MINING ENGINEERING PROGRAM

COURSE SYLLABI

MinE 301: Principles of Mining Engineering (3: 3, 0) – Spring 2006/ 2007
(Required Core Course)

Course Description	Importance of minerals; Past mining activities; Present production and supplies; Mineral resources, exploration and classifications; Role of Deputy Ministry for Mineral Resources; Ore grades and recoveries; Project planning; Mine development; Mining methods Surface and underground; Mine equipment and advanced techniques; Concept of ore upgrading, metals recovery and refining; Mine environment, safety, and reclamation.
Prerequisite	Completion of the 2nd level of engineering courses, EMR 101, Gen Geol
Textbook	Thomas, L. J., "An Introduction to Mining", 1978 Hartman, H.L. , " Introductory Mining Engineering, 1987 SME Mining Engineering Handbook
Reference	Thomas, L. J., "An Introduction to Mining", 1978 Hartman, H.L. , " Introductory Mining Engineering, 1987 SME Mining Engineering Handbook
Course Learning Objectives (C.L.O.)	1-Explain the natural of mining industry. 2- Identify needs &uses of minerals 3- Outline local ore occurrences 4- Define natural of mining industry 5- Describe principle item and operations of mining engineering 6- Define mining conventional terms 7- Calculate mine ore reserve and ore grades 8- Recognize mining methods 9- Outline features and uses of mine equipment 10- Describe drilling principles 11- Identify the needs for ventilation/ safety in mining and environment 12- Calculate total shipping & refining cost for a mine project 13- Analyze requirement suitability of mining methods 14- Display mining methods, new mining techniques and equipment using internet websites
Topics covered by (weeks)	• Introduction to mining activities, past and present (1) • Importance/ role of minerals in economic development (0.5) • World ore Production, consumption, future supplies and ore depletion (0.5) • Minerals occurrences, resources, classification of ore reserves (1) • Potential ore deposits in SA, & needed ore deposits to replace imports (1) • Mining methods vs. rock/ orebody strength, depth and configuration (1) • Surface: Open-pit, quarrying, strip mining, auger mining (1) • UG mining methods selection vs., physical characteristics of ore (1) • Advanced techniques: ocean mining, in-situ mining, heap leach leaching (1) • Exploration: geophysical, geochemical, trenching, drilling, assay grades (1) • Development: access to orebody, equipment surface plant, mine structure (1) • Production/ore extraction: drilling-blasting-support, Load-Haul-Dump (1) • Drilling in mining: types and development of drills, drill patterns (1) • Mine safety: health, working conditions, ventilation, communications (1) • Mine plant: upgrading ore, recovering metals, concentrate & tailings (1

<table>
<tr><td rowspan="3">Course Relationship to Program Outcomes</td><td colspan="11">Program Outcomes</td></tr>
<tr><td rowspan="2">Highest attainable level of Learning</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>3</td><td>-</td><td>-</td><td>-</td><td>2</td><td>2</td><td>-</td><td>2</td><td>-</td><td>-</td><td>3</td></tr>
<tr><td>Class/ Lab Schedule</td><td colspan="11">The class meets twice a week, 110 minutes per class. The class is equipped with a complete multimedia and Pc for each student to facilitate active cooperative learning</td></tr>
<tr><td>Instructional Methods</td><td colspan="11">Lectures, Homework, Quizzes, Project, Mid Exam, Final Exam.</td></tr>
<tr><td>Course Contribution to Professional Component</td><td colspan="11">Engineering Science : 3 credits or 100%</td></tr>
<tr><td>Instructor</td><td colspan="11">Dr. Abbas A. Fadol, Associate Professor - alfadol@yahoo.com</td></tr>
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MinE 311: Rock Mechanics I (3: 3,0) – Fall 2007/ 2008
(Required Core Course)

Course Description	Geological consideration; Physical properties of rocks. Engineering properties of rocks; Failure criteria of rock; Rock testing; Stress distribution around underground openings; Rock quality and design of rock supporting system; Principle of rock slopes; Computer application in rock mechanics.
Prerequisite	MinE 301 Principles of Mining Engineering; CE 270 Strength of Materials
Textbook	Franclin, J. A. & Maurice, B., 'Rock Engineering Applications', McGraw-Hill Book Co., 1991; Jaeger J. C. & Cook, N. G. W.' Fundamentals of Rock Mechanics' Chapman & Hall London, 1979. Jumikis, J. R.,' Rock Mechanics' 2nd. Edition, Trans Tech Publications, Houston, 1983
Course Learning Objectives (C.L.O.)	1- Recognize geological consideration needed in rock mechanics course. 2- Determine physical properties of rock. 3- Analyze compressive strength of rock 4- Identify tensile strength of rock 5- Analyze shear strength of rock 6- Design an experimental model to correlate all the rock testing together. 7- Distinguish stress and strain analysis of rocks. 8- Evaluate stress distribution around underground openings. 9- Evaluate rock quality. 10- Design rock supporting system. 11- Outline principle of rock slope. 12- Apply some software which is available in network for rock mechanics applications.
Topics (weeks)	• Geological consideration (1). • Physical properties of rocks (1). • Engineering properties of rocks (2). • Failure criteria of rock (1). • Rock testing (2). • Stress distribution around underground openings (1.5). • Rock quality and design rock supporting system (2). • Principle of rock slopes (1). • Computer application in rock mechanics (1.5)

Course Relationship to Program Outcomes	Program Outcomes											
	Highest attainable level of Learning	a	b	c	d	e	f	g	h	i	j	k
		3	3	-	-	-	-	2	-	2	-	3
Class/ Lab Schedule	The class meets twice a week as lectures (110 min. per class). Laboratory practice is performed at the rate of once a week (60 min).											
Instructional Methods	Lectures, Tutorials, Homework, Quizzes, Reporting, Presentation Lab, and Computer applications.											
Course Contribution to Professional Component	Engineering Science: 75% Engineering Design: 25%											
Instructor	Prof. Dr. Mahmoud Aboushook - *E-mail: prof_dr_aboushook@yahoo.com* *Mob: 0568265313*											

MinE 312: Rock Blasting (3: 3,0) - Spring 2006/ 2007
(Required Core Course)

Course Description	Fragmentation principles, Types of Explosives, Properties and characteristics of explosives, Blasting agents (Initiation devices and Safety fuse, Electric shot-firing and detonating cords, Primers & boosters), Blasting theory, Design of electrical blasting circuits, Blasting cuts design, Design of bench blasting, Design of round blasting, Practical usage of explosives (Blasting in quarries, Blasting in shaft, tunnels, Blasting in stope operations, Blasting in coal mines).
Prerequisite	MinE 301, Principles of Mining Engineering
Textbook	Gregory, C. E. 'Explosives for North American Engineers', 2nd. Edition. Trans tech Publications, 1979. Olofsson, S. O.,'Applied Explosives Technology for Construction & Mining'APPLEX, Arla, Sweden, 1988. Hand-outs
Course Learning Objectives (C.L.O.)	1- Identify principles of fragmentation. 2- Classify Explosive types. 3- Recognize properties and characteristics of explosives 4- Describe blasting agents (Initiation devices and Safety fuse, Electric shot-firing and detonating cords, Primers & boosters). 5- State theory of blasting. 6- Design electrical blasting circuits. 7- Design of blasting cuts. 8- Design of bench blasting. 9- Design of round blasting. 10- Outline blasting in quarries. 11- Point out blasting in shaft. 12- Distinguish blasting in tunnels. 13- Set up blasting in stope operations. 14- Summarize blasting in coal mines.
Topics (weeks)	• Fragmentation principles (1). • Types of Explosives (1). • Properties and characteristics of explosives (1). • Blasting agents (Initiation devices and Safety fuse, Electric shot-firing and detonating cords, Primers & boosters) (2). • Blasting theory (1). • Electrical Blasting circuits design (1) • Cuts design (1). • Bench blasting design (1) • Round blasting design (1) • Practical usage of explosives: • Blasting in Quarry (1) • Blasting in Shaft, tunnels & other main headings (1). • Blasting in stope operations (1). • Blasting in coal mines (1).

Course Relationship to Program Outcomes	Program Outcomes											
	Highest attainable level of Learning	a	b	c	d	e	f	g	h	i	j	k
		3	-	3	-	2	-	-	-	-	-	3
Class/ Lab Schedule	The class meets twice a week, 110 minutes per class.											
Instructional Methods	Lectures – Projects – Exams – Mid Exam. – Final Exam.											
Course Contribution to Professional Component	Engineering science: 67% Engineering design: 33%											
Instructor	Prof. Dr. Mahmoud Ali Darwish- *Mob: 0505601620-* *Email: Darwishmam@hotmail.com*											

MinE 321 Mine Planning (3: 2 & 2) - Fall 2006/2007
(Required Core Course)

Course Description	Design and planning of mine operations with emphasis on the design and planning of surface layouts, main access entries and secondary development openings, underground layouts etc.; Long and short term planning; Project scheduling and systems analysis.
Prerequisite	MinE 301, Principles of Mining Engineering & IE 311, Operations Research I
Textbook	Howard L. Hartman, 'Introductory Mining Engineering' John Wiley & Sons, 1987. Moder, J. J., 'Project Management with CPM & PERT', Van Nostrand Reinhold, Germany, 1970
Reference	Cummins, A. B., 'Mining Engineering Handbook', vol. 1 & 2, S.M.E; A.I.M.E., 1973.
Course learning Objectives **(CLO)**	1- Identify processes of formation of mineral deposits and mineral exploration methods 2- Estimate ore reserves of mineral deposits 3- Plan layout of surface plant and services 4- Explain methods of construction of main and secondary development openings 5- Design and plan construction of main and secondary development openings 6- Explain principles of equipment selection 7- Explain principles of preparing long-term, short-term and daily production plans 8- Design a project involving selection of mining method, design and construction schedule of the main and secondary entries, production plan and environmental considerations as well as report writing and presentation.
Topics Covered by *(weeks)*	• Introduction to processes of formation of economic mineral deposits and exploration techniques. Ore reserves estimation. (2 weeks) • Parameters affecting the selection of sites and planning the surface layout of hoists, crusher, grinding mills, treatment plant, ore stockpiles, waste dumps, tailings disposals, workshops, laboratories, offices, housing, etc (2 weeks) • Project scheduling: Bar charts, CPM and PERT techniques of project scheduling. (2 weeks) • Design, planning and construction of main entries: vertical and inclined shafts, adits and declines, etc; (2 weeks) • Design, planning and construction of secondary openings: cross-cuts, drifts, raises, winzes, etc; (2 weeks) • Long term mine planning. (1 weeks) • Short term mine planning. (2 weeks) • Daily or immediate production planning. (2 weeks)

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<tr><td>Instructional Methods</td><td>Lectures, Tutorials, Homework, Quiz, Computer applications</td></tr>
<tr><td rowspan="2">Course Contribution to Professional Comp.</td><td>Engineering science; 2 Credit or 67%</td></tr>
<tr><td>Engineering science; 1 Credit or 33%</td></tr>
<tr><td>Instructor</td><td>Dr. Muhammad Hanif, Associate Professor- E-mail: mhanif3@gmail.com</td></tr>
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MinE 322: Surface Mining (3: 3, 0) - Fall 2006/ 2007
(Required Core Course)

Course Description	Current, and future status of surface mining. Prospecting and exploration; Land and water acquisitions; Preliminary evaluation; Planning and engineering design of open-pits, quarries, and alluvial mining operations; Exploration unit operations– drilling, blasting, excavation; Loading, haulage & transportation, etc; Auxiliary operations; Organization management and economics.
Prerequisite	MinE 301
Textbook	Kennedy, B.A., Editor, "Surface Mining", 1990 Stout, K.S. , " Mining Methods & Equipment", 1980 Crowford, J.T., and Hustrulid, W.A., " Open Pit Mine Planning and Design", 1979.
Reference	Thomas, L. J., "An Introduction to Mining", 1978 Hartman, H.L. , " Introductory Mining Engineering, 1987 SME Mining Engineering Handbook, 1990.
Course Learning Objectives	1-Identify surface mining principles 2-Define principle items in surface mining 3-Discuss different methods of ore reserve estimation 4-Calculate ore reserves 5-Determine grade of an ore using statistical analysis 6-Plot cut off grade graph 7-Apply geostatistical method in surface mining 8-Calculate break- even stripping ratio 9-Calculate break- even cutoff grade 10-Explain mining sequences of open pit mining method 11-Determine maximum height of a high wall in surface mining 12-Calculate advance rate per shift for a surface mining 13-Discuss factors affecting bench design 14-Choose mine equipment for surface mining 15-Analyze haulage system in surface mining 16-Calculate mine production in a surface mine 17-Discuss the required training for new miners in surface mining

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<tr><td>Topics Covered by (weeks)</td><td>

Overview of course requirements and Introduction to surface mining (1)
Geological Aspects and Preliminary Evaluation (1).
Mine Development and Correlation of development data (1).
Geostatistics, geostatistical test of data (1.5)
Ore reserve estimation using different methods (1.5).
Planning and Engineering Design of Open Pits and Quarries (1).
Computer applications in planning and Engineering Design of Open Pits and Quarries (1).
Planning and Engineering Design of surface Coal Mines (1).
Drilling and Blasting (1.5).
Excavation and Loading, Haulage and Transportation (1).
Organization and Management (0.5).
Future of Surface Mining (0.5).
Application of Operations research and computer in surface mining (1).

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<tr><td>Course Contribution to Professional Component</td><td>Engineering Science : 2 credits or 67%
Engineering Design: 1 Credit or 33%</td></tr>
<tr><td>Instructor</td><td>Dr. Mohamed Al-Juhani, Associate Professor- Email: msjuhani@yahoo.com
Tel: 68072</td></tr>
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MinE 323: Mining Methods (3: 3,0) - Fall 2006/ 2007
(Required Core Course)

Course Description	Classical mining techniques for narrow veins, wide lodes, massive and stratified deposits, associated with corresponding methods of mine development; classification of underground mining methods; choice of methods depending upon configurations and regularity of the deposit, depth below surface, physical characteristics of the ore & enclosing rocks; comparisons in terms of applicability, flexibility, preparatory development, percentage recovery, dilution with waste, rate of extraction, level intervals, unit cost & safety; ramp mining using LHD equipment & declines; methods of timbering/ support in the workings & stope filling; stope mechanization; coal mining methods - - - room-and-pillar, longwall, shortwall and other methods.
Prerequisite	MinE 301, Principles of Mining Engineering
Textbook	Stout, K. S. ,'Mining Methods & Equipment', McGraw
Course Learning Objectives (C.L.O.)	1- Classify mineral deposits & rock materials. 2- Explain underground mining methods 3- Classify underground mining methods. 4- Discuss basic & parametric criteria in the selection, design and development of underground mining methods. 5- assess underground classical mining Techniques. 6- Describe Special underground mining methods
Topics (weeks)	• Classification of mineral deposits & rock materials (1). • Introduction to underground mining methods (1). • Basic & parametric criteria in the selection, design &development of underground mining systems (1). • Room & pillar methods (1). • Longwall mining systems (1). • Open stopes – Horizontal deposits (1). • Timbered stopes (1). • Shrinkage stoping (1). • Sub-level stoping (1). • Block caving (1). • Sub-level caving (1). • Underground coal mining equipment (1). • Underground classical mining Techniques. (1). • Special underground mining methods (1).

Course Relationship to Program Outcomes	Program Outcomes											
	Highest attainable level of Learning	a	b	c	d	e	f	g	h	i	j	k
		3	-	-	-	3	-	2	2	-	2	2
Class/ Lab Schedule	The class meets twice a week, 110 minutes per class.											
Instructional Methods	Lectures – Tutorials - Exams											
Course Contribution to Professional Component	Engineering science: 67% Engineering design: 33%											
Instructor	Prof. Dr. Mahmoud Ali Darwish- *Mob: 0505601620-* *Email: Darwishmam@hotmail.com*											

MinE 331: Mine Plant Design I (3: 2,2)- Spring 2006/2007
(Required Core Course)

Course Description	Introduction to the material handling; Classification of the most type of material handling equipments; A review of applied mechanics principles; Design parameters and selection of ore conveying systems.
Prerequisite	MinE–301; Principles of Mining Engineering
Textbook	No definite textbook will be followed. Lecture notes are available for most chapters and photocopied at the departmental secretary office.
Reference	• Mechanics of bulk materials handling notes. • SME, Mining engineering handbook, Vol.1 and 2.
Course Learning Objectives (C.L.O.)	1. A brief discussion of the characteristics, types, principles, methods and the most equipments used in the material handling 2. Employ the material handling knowledge to cope with the mine ore handling and conveying system. 3. State a working knowledge on a simple description of some of the mine machineries including a simple discussion of the methods and procedures for a proper selecting mine plant equipments including their structures during the mine activities. 4. Utilize the basic concepts of fundamental mathematics, physics, chemistry and applied mechanics to simplified engineering problems of the ore and the materials handling. 5. Describe the specifications, types, applications, factors affecting the usage of the belt conveyors and structure design of the belt conveyors. 6. Estimate the belt width, length, the speed, the gradient of the roads, ore loading conveying factor, number of belt layers, the belt working strength, the effective tension (value and location), friction of a belt on a pulley, pulley angle of wrap, the powers required by the belt conveyor, and motor size to operate the system.. 7. Describe the specifications, different types, applications, and the structure design of the rope haulage system. 8. Describe the specification, applications, and structure design of the monorails and aerial ropeways. 9. Study the types of wire rope, structure, rope safety factor, and rope haulage calculations. 10. Estimate the size and number of waggons, size of the rope used, journey time of ore conveying, the maximum and minimum pull force and the tail tensions value and location and the motor size to operate the conveying system. 11. Define the specifications, types, applications and structure design of the open and enclosed chain conveyors. 12. Define the specifications, types, applications and structure design of the Bucket elevators. 13. Define the specifications, applications and structure design of the screw conveyors and elevators. 14. Define the specifications, applications and structure design of the shaking and vibratory conveyors. 15. Solve practical practice problems related to the conveying system machineries for the ore and the material handling. 16. Utilize a computing program to design a software for an ore conveying system.

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<tr><td>Topics covered by (weeks)</td><td colspan="7">

General introduction to the Material handing. (0.5).
Classification, type, principles, methods and the most type of equipments used in the material handling. (0.5).
A review of the applied mechanics: work, energy, power, the friction, the units, Conversion factors for units of measurement.(0.5).
Newton’s laws of motion, Rotary motion, Motion in circle. (0.5).
Combinations of forces, D’Alembert’s principle. (0.5).
Moment of force & Moment of inertia, Work, Energy, Power, Friction; friction of wheeled vehicles & a belt on a pulley. (0.5).
Belt conveyors (3).
Rope haulage system (3).
Open and enclosed Chain conveyors (1).
Bucket elevators (0.5).
Screw conveyors and elevators (0.5).
Shaking conveyors (0.5).
Vibratory conveyors (0.5).

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<tr><td>3</td><td>3</td><td>2</td><td>2</td><td>2</td><td>2</td></tr>
<tr><td>Class/ Lab Schedule</td><td colspan="7">The class meets twice a week, 110 minutes per class. The class is equipped with a complete multimedia and Pc for each student to facilitate active cooperative learning.</td></tr>
<tr><td>Instructional Methods</td><td colspan="7">Lectures, Tutorials, Homework, Reporting, Quizzes, Exam and Computer applications</td></tr>
<tr><td>Course Contribution to Professional Component</td><td colspan="7">Engineering Science: 33.3 %
Engineering Design: 66.6 %</td></tr>
<tr><td>Instructor</td><td colspan="7">Dr. Hassan M. Meriky - E-mail: hmeriky @yahoo.com
Mob: 0505523445</td></tr>
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MinE 342: Mineral Processing (1) (4: 3,2) - Fall 2006/2007
(Required Core Course)

Course Description	Introduction to mineral processing. Efficiency of operations. Liberation. Concentration and metallurgical balances. Comminution and classification. Sampling. Sizing. Gravity concentration. Heavy medium separation. Magnetic and electrostatic separation. Flowsheet design, examples and computer applications for process simulation.
Prerequisite	**MinE 301, Principles of Mining Engineering**
Textbook	• B. A. Wills "Mineral Processing Technology" 1997 6th ed.
Reference	• Maurice C. Fuerstenau, Kenneth N. Hahn "Principles of Mineral Processing", SME, 2003
Course Learning Objectives (C.L.O.)	1. Explain the fundamental operations & their efficiency in mineral processing. 2. Classify the methods of sizing of mineral particles. 3. Illustrate size reduction in crushing. 4. Illustrate size reduction in grinding. 5. Describe the methods of separation. 6. Design a flowsheet of a mineral processing plant.
Topics covered by (weeks)	• Efficiency of operations – liberation- concentration and metallurgical balances (2). • Crushing (primary, secondary, tertiary) and crushing circuits (2). • Grinding (rod mill, ball mill) and grinding circuits (2). • Classification (Stoke's law, Newton's law) free and hindered settling and types of classifiers (2). • Sizing and size analyses (0.5). • Gravity concentration (1.5). • Magnetic separation (1). • Electrostatic separation (1). • Flowsheet design for beneficiation plants (examples and simulation) (2).

Course Relationship to Program Outcomes	Program Outcomes											
	Highest attainable level of Learning	a	b	c	d	e	f	g	h	i	j	k
		3	**3**	**3**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	2
Class/ Lab Schedule	The class meets twice a week as lectures (80 min. each). Laboratory practice is performed at the rate of once a week (110 min).											
Instructional Methods	Lectures, Laboratory practice, Tutorials, Homework, Exams, Computer applications, and Presentations											
Course Contribution to Professional Component	Engineering Science: 75% Engineering Design: 25%											
Instructor	Dr. Mohammed-Noor Naher Al-Maghrabi **Mail: almagrabii@yahoo.com, Tel.: 0505603099**											

MinE 401: Mine Surveying (3: 2, 3) - Spring 2006/ 2007
(Required Core Course)

Course Description	Triangulation figures (design, measuring and correction), Introduction to mine surveying, Underground Traversing workings (design, measuring orientation connection and correction), Apply the theory of errors and probability in mine survey, Computer application in mine survey, application of mine survey in tunnels construction,
Prerequisite	**MinE 301, CE 371**
Textbook	• Staley, W.W., "Introduction to Mine Surveying", 2nd. ED 1996, Stanford University Press. • Whyte, W.S. et al., "Basic Surveying", Butterworth Heeinemann, June, 1999, ISBN 0750717713
Reference	• Robbiland, W.G., "Clark on Surveying and Boundaries", Lexis Law Pub. ISBN 1558348166 • Francis H. Moffitt, 1982, "Surveying" Seventh Harper & Raw Publishers Inc. , New York.
Course Learning Objectives (C.L.O.)	1. Recognize surveying instruments. 2. Adjust surveying instruments to be suitable for underground works. 3. Design triangulation figures. 4. Correct triangulation figures. 5. Use statistics in adjusting triangulation figures 6. Choose the underground stations. 7. Apply the leveling in underground workings. 8. Measure the angles in underground workings. 9. Practice the distance measurement in underground workings. 10. Select the underground traverse. 11. Carry out necessary measurements in an underground traverse 12. Describe the methods of mine orientation surveys. 13. Connect the Triangulation figures with underground traverses 14. Apply the theory of errors and probability in mine survey. 15. Use underground surveying in tunnels construction. 16. Use computer programs in contour maps drawing. 17. Estimate the ore reserves by surveying application. 18. Design mine surveying project.
Topics covered by (weeks)	• Introduction to mine surveying, differences between surface and underground surveying consideration of mine environment (1). • Testing and adjusting surveying instruments (Levels & theodolites) (1). • Design and adjustment of Triangulation figures (1.5). • Underground Stations (0.5). • Angle measurement in underground workings (1). • Distance measurement in underground workings (1). • Traversing in underground workings (1). • Mine orientation surveys: shaft plumbing in a single shaft (1). • Mine orientation surveys: shaft plumbing in a two shaft (1). • Connect the Triangulation figures by underground traverses (1). • Apply the theory of errors and probability in mine survey (2). • Tunnel survey (1). • Computer application in mine survey (1). • Sections, areas & volumes, ore reserves estimation (0.5). • Project (0.5).

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<tr><td>Course Contribution to Professional Component</td><td>Engineering Science: 70%
Engineering design: 30%</td></tr>
<tr><td>Instructor</td><td>Dr. Gamal Saad Abdel Haffez Hassan
Mail: gamalhaffez@yahoo.com, Tel.: 0560215134</td></tr>
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MinE 402: Mining Economics (3: 3,0) - Fall 2006/ 2007
(Required Core Course)

Course Description	An overview of mining economics; The economic minerals: Resources and reserves; Patterns of production, consumption, transportation, and marketing etc. Perspective of the past, present and future supplies of minerals worldwide and in Arab countries; Finance and economic analysis and interpretation; The concept of cash flow and time value; Sensitivity and risk analysis techniques etc.; Introduction to writing of technical reports and preliminary feasibility study reports using spreadsheet computer applications.
Prerequisite	Min.E. 301, Principles of Mining; I.E. 255, Engineering Economics Fundamentals of Applied Sciences and Engineering
Textbook	Stermole, Frank, 1980, "Economic Analysis and Decision Making", Investment Evaluation Corp., Golden, Colorado. (Selected parts). Gentry, D. W. & O'Neil, T. 1984 "Mine Investment Analysis"AIME SME,N.Y. (Selected parts). Various chapters from above texts, in addition to Class Notes and Handouts from various texts in Mining Economics.
Reference	Hartman. H. L., 1992, "SME Mining Engineering Handbook", Society for Mining, Metallurgical, and Exploration, SME, Colrado. Runge, Ian L, 1998, "Mining Economic and Strategy", SME, Society for Mining, Metallurgy, and Exploration, Colorado, USA.
Course Learning Objectives (C.L.O.)	1- Introduce purpose of mining economics, Minerals contributions, to Economic development of SA, 2- Interpret concept of mineral resources, ore reserves, supplies & depletion, SA potential ore locations 3- Appraise ore values, anticipated market prices, minerals availability, environment, preservation. 4- Compare interest rate, inflation, and indices, time value. Use of SS. 5-. Describe concept of ore grade &recovery, upgrade. Mill metal recovery & concentrate grade.. 6- List components of mine costs; Mine development, operating cost, mine sizes; stages of mining project. 7-.Compute & interpret cost estimation, sensitivity, nature of mining industry, novice & constraints, 8-.Construct cashflow pattern over project life, tax structure, time diagram, economic theory, viability. 9- Analyze mine valuation techniques, Introduce tech.. writing report.
Topics Covered by (weeks)	- Importance of minerals to industry, society & economic development - Converting ore deposits into national wealth; ore reserve, metal contents - Potential ore deposits in SA, in Arab countries; Locations & constituents - Introduction to commercial mining operation, cost, revenue, and profit - Interest rates, time value of money, inflation, escalation, price index - Concept of mine ore grade, mine recovery/ dilution and mined ore grade - Concept of mill metal recovery and ore concentrate metal grades - Cost estimation of mine projects; construction cost; Operating cost - Cost of mine structure, mill plant, surface facilities, and financing - Capital-intensive concept; capital cost vs. operating cost. - Costs of concentrating, transporting, smelting, refining, and marketing, - Mine revenue; Product scheduling; Optimal grade; Price forecasting - Applications of economic theory, Time diagram; PV, FV, IRR - Commercial projects; Cash flow, Mine depreciation; Depletion, Taxes - Initial feasibility study, computer applications and analysis; problems and review.

<table>
<tr><td rowspan="3">Course Relationship to Program Outcomes</td><td colspan="12">Program Outcomes</td></tr>
<tr><td rowspan="2">Highest attainable level of Learning</td><td>a</td><td>b</td><td>c</td><td>d</td><td>e</td><td>f</td><td>g</td><td>h</td><td>i</td><td>j</td><td>k</td></tr>
<tr><td>3</td><td>-</td><td>-</td><td>-</td><td>3</td><td>-</td><td>2</td><td>2</td><td>-</td><td>2</td><td>2</td></tr>
<tr><td>Class/ Lab Schedule</td><td colspan="12">The class meets twice a week, 110 minutes per class. The class is equipped with a complete multimedia and Pc for each student to facilitate active cooperative learning</td></tr>
<tr><td>Instructional Methods</td><td colspan="12">Lectures, Tutorials, Homework, Quizzes, Computer applications</td></tr>
<tr><td>Course Contribution to Professional Component</td><td colspan="12">Engineering Science :3 credits or 100%</td></tr>
<tr><td>Instructor</td><td colspan="12">Dr. Abbas A. Fadol, Associate Professor</td></tr>
</table>

MinE 403: Mining Laws and Management (3: 3,0)
Fall Semester

Course Description	The Mining Code of Saudi Arabia; A comparative study of the mining laws of the Kingdom and industrially developed countries, e. g. U.S.A., U. K., etc. Mineral concession and conservation laws; Mine labor and safety laws; Management structure: The structure of modern mining industry; Organization—Command; Co-ordination and control, human relations—Disputes, Join concilation and concolation; Management techniques: Industrial efficiency; Engineering economy; Application of operation Research in mining; Project Scheduling; Gantt Charts, PERT, CPM and other methods; Training programs.
Prerequisite	MinE 301, IE 256, IE 311
Textbook	Mining code, Kingdom of Saudi Arabia, Deputy ministry for mineral resources, 1972.
Reference	Gentry, D. W. and O'Neil, T. J., Mine Investment Analysis, SME, New York, N. Y., 1984. Torries, T. F., Evaluating Mineral Project; Applications and Misconceptions, SME, New York, N. Y., 1998. Hartman, H. L., editior, SME Mining Engineering Handbook, 2nd edition, SME, New York, N. Y., 1992. Tomlingson, P. D., Equipment Management, Kendel/Hunt publishing Comp, Dubuque, lowa, 1998. Bise, C. J., Mining Engineering Analysis, SME, New York, N. Y., 1986.
Goals	- To develop student's ability to understand Mining laws of Saudi Arabia. - To develop a student's ability to understand mine health and safety that applied in Saudi Arabia. - To give the student an introduction to mine management. - To develop a student's ability to make decisions using engineering economics, determenisties methods and computers based on data analysis.
Intructor	Dr. Mohammad AL Juhani, Associate Professor
Topics	- Mining Law in Saudi Arabia. - Continue-mining Law in Saudi Arabia. - Continue-mining Law in Saudi Arabia, A Comparative study of the mining Laws of KSA and industrial developed Countries. - Mine health and safety in KSA mines. - Mine health and safety of Mahd Addahab mine. - Introduction to mine management – A brief history of management. - Management terms: planning, organizing, controlling ... etc. - Co-ordination and control, duties, and responsibilities of mine managers. - Engineering Economy, decision making. - Applied problems to mineral industry. - Continue … problems. - CPM, PERT. - Applied problems in mining. - Linear programming. - Applied problem in production scheduling. - Dynamic programming in production scheduling. - Applied Examples. - Training programs in surface mining and underground mining. - Refresher training programs. - Career planning.
Computer Usage	Solution of cash flow problems using spread sheet computer program Solution of linear programming problems using computer soft wares.
Engineering science	3 Credit or 75%
Engineering design	1 Credit or 25%

MinE 443: Mine Ventilation and Safety (4:3,2) - Fall 2006-2007
(Required Core Course)

Course Description	General introduction; Nature and importance of ventilation and its control; Sources of heat and humidity in mines; Heat conduction in rocks; Mine hygrometry and psychrometry; Temperature and humidity control; Mine cooling systems; Mine ventilation: Quality control; Normal air, Mine air; Gas flow through strata; Gas adsorption; Physiological effects and permissible limits; Methane drainage system; Mine dusts: Sources of dust, Dust suppression; filtration etc., Physiological effects and permissible limits; Mine fires and explosions; Quality control; Ventilation flow and its principles; Natural ventilation; Artificial ventilation; Ventilation systems; Ventilation ducts & Airways, Mine fans, booster and auxiliary fans etc., Occupational diseases of miners; Mine accidents causes of physical accidents and their nature; Accidents statistics frequency and severity rates; The international mine safety rating scheme; General aspects of mine safety; Safety organizations; Industrial hygiene; Personal protective equipment; Safety first aid programs; Mine health and safety laws; Mine rescue and recovery operations/procedures.
Prerequisite	MinE –301 ; Principles of Mining Engineering , MinE –322 ; Surface Mining MinE –323 ; Mining Methods, MEP –290 ; Fluid Mechanics
Textbook	No definite textbook will be followed. Lecture notes are available.
Reference	• Mine Ventilation For Beginners. • Mine Ventilation and Air Conditioning. • SME, Mining Engineering Handbook, Vol.1. • Subsurface Ventilation and Environmental Engineering. • Safety Manual No.2 Mine Gases. • Monitoring For Health Hazards at Work. • Measurement in Mine Environmental Control.
Course Learning Objectives (C.L.O.)	• Identify the basic concepts of mine ventilation systems and mine safety. • Solve practical practice problems related to the subsurface ventilation and monitoring for health hazards at mine activities. • State a working knowledge on the quantity of fresh air should be supplied to the workers in working faces during the underground mine activities and the importance of the time factor for the miner life during the rescue operation. • Design a software of calculating the required air for mine ventilation and the mine environment control.

<table>
<tr><td>Topics Covered By
(weeks)</td><td colspan="12">

Introduction to the atmospheric air & mine air (1).
Mine Gases: Sources, Classification, Detection, and Controls (1.5).
Mine Dust: Sources, Classification, Detection, and Controls (1.5).
Air Quality Control : Calculation of the required air quantity (2).
Temperature – Humidity Control (0.5).
Geothermal Gradient & Natural Ventilation (0.5).
Heat in U/G Mine: Sources, Detection, and Controls (0.5).
Fundamentals of Airflow (2.5).
Mine Resistance (1).
Regulators and Air Splitting (0.5).
Ventilation Survey (0.5).

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<tr><td>Instructional Methods</td><td colspan="12">Lectures, Tutorials, Homework, Reporting, Quizzes, Lab, and Computer applications.</td></tr>
<tr><td>Course Contribution to Professional Component</td><td colspan="12">Engineering Science: 75%
Engineering Design: 25%</td></tr>
<tr><td>Instructor</td><td colspan="12">Lec. Eng. Hassan M. Meriky - E-mail: hmeriky @yahoo.com
Mob: 0505523445</td></tr>
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MinE 499: Senior Project (4: 2, 4) – Fall & Spring 2007/ 2008
(Required Core Course)

Course Description	Review of selected ore around world and Saudi Arabia (including: ore distribution, industrial uses, economic & marketing view and environmental impact)- Geological Consideration and Reserve Estimations of selected ore--Mine Design and Equipment Selection& Management for Extraction and transportation of selected ore- Process Design and Equipment Selection for beneficiation of selected Ore- Optimization of mining & processing operation- Cost Analysis and Marketing- Environmental Impact
Prerequisite	Completion of 120 credit hours
Textbook	All the text books used for other core mining courses
Reference	All the references used for other core mining courses
Course Learning Objectives (C.L.O.)	1- Outline a brief report about general view of selected ore around the world and Saudi Arabia (including ore distribution, industrial uses, economic view & marketing and environmental impact). 2- Summarize a brief geological report about the studied area. 3- Evaluate ore reserves using different methods (Tonnage, av. Assey, av. thickness, histograms and global variogram) 4- Construct the following maps: bed top structure, isopach and isocheimal. 5- Determine the number of required working mine faces and their locations to produce required production and design one of working face 6-Deduce alternative solutions for selection of necessary equipment for: excavation, extraction, loading and haulage operations. 7- Select alternative solutions for a Qualitative and quantitative processing flow sheet design (Flow sheet should include: ore preparation; storage packing; transportation, other material handling equipments and material balance). 8- Arrange network of access and circulation from the working faces to the processing plant and propose alternative solutions for plant / mill location. 9- Optimize and schedule mine & processing operations and estimate productive life of the mine. 10- Formulate cost analysis from ore exploration to the final product 11- Propose some solution for the environmental impact of selected ore industry

<table>
<tr><td>Topics covered by (weeks)</td><td>- Review of selected ore around world and Saudi Arabia (including: ore distribution, industrial uses, economic & marketing view and environmental impact)- (4).
- Geological consideration and reserve estimations of selected ore (5).
- Mine design and equipment selection& management for extraction and transportation of selected ore- (7).
- Process design and equipment selection for beneficiation of selected ore (7)
- Optimization of mining & processing operation (3)
- Cost Analysis and Marketing (2).
- Environmental Impact (2).</td></tr>
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<tr><td>Instructional Methods</td><td>Lectures, Homework, field & offices trips, library, Networks, Seminars, Discussions and Presentations.</td></tr>
<tr><td>Course Contribution to Professional Component</td><td>Engineering Science: 25%
Engineering Design: 75%</td></tr>
<tr><td>Instructor</td><td>Prof. Dr. Mahmoud Aboushook - E-mail: prof_dr_aboushook@yahoo.com
Mob: 0568265313</td></tr>
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