve calculation; material balance; decline curve analysis; fluid flow in porous media.

2186568 Basic Drilling Engineering 3(3-0-9)

Mechanics of rotary drilling; drilling fluids and their hydraulics; directional drilling; formation pore pressure and fracture resistance; casing and cementing design; well control.

2186569 Basic Production Engineering 3(3-0-9)

Well completion; subsurface and wellhead equipment; perforating; sand control; formation damages and production stimulation; surface production processes; production problems and remedies; well intervention and workover.

2186608 Environment and Pollution Prevention in the Life Cycle of Resources 3(3-0-9)

Major environmental problems from production and utilization of resources; technology in managing and controlling environmental effects; waste minimization, waste storage and disposal; environmental management planning for sustainable resource development and utilization; relevant environmental issues in the global arena.

2186623 Process Separation for Resources Recovery 3(3-0-9)

Review of fundamentals of separation processes; mass balance and mass balance adjustment; separation efficiency; separation by physical properties; comminution and classification; gravity separation; separation by magnetic and electrical properties; flocculation and coagulation; flotation. introduction to chemical processing.

2186635 Industrial Minerals Technology 3(3-0-9)

Technology in industrial minerals: extraction, separation and utilization of some major industrial minerals and dimension stones and improvement of their quality to meet industrial requirements; discussion of advanced technology in industrial minerals and case studies.

2186636 Fuel Minerals Technology 3(3-0-9)

Technology in fuel minerals; mineral resource evaluation or assessment, mining processing and utilization of fuel minerals and their quality improvement to meet industrial requirements; discussion of advanced technology in industrial minerals and case studies.

2186637 Quarry Technology 3(3-0-9)

Quarry technology: rock resource evaluation, quarrying, size reduction to various industrial applications; economic aspects of the technology; quality improvement of products according to industrial requirements; discussion of advanced technology in quarry and case studies.

2186638 Advanced Geotechnique 3(3-0-9)

Review of soil and rock mechanics; investigation and data collection; application of soil mechanics theory to both mining and civil engineering works; grouting in engineering works; rock support and reinforcement; various analysis methods in geotechnique; case studies in either rock slope engineering or underground excavations.

2186639 Resources Recovery and Waste Recycling 3(3-0-9)

Classification of resources: renewable and non-renewable resources; resources utilization and recycling; waste utilization; waste-to-raw materials and waste-to-energy; life cycle and sustainable resource management; concepts and case studies of sustainable production and consumption.

2186642 Resources Economics 3(3-0-9)

Mineral demand and supply; mineral trade and markets minerals market model forecasting techniques; time series forecasting; government regulations and mineral taxation; specification of boundaries and distribution of earth resources; resources evaluation; utilization; cost-benefit analysis; optimal control of the development of earth resources.

2186651 Advanced Reservoir Engineering 3(3-0-9)
Oil and gas well tests; waterflooding; water and gas coning; reservoir management.

2186652 Reservoir Simulation 3(3-0-9)
Principles and mathematical techniques in numerical simulation for multiphase, multidimensional flow in porous media; applications of reservoir simulation; history matching techniques; data preparation.

2186656 Carbon Capture and Storage 3(3-0-9)
Climate change; fundamental of carbon capture; carbon storage; storage capacity assessment.

2186657 Unconventional Resources Production 3(3-0-9)
Properties of heavy oil; recovery of heavy oil; thermal recovery; steam flooding; gas injection; steam assisted gravity drainage; in-situ combustion; tar sand or oil sand; oil shale; coalbed methane; gas hydrate.

2186662 Enhanced Oil Recovery 3(3-0-9)
Fundamental of Enhanced Oil Recovery (EOR); miscible flooding, thermal flooding, chemical flooding, current technology in EOR, and stages of EOR screening.

2186664 Petroleum Well Construction 3(3-0-9)
Well planning process; well design and drilling program; well completion; perforating; sand control; well stimulation and workover.

2186666 Advanced Petrophysics 3(3-0-9)
Electrical property of reservoir rock; surface properties of different lithologies; reversal of rock wettability by natural mechanism; oil recovery mechanism related to surface properties, petrophysical properties in complex rock formation; shaly sand interpretation, carbonate interpretation; abnormally overpressure; fractures.

2186667 Production System Analysis 3(3-0-9)
Single- and multiple-phase horizontal and vertical flows; inflow and outflow performances; nodal analysis; restricted flow into wellbore; artificial lift methods.

2186670 Sustainable Mineral and Petroleum Resource Development 3(3-0-9)
Mineral and petroleum resource development for economic growth; concept of sustainable development (SD); overview of resource development technology; future availability of resources; implications of sustainable development of mining and petroleum industry; community relationship in the resource development project.

2186671 Advanced Natural Gas Engineering 3(3-0-9)
Phase behavior of the natural gas system; natural gas properties; gas flow in pipe; gas compression calculations; field separation; dehydration; gas processing and transportation; gas production and production problems.

2186676 Advanced Petroleum Economics 3(3-0-9)
Petroleum exploration and production investment analysis; deterministic models of petroleum development project; modeling of petroleum fiscal system; project evaluation criteria and basic risk assessment; probabilistic models of petroleum exploration projects; expected value; decision tree analysis; and value of information.

2186721 Advanced Resources Recovery and Recycling 3(3-0-9)
Principle of resource recovery and recycling; types of secondary resources; criteria for resource recovery and recycling; benefits and limitations of recycling; rate of recycling and resource depletion; energy conservation from recycling; review of separation processes including physical, chemical and bacterial processes; recycling of ferrous and non ferrous metals, non metals, industrial waste, electrical and electronic equipment waste, end of life vehicles, packaging waste, construction and demolition waste, liquid and waste water from processes recovery in the form of energy, sub-marginal mineral deposit and low grade tailings; energy recovery from waste; unconventional resources; economic aspects in resource recovery and recycling; environmental considerations; current legislation and management for resource recovery and recycling in Thailand and international communities; trade and market for recycling; planning and design of separation for resource recovery project; feasibility case studies.

2186756 Research Seminar 1(1-0-3) (S/U)
Condition: - Consent of faculty
Presentation and discussion of the topics to the researched into or current interesting research topics.

2106811 Thesis 12 Credits