DEPARTMENT OF RESOURCES ENGINEERING

UNDERGRADUATE COURSES:

**E420700 Engineering Economics / 3 credits**
(1) Present value analysis, Breakeven analysis, (2) Depreciation, Depletion, Cash flow, (3) Discounted cash flow analysis, tax, (4) Replacement analysis, (5) Leverage applications, (6) Personal investment and hedging. (Prof. Chia-Yon Chen)

**E421200 Engineering Statistics / 3 credits**

**E420600 Computer Applications / 2 credits**

**E420210 Engineering Mechanics (1) / 3 credits**

**E420220 Engineering Mechanics (2) / 3 credits**

**E420500 Mineralogy / 3 credits**

E420200 Elements of Mining
(1) Introduction to mining industry, (2) Feasibility study of mining projects, (3) Unit operations of mining engineering, (4) Surface/underground mining methods, (5) Mining machinery, (6) Mine environmental protection, (7) Future development of mining technology. (Associate Prof. Jui-lin Chang)

E420100 Introduction to Petroleum Engineering / 3 credits
(1) Petroleum exploration - Geological and geophysical explorations; reservoir-fluids and drives, (2) Aspects of leasing - The private landowner's and oil company's legal rights, obtaining a valid lease; provision of the lease, (3) Drilling engineering - onshore and offshore drilling rigs; routine drilling operations, (4) Production engineering - Well completions; surface production facilities well stimulation; improved oil and gas recovery. (Prof. Zsay-Shing Lin)

E426100 Structural Geology / 3 credits

E432500 Ceramic Engineering / 3 credits
Evaluation of Mine

Mineral Economics

E442400 Natural Gas Engineering
The course covers all the operations involved in moving natural gas from its initial location in the reservoir to its final destination, including movement of the gas through the reservoir, the piping system, separation facilities, and the compressor. The course also discusses the properties of natural gases, and flow measurement. The course uses field examples to illustrate natural gas field development and underground storage. (Ming-Ching Kuo)

Petroleum Exploration Production
The courses introduce the basics of petroleum engineering, such as petroleum geology, exploration, drilling engineering, production engineering and reservoir engineering. The course also introduces political, economical and environmental issues related to petroleum. Lab work studies the measurement of basic fluid and rock properties. Production Engineering

Formation Evaluation

Simulation of Underground Fluid Flow
The purpose of this course is to explain how to develop a numerical model of
underground fluid flow. The course begins with a discussion of the basic mathematical model (partial differential equations, describing underground single-phase fluid flow) and the formation of a set of algebraic equations for system equation by finite difference approximation. It then moves into a discussion of various numerical techniques used in computer programming to solve the system equation to obtain a numerical solution (or numerical model). The calculation of wellbore pressures as well as production rates in the model will be addressed. Finally, an example of the application of simulation will be offered.

**Water Flooding**

**E432200 Fluid Mechanics**

**Applications of Computer Calculation in Petroleum Engineering**

**Reservoir Engineering**

**E4420110 Engineering Mathematics(1)**
integrals, partial differential equations.

**E4420120 Engineering Mathematics(2)**


**Transformation of Minerals**


**E441300 Rock Mechanics**

Analysis of stress and strain, stress distribution in simple structure, theories of inelastic behavior of solids, statistical analysis and experimental design, instrumentation, mechanical properties and behavior of rock, mechanical property tests, photoelasticity and photoelastic model studies, rock model studies, on-site measurements, design of single opening in competent rock, design of multiple opening in competent rock, subsidence and caving, rock bursts bumps and gas outbursts, rock bolting applications in mining and geological engineering. (Tso-Min Shih)

**E435400 Drilling & Production Engineering**


**E420200 Elements of Mining**

Mining law, the support of mining excavation, drilling, explosives, blasting, shaft, haulage and hoisting, prospecting and exploration, sampling and valuation of mines, surface mining, underground mining method, development and exploitation, open stope with pillar, sublevel stoping, shrinkage stoping, aut and fill stopping, square set stopping, top slicing and sublevel caving method, block caving method, coal mining methods, room and pillar method, long wall method, mine drainage and pumping, compressed air, mine ventilation, mine organization management
safety work. (Jui-Lin Chang)

**E432600 Mine Drainage, Ventilation and Safety**

Air conditioning and control processes, properties and behavior of air, mine gases and control, mine dusts and control, flow of air through ducts and mine openings, instrumentation and air measurements, basic mine ventilation circuits, economics of air flow, natural ventilation, mechanical ventilation equipment, ventilation of mines by fans, auxiliary ventilation, mine ventilation systems, water head and water pressure, flow of water through pipes, loss of head due to friction, velocity and discharge in pipes, relative discharge capacity of two pipes, hydraulic gradient, compound pipe lines, pipe with a nozzle, flow of water in conduits and rivers, formula for mean velocity, circular conduits, rectangular conduits, transporting capacity, measurement of water, pumping through pipes, pipe line characteristics, choice of pipe diameter when pumping water. (Tso-Mih Shih)

**E440100 Mine Plant Design**

1. The properties and steps of mineral processing plant design. 2. Development and decision of mineral processing flowsheets. 3. The properties of mineral processing machines and selective parameters for all mineral processing units. 4. Arrangement, control and management of mineral processing machine. 5. Economic evaluation of mineral processing plant. (Jui-Lin Chang)

**E446100 Extractive Metallurgy**

1. Introduction to the properties of metals, the history of metallurgy yards the pretreatment of ores. 2. Pyrometallurgy methods. 3. Hydrometallurgy methods. 4. Extractive processing of metals, including iron and steel, copper, zinc, aluminum, magnesium, titanium, gold, and silver.

**Introduction to Systems Engineering**