MINING EXPLORATION COURSE DESCRIPTIONS for a Degree of M. Sc. GRADUATE COURSES

12501 Feasibility Study of Projects: Factors affecting Capital investments, capital values and costs, interest rates, risks and sensitivity analysis, Net Present Value (NPV), Discount Cash Flow (DCF), Compound continuous and discontinuous interest methods, converting coefficients, Equal Annual Costs (EAC), Internal Return Rate (IRR), Comparative study on advantages and disadvantages of above mentioned methods, Criteria for selecting equipment's and machinery, economic life of machines, industrial accounting, feasibility study of a mining project.

12502 Advanced Mathematics: Advanced theory of complex functions, review of the matrices and tensors, solutions of the Partial Differential Equations (PDE), integral transforms, orthogonality conditions of functions, Storm-Liuville problems, special functions such as Bessel, Legendre, Gamma, Hermit, Gauss and Lagurre functions, theory and application of the variational principle and perturbation theory.

12503 Designing Exploration Geophysics Projects: Position of exploration geophysics in sequential exploration program, selection of the appropriate geophysical methods according to the type of deposits, designing optimal geophysical survey grids, geometry of deposits, filtering raw data, cost functions and estimates, performing above designing rules on an assumed typical deposit.

12504 Designing Exploration Geochemistry Projects: Methods for evaluating the probabilities of detecting deposits and/or their haloes, role of deposits shapes and geometry's, theory of geometric probability, evaluation methods, cost estimations, theory and strategies of optimization for mineral deposits, optimization for different type of deposits such as porphyritic Cu-Mo, Contact metamorphosed ultrabasic Ni-Cu, volcanogenic massive sulfide ores, Micissipi types Pb-Zn and vein type gold deposits, selection of optimum drilling points.

12505 Geostatistics: Fundamental concepts of geostatistics, regional variables theory, variograms, covariograms, correlograms, regularization, estimation and dispersion variances, structural analysis based on variograms, geostatistical estimation, Point Kriging, Block Kriging, Linear Kriging, Non-Linear Kriging, geostatistical sampling.

12506 Exploration of Metallic Mineral Deposits: General characteristics of metallic deposits, their shapes, condition of formation, classification, description, prospecting and exploration methods of metallic deposits such as: 1) Ferrometals (Fe, Mn. Cr, Ti and V deposits), 2) Nonferrous metals (Al, Mg, Cu, Pb, Zn. Ni, Co, Mo, Sn, W, Sb deposits), 3) Precious metals (Au, Ag, Pt group (PGE), 4) Light rare metallic elements (such as Li and Be), 5) Heavy rare metallic elements (Nb, Ta, Rare Earth Elements (REE) such as Ce, La, Y ...).

12507 Exploration of Non - Metallic Mineral Deposits: Soils and construction rocks (gravel, sands, clays, brick material, road material, ceramics, refractory clays, refractory sands such as Silimanite, Disthene, Chromite, Magnesite and Dolomite), quality, mineralogy and methodology for exploration of above deposits; industrial minerals (geology, mineralogy and exploration of Asbestos, Bentonite, Borates and Diatomites); Precious rocks and Jewelry; Igneous deposits (Feldespars, Nepheline, Syenite, Mica, Granite and ...); Phosphate, sulphate, Quartz, Barite, Talk and so on deposits; Salty deposits; Radioactive deposits (Uranium, Thorium and so on); Coal deposits.

12508 Seminar: A topic related to the exploration of deposits which should be surveyed throughout existing literature and then writing a seminar report in appropriate format.

12509 M.Sc Thesis: A research topic in applied exploration related discipline or inter-disciplinary fields.

ROCK MECHANICS COURSE DESCRIPTIONS for a Degree of M. Sc. GRADUATE COURSES

16550 Advanced Rock Mechanics:
Physical and mechanical properties of intact rocks and rock masses and the effects of discontinuity features; intact rock classifications; rock mass classifications; types of discontinuity features in rock masses; observation and measuring geometrical and mechanical properties of single fractures; deformability of rock masses; measuring rock mass properties in field; rock dynamics; time dependency of mechanical properties of rocks; stress around the cavities.

16552 Fundamentals of Elasticity:
Apply the fundamentals of elasticity to engineering problems. Comparison with solutions obtained by using elementary strength of materials in solving engineering problems will be emphasized. It also covers Analysis of Stress and Strain, Two Dimensional Problems in Elasticity, Criteria for Material Failure, Axisymmetrically Loaded Members, Energy Methods, Special Topics, Thermal Stresses, Finite Difference, Finite Elements, Boundary Element Methods.

16553 Advanced Open Pit Mine Excavation Design:

This course covers the following topics:
Role of geology in open pit mining, engineering geology studies on design of open pit mining, in-situ stresses determination, stress distribution after excavation of open pit minings, ground treatment and stabilization methods, open pit mining in soft ground, support of pit in soft ground, excavation of pit openings in strong ground, quality assessment of open pit machineries, support of pit opening in strong ground, structural failure assessment on jointed rock masses and effects of dynamic loads on stability of pit openings

16554 Theory of Continum and Discontinum Mechanics:

This course covers the following topics:

Tension and vector analysis, strain, stress, kinematic elasticity, fluid movement equations.

16555 Advanced Underground Excavation Design:
This course covers role of geology in underground excavations, engineering geology studies on design of underground openings, in-situ stresses determination, stress distribution after excavation of underground openings, ground treatment and stabilization methods, excavation of underground openings in soft ground, support of underground openings in soft ground, excavation of underground openings in strong ground, quality assessment of underground excavations machineries, support of underground openings in strong ground, structural failure assessment on jointed rock masses and effects of dynamic loads on stability of underground openings

12512 Seminar: A topic related to rock mechanics which should be surveyed throughout existing literature and then writing a seminar report in appropriate format.

12524 Thesis Project: A research topic in applied exploration related discipline or inter-disciplinary fields