ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language
MAD 316, Blasting Technology, 3+0 hour/week, 3 Credit, Elective , Turkish
Course Description
Rock drilling methods, properties of explosives, industrial explosives, initiation systems, mechanism of rock breakage, characterization of the rock masses for blast designing, controllable parameters of blasting, bench blasting, blasting for tunnels, drifts and shaft sinking, underground production blasting in mining engineering, evaluation of blast results, blast induced environmental effects.
Prerequisite(s)
None
Textbook(s) or Other Required Material
Kuzu, C., Lecture notes (Main text book) Konya, J. C., Edward, J. W.: Surface blast design, Prentice-Hall, London, 1990. Jimeno, C. L. et all: Drilling and blasting of rocks, A. A. Balkema, Rotterdam, 1995.
Course Objectives
The theme of Blasting is as an older work as the mining itself and the blasting technologies are still in use almost in all underground mines, open pit mines and in construction sector. For that reason, it is intended to give the basic knowledge of blasting including environmental aspects to the mining students through this course. It is also aimed to show the methods of blasting design, which is rational, applicable and follows scientific principles.

Topics Covered on a Weekly Basis	
1. Explosive energy (the kind of explosive energy, work energy, waste energy, oxygen balance, energy release calculations)	(1 week)
2. Rock breakage mechanism (blasting process and time considerations, detonation, shock energy and stress waves, gas pressure and gas expansion, mass movement) and blasting theories	(1 week)
3. Seismic energy and blast induced vibrations	
4. The effect of rock and rock mass properties (density, dynamic strength, index of blastability, porosity, internal friction/lithology, joint system, stress fields, water content) on the results of blasting, I. Quiz	(1 week) (1 week)
5. Characteristics of explosives (VOD, strength, sensitivity, critical diameter, water resistance, fume and gas characteristics) and industrial explosives (dynamites, slurries and emulsions, ANFO)	(1 week)
6. Initiation systems and priming properties	
7. Controllable parameters of blasting (geometric properties, explosive properties, time considerations)	(1 week) (1 week)
8. Bench blasting (pattern design, delay timing, initiation sequence)	
9. Mid-term exam	(1 week)
10. Blasting in other surface operations (excavation for highways and railways, trench blasting, ramp blasting, blasting for foundation (smooth blasting, pre splitting)	(1 week) (1 week)
11. Blasting for tunnels and drifts, shaft sinking and raise driving (the types of cuts and their calculations)	(1 week)
12. Underground production blasting in mining (VCR, LBH, etc.)	
13. Blasting and environmental effects, blast induced vibrations, air blast, fly rock, and other issues II. Quiz	(1 week) (1 week)
14. Evaluation of drilling and blasting (observation of a bench blasting operation in a quarry)	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 40 % (10 % homework, 10 % quiz, 20 % mid-term exam); 1 mid-term exam, 2 quiz, 2 homework (sensors and actuators; comments on articles for mine automation systems), final examination 60 %.

Contribution of Course to Meeting the Professional Component

80% Mining Engineering Design (MT), 20 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	13
(b) an ability to design and conduct experiments, as well as to analyse and interpret data	13
(c) an ability to design a system, component, or process to meet desired needs	12
(d) an ability to function on multi-disciplinary teams	3
(e) an ability to identify, formulate, and solve engineering problems	12
(f) an understanding of professional and ethical responsibility	2
(g) an ability to communicate effectively	-
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	13
(i) a recognition of the need for, and an ability to engage in life-long learning	12
(j) a knowledge of contemporary issues	13
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	13
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	13

Prepared By

Doç. Dr. Cengiz KUZU 06/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language
MAD 415 E, Cement Technology, 3+0 hours/week, 3 Credit, Elective , English
Course Description
Cement raw materials and raw material production, Raw material size reduction and preparation processes, Silos, pre-homogenisation and mix calculations, Clinkering process (homogenisation, pre-heating, calcination, burning and cooling processes), Cement grinding systems, Cement types and standards, Concrete& Ready-mix concrete, Standard tests, New research and developments.
Prerequisite(s)
None
Textbook(s) or Other Required Material
Lecture Notes, (main textbook) Gani, M.S.J., Cement and Concrete, Chapman & Hall, 1997, (main textbook) Ghosh, S.N., Cement and Concrete Science &Technology, Bauverlag D-65173 Wiesbaden, Vol-1 Part=I, II, 1994 Zhaoqi Wu, Cement and Concrete, Chapman & Hall, 1998 Barnes, P., Structure and Performance of Cements, Chapman &Hall, 1983 Bye,G.C., Portland Cement: Composition, Production and Properties, Pergamon Press, 1983. Walter, H.D., Cement Data Book, , Bauverlag D-65173 Wiesbaden, Vol.2, 1984, Vol.3, 1988.
Course Objectives
Turkey is the biggest cement producing country in Europe and 7 th biggest world scale with the production rate of 37 Mton. This industry has been playing a very important role in the development of Turkey. The machines used are very specific to this industry and not covered by any engineering disciplines. To fill this gap, cement raw materials and production, clinkering process and cement grinding process together with standards cement types, tests and new research and developments are intended to teach in Mining Engineering education.

Topics Covered on a Weekly Basis	
1.Cement raw materials, Raw Material Production Planning, Drilling and Blasting, Loading and Mucking, Transportation	(1 week)
2.Aspects of Raw Material Homogenisation, Quality Control Formulas, Kiln Feed Mix Calculation	(1 week)
3.Principles of Crushing and Grinding	(1 week)
4.Raw Material Grinding Systems	(1 week)
5.Design of Bins and Feeders, Drying Systems	(1 week)
6.Burning and Cooling Processes, Kiln Design and Operation	(1 week)
7.Kiln Performance and Efficiency, Heat Balance, Clinkering Process, Cooling Process	(1 week)
8.Cement Grinding Systems & MID-TERM EXAM	(1 week)
9.Cement Grinding Systems	(1 week)
10.Cement Types & Standards	(1 week)
11.Concrete & Ready –Mix Concrete	(1 week)
12.Standard Tests for Cements, Cement Pastes, Mortars and Concrete	(1 week)
13.Analysis of Cement Industries – Production, Imports and Exports Figures	(1 week)
14.New researches & Future Developments	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies : 50 % (homework: 10 %; mid-term exam 40%) and final examination: 50%.
Laboratory : None
Computer Usage : MS OFFICE programs to do their mid-term studies
Field Schedule : Visit to a cement factory and raw material pit.

Contribution of Course to Meeting the Professional Component

70% Mining Engineering Design (MT), 30 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following grading are used in the table.

0 week : No relation — 5 – 8 week : Related
1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	13
(b) an ability to design and conduct experiments, as well as to analyse and interpret data	1
(c) an ability to design a system, component, or process to meet desired needs	7
(d) an ability to function on multi-disciplinary teams	-
(e) an ability to identify, formulate, and solve engineering problems	13
(f) an understanding of professional and ethical responsibility	2
(g) an ability to communicate effectively	-
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	4
(i) a recognition of the need for, and an ability to engage in life-long learning	2
(j) a knowledge of contemporary issues	4
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	13
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	7

Prepared By

Assoc.Prof.Dr. Hasan Ergin 04/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 431, Coal Preparation And Technology , 2+0 hour/week, 2 Credit, Required , Turkish

Course Description

Coal characterization, washability of coals, washability analyses, coal cleaning processes, sampling, dewatering, coal preparation plant practice-design, plant control and coal technology (coking, briquetting, pyrolsis and gasification)

Prerequisite(s)

None

Textbook(s) or Other Required Material

Coal Processing, G. Atesok, Güney Grafik, 1986, (in Turkish) (main text book)
The beneficiation of coal and coal washing plants, Seminar notes, Güney Grafik, 1986, (inTurkish)
Handbook for Mineral processing, (Published by, Turkish Mining Development Foundation 1994), (inTurkish)
Proceedings of Coal Technology and Utilization Seminars I, II, III, IV and V (1991, 1993, 1995, 1997, 2000) Published by Turkish Mining Development Foundation, (in Turkish)
Proceedings of National Coal Congress
Different papers

Course Objectives

Coal is the most important input of Energy production. The subject of coal preparation are to increase the calorific value of coal with removing of ash and to desulfurize coal to combat air pollution. It is the objective of this course, to teach the students what is the concept of coal cleaning, to describe the methods of coal preparation, coal technology, plant practice and plant control.

Topics Covered on a Weekly Basis

1. The importance of coal in the energy production	(1 week)
2. Determination and classification of coals, chemical properties	(1 week)
3. Pysical properties of coal and coal petrography	(1 week)
4. Turkish coals, sampling of coal	(1 week)
5. Coal preparation and washability, Quiz 1	(1 week)
6. Washability analyses and Mayer Curves	(1 week)
7. Crushing, screening and coal beneficiation in course particles	(1 week)
8. Coal beneficiation in fine particles	(1 week)
9. Dewatering of coals, Quiz II	(1 week)
10. Transporting, Storage of coals	(1 week)
11. Mid-term exam	(1 week)
12. Coal processing plant design and control	(1 week)
13. Coal technolgy-coking of coal	(1 week)
14. Briquetting, pyrolysis and gasification of coal	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 50 %(20 % mid-term studies, 30% mid-term exam) and final examination 50 %. / Computer Usage : MS OFFICE programs like WORD in order to do their mid-term studies/ Field Schedule : None .

Contribution of Course to Meeting the Professional Component

90% Mining Engineering Design (MT), 10 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	4
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	6
(c) an ability to design a system, component, or process to meet desired needs	9
(d) an ability to function on multi-disciplinary teams	2
(e) an ability to identify, formulate, and solve engineering problems	5.5
(f) an understanding of professional and ethical responsibility	2
(g) an ability to communicate effectively	-
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	2
(i) a recognition of the need for, and an ability to engage in life-long learning	-
(j) a knowledge of contemporary issues	4
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	8.5
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	4

Prepared By

Prof. Dr. Gündüz Atesok 10/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 322 E, Design of Support in Mines and Tunnels, 2+1 hour/week, 2,5 Credit, Required , English

Course Description

Main principles for selecting support systems. Determination of loads affecting on support systems. Engineering characteristics of mine timber and design principles. Wooden gallery and face support systems. Engineering characteristics of stell and design of rigid, articulated and yielding arches. Steel longwall support systems. Roof bolts and design principles (slot and wedge bolts, resin bolts, concrete bolts, split set and swelex). Engineering characteristics of concrete and its use as a mine support (design of shotcreting, shaft lining etc.). Backfill and design principles (pneumatic, hydraulic). Support systems in tunnels and subways. Design of supports using rock classifications systems.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Hoek, E., and Kaiser, P.K., Bawden, W.F.,, Support of Underground Excavations in Hard Rock, Balkema /Roterdam/Brookfield/1995, 215 pp. (main text book)

Birön, C., Arioglu E., Design of Supports in Mines, Willey and Sons, New York, 1983. (main text book)

Whittaker, B.N., and Frith R.C., Tunneling, Design, Stability and Construction IMM (The Institution of Mining and Metallurgy).

Bengt Stillborg., Professional Users Handbook, for Rock Bolting Trans Tech Publications, 1986.

Danuta Krzyszton, Editor., Geomechanical Criteria for Underground Coal Mines Design International Bureau of Strata Mechanics, Central Mining Institute, Katowice, 1995.

Course Objectives

Design of a support system in underground mining galeries, faces and subway tunnels are very important as far as economy and safety are concerned. It is, therefore, Design of Support in Mines and Tunnels lecture is highly required for mining engineers who want to work in underground. The main objective of this course is to teach students the types and the design principels of support systems used in mining and subway tunnels by examples and computer.

Topics Covered on a Weekly Basis	
1. An overwiev of Rock Support Design	(1 week)
2. Determination of loads affecting on support systems	(1 week)
3. Engineering characteristics of mine timber and design principles. Wooden gallery and face support systems	(1 week)
4. Engineering characteristics of stell and design of rigid, articulated and yielding arches	(1 week)
5. Steel longwall support systems	(1 week)
6. Rockbolts and Dowels (slot and wedge bolts, resin bolts, concrete bolts, split set and swelex)	(1 week)
7. Engineering characteristics of concrete and its use as a mine support	(1 week)
8. Shotcrete Support	(1 week)
9. Backfill and design principles (pneumatic, hydraulic)	(1 week)
10. Support systems in tunnels and subways	(1 week)
11. Mid-term exam	(1 week)
12. Support Design using rock mass cllasification systems	(1 week)
13. Support Design in Rock masses, (Support-Rock interaction analysis) EXCEL Aplications	(1 week)
14. Bearing capacity calculations in rock and soil formations	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 50 % (10% Homework and 10 % Class attendance, 30% Mid-term exam) and Final examination 50 %. / Computer Usage : MS OFFICE programs like WORD and EXCEL, to do their mid-term studies/ Field Schedule : None .

Contribution of Course to Meeting the Professional Component

100 % Mining Engineering Design (MT)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	13
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	-
(c) an ability to design a system, component, or process to meet desired needs	13
(d) an ability to function on multi-disciplinary teams	-
(e) an ability to identify, formulate, and solve engineering problems	13
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	-
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	-
(i) a recognition of the need for, and an ability to engage in life-long learning	-
(j) a knowledge of contemporary issues	5
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	13
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	-

Prepared By

Prof. Dr. Erkin Nasuf 04/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 313 E, Drilling Techniques, 3+0 hours/week, 3 Credit, Elective, English

Course Description

Fundamentals of Drilling, Physical and Mechanical properties of rocks, Rotary table drilling, Drill rigs and equipment, Core drill rigs and equipment, Percussive drilling, Drill bits. Drill hole flushing, deviation of drill holes, directional drilling. Fishing operations, Lining, Selection of Drill and Performance prediction models. Drilling standards, Application of drilling (Spring water, water borehole, large hole for mining), New developments in drilling.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Lecture Notes, (main textbook)
Principles of Rock Drilling. U.M. Rao Karaman, B. Misra, 1998 A.A.BALKEMA/ROTTERDAM, (main textbook)
High Technology in Drilling and Exploration. C.P.CHUNG, 1992 A.A.BALKEMA/ROTTERDAM
Drilling and Blasting of Rocks. Carlos Lopez Jimeno et al. 1995 A.A.BALKEMA/ROTTERDAM
Diamond Drilling Handbook, W.F.Heinz, 1994 Third Edition, Sigma Press Ltd
Diamond Drilling Handbook (in Turkish), Y. Özbayoglu, 1983, Safak Press / ANKARA
Drilling Techniques (in Turkish), A.Göktekin, 1983, ITU Press / ISTANBUL

Course Objectives

Drilling is the most reliable method in exploration of mine deposits. To establish a mine either underground or open pit, drilling works have to be carried out. In most of the open pit mines, the blasting holes are required to open. Drilling is also required to drive the main galleries in underground mines and tunnels. Therefore, the drilling theories and the machines together with their equipment should be covered in Mining Engineering education.

Topics Covered on a Weekly Basis	
1.Fundamentals of Drilling and the Physical and Mechanical Properties of Rocks	(1 week)
2.Rotary Table Drilling – Drill Rigs	(1 week)
3.Rotary Table Drilling – Drill Pipe String, Drilling Conditions and Operations	(1 week)
4.Core Drilling – Drill Rigs	(1 week)
5.Core Drilling – Drill Pipe Strings, Core Barrels, Wireline Drilling Techniques	(1 week)
6.Percussive Drilling	(1 week)
7.Drill-Hole Flushing	(1 week)
8.Mid-term exam	(1 week)
9.Drill Bits	(1 week)
10.Deviation of Drill Holes, Directional Drilling, Fishing Operations	(1 week)
11.Laboratory drilling Experiments and Instrumentation	(1 week)
12.Safety and Environmental Aspects of Drilling Projects	(1 week)
13.Novel Techniques of Rock Drilling	(1 week)
14.Application of Drilling	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies : 50 % (homework 10 %, mid-term exam 40%); Final examination (50%)
Laboratory : Working on Horizontal Drill Rig (3, 8 and 10 th weeks)
Computer Usage : MS OFFICE programs to do their mid-term studies
Field Schedule : Visit to a drill side (at the end of the term).

Contribution of Course to Meeting the Professional Component

80% Mining Engineering Design (MT), 20 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following grading are used in the table.

0 week : No relation
1 – 4 week : Partly related
5 – 8 week : Related
9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	13
(b) an ability to design and conduct experiments, as well as to analyse and interpret data	1
(c) an ability to design a system, component, or process to meet desired needs	7
(d) an ability to function on multi-disciplinary teams	-
(e) an ability to identify, formulate, and solve engineering problems	13
(f) an understanding of professional and ethical responsibility	2
(g) an ability to communicate effectively	-
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	6
(i) a recognition of the need for, and an ability to engage in life-long learning	3
(j) a knowledge of contemporary issues	3
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	13
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	4

Prepared By

Assoc.Prof.Dr. Hasan Ergin 04/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language
MAD 410, Economical Evaluation of Mining Investments, 3+0 hour/week, 3 Credits, Elective , Turkish
Course Description
Unique aspects of mining investments; Natural resources, definitions and classifications; Ore deposit reserv problem and reserv classifications; Optimal recovery of an ore deposit; Time value of money; Cash flow diagrams and data collection; Capital and Operating Costs Estimation Techniques; Depreciation Techniques; Investment appraisal techniques, Net present value, Internal rate of return, Payback period, Hoskold method, etc.; Risk analysis in mining investments; Effect of inflation in mining investments.
Prerequisite(s)
None
Textbook(s) or Other Required Material
Gentry, D. W. and T. J. O'neil, Mine Investment Analysis, SME Publishing, 1984, (main textbook) Vogely, W. A., Economics of the Mineral Industries, SME Publishing, 1985. Rudawsky, O., Mineral Economics, Elsevier publishing, 1986. Wahl, Siegfried von, Investment Appraisal and Economic Evaluation of Mining Enterprise, 1983. Stermole, F. J. and J. M. Stermole, Economic Evaluation and Investment Decision Methods, Investment Evaluation Corporation, 1987.
Course Objectives
Purpose of the course is to teach decision making techniques for economical operation of mines. Students will have the skills to carry out pre-feasibility and feasibility studies for a mining operation.

Topics Covered on a Weekly Basis

1. Unique aspects of mining investments	(1 week)
2. Natural resources, definitions and classifications	(1 week)
3. Ore deposit reserv problem and reserv classifications	(1 week)
4. Optimal recovery of an ore deposit	(1 week)
5. Time value of money, Cash flow diagrams and data collection	(1 week)
6. Capital and Operating Costs Estimation Techniques	(1 week)
7. Week 6 continued	(1 week)
8. Depreciation and depletion techniques	(1 week)
9. Mid-term exam	(1 week)
10. Investment appraisal techniques, Net present value, Internal rate of return,	(1 week)
Payback period, Hoskold method, etc.	(1 week)
11. Week 10 continued	(1 week)
12. Risk analysis in mining investments	(1 week)
13. Week 12 continued	(1 week)
14. Effect of inflation in mining investments.	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 50 % (20 % homework and term project, 30 % mid-term exam) and final examination 50 % / Computer Usage: Cash Flows in MS EXCEL and @RISK for risk analysis / Field Schedule : None .

Contribution of Course to Meeting the Professional Component

80% Mining Engineering Design (MT), 20 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	10
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	0
(c) an ability to design a system, component, or process to meet desired needs	3
(d) an ability to function on multi-disciplinary teams	2
(e) an ability to identify, formulate, and solve engineering problems	5
(f) an understanding of professional and ethical responsibility	1
(g) an ability to communicate effectively	3
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	1
(i) a recognition of the need for, and an ability to engage in life-long learning	1
(j) a knowledge of contemporary issues	3
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	4
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	3

Prepared By

Doç. Dr. Selamet Gürbüz Erçelebi 07/06/2002

NAME OF DEPARTMENT					
Course Name	**Code**	**Regular Semester**	**Credit**	**Lecture**	**3**
				Recitation	**-**
Economics	**EKO 201**	**Spring**	**3**	**Laboratory (Hour/Week)**	**-**

Course Language	Turkish
Course Type	Compulsary
Course Description	An introduction to the principles of micro and macro economics, the basic problems of the economy, modeling the household and firm behaviour, modeling the markets, modeling the macro economy in a global context.
Course Objectives	Presenting the principles of micro economics: Presenting the functioning macro economics in relationship with the economic policies.
Outcomes	(h) the broad education necessary to understand the impact of engineering solutions in a global societal context.
Textbook	Economics, David Begg, Stanley Fischer and Rudiger Dornbusc, (latest edition) Mc Graw Hill 2000
Other References	
Prequisite (s)	

TOPICS COVERED

Week	Topics
1	Economics and the economy: The tools of economics analysis, Government and the mixed economy
2	Demand, supply and the market: The effect of price and income on demand quantities
3	The theory of consumer choice
4	Developing the theory of supply: cost and production
5	Perfect competition and pure monopoly
6	Market structure and imperfectcompetition
7	Midterm exam
8	Introduction to macroeconomics and national income. The determination of national income
9	Aggregate demand, fiscal policy and foreign trade
10	Money and modern banking
11	Cenral banking and monetary system
12	Inflation
13	Open macroeconomics
14	International monetary system and international finance

Course Evaluation Method		**Quantity**	**Percentage**
	Midterm Exams	1	30 %
	Quizzes	2	10 %
	Homeworks	1	10 %
	Projects		
	Term Paper		
	Laboratory Work		
	Other		
	Final Exam		50 %
Contribution of course to meeting the professional component	**Mathematics and Basic Science**		
	Engineering Science		
	Engineering Desing		
	Social Sciences	100 %	
Prepared by: Assist. Prof. Dr. Özlem ONARAN		Date: 10.03.2002	

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 414, Electrotechniques in Mines, 3+0 hour/week, 3 Credit, Elective , Turkish

Course Description

Using of electrical energy in mines, direct current, alternating current, power distribution systems topologies in underground mines, in open pit mines, in coal-ore preparation plants, automation systems for safety and production in mines, ISO-OSI Reference Model, concept of distributed systems, process, process surroundings, process functions, process automation, PLC devices, sensors, actuators, interfaces, communication lines, modern automation system architecture in mines, classification of hazardous atmospheres in mines, methods of protection for equipment used in hazardous atmospheres, problems.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Kuzu, C.: Lecture notes (main text book)
Morley, L., Novak, T.: Electrical Power and Utilisation, SME Mining Engineering Handbook, Colorado, 1992.
Stefanko, R.: Coal Mining Technology Theory and Practice, Society of Mining Engineers, New York, 1983.
Williams, R.: Mine Mapping and Layout, Prentice-Hall Inc., New Jersey, 1983.
Dose, Wolf-Dieter.: Explosionsschutz durch Eigensicherheit, Vieweg Verlag, Braunschweig, 1993.
Ünal, E.: Patlayici ortamlar ve patlamayi önleme metodlari, Zonguldak, 1987.
Groh, H.: Schlagwetter- und Explosionsschutz, Glückauf-Betriebsbücher Band 33, Verlag Glückauf, Essen, 1986.
Olaf, J.: Automatisierung und Fernüberwachung in Bergbaubetrieben, Verlag Glückauf, Essen, 1976.
Ollaf, J.: Fernwirktechnische Geraete, Verlag Glückauf, Essen, 1988.
Anon.: Colliery electrician, NCB National Coal Board, London, 1976.

Course Objectives

The use of electricity and automation in modern mining are necessary and probably no other facet of mining has grown more rapidly and has been so poorly understood by the average person involved in mining. In industrial level, the mine operator or anyone responsible for the efficiency and safety of mine operation must be familiar with mine electrical systems. Therefore, it is also necessary to give the basic knowledge to the mining engineering students through this course.

Topics Covered on a Weekly Basis

1. Introduction to mine automation systems (regulations, mechanization-remote control-automation-robotic, open and closed systems, ISO-OSI Reference model)	(1 week)
2. Distributed systems and process control (topologies of distributed information systems, the process as an element of distributed systems, open and closed control loops, interfaces)	(1 week)
3. Modern automation system architecture for mining industry I (aims, levels of automation, network structure)	(1 week)
4. Modern automation system architecture for mining industry I (components, sensors, actuators, application of sensors and actuators, PLC and other automation devices), I. Quiz	(1 week)
5. Modern automation system architecture for mining industry II (an application in mining with using of PLC's, introduction of OAL monitoring system)	(1 week)
6. Automation devices and their properties, apparatus or gas grouping, temperature classification, methods of protection for equipment used in hazardous atmospheres i-e-d-o-q-p protection, ingress protection (IP) system for enclosures	(1 week)
7. Mid-term exam	(1 week)
8. Power distribution systems I (components, substations, power centres, switchhouses, cables)	(1 week)
9. Power distribution systems II (topologies for power distribution systems, radial systems, secondary selection systems, primary selection system)	(1 week)
10. Power distribution systems III (topologies for underground and open pit mines and coal preparation plants	(1 week)
11. Direct and alternative current I (generators for DC and AC circuits, impedance, hydraulic analogy of reactance effect in electrical circuits, capacitive and inductive power, power factor)	(1 week)
12. Direct and alternative current II (series and parallel AC circuits, power and their physical explanation, useful power, apparent power, wattless power)	(1 week)
13. Applications (solved problems, case study power distribution system for OAL mine),	(1 week)
II. Quiz	(1 week)
14. Discussion	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies % 40 (%10 homework, %10 quiz, % 20 mid-term exam); 1 mid-term exam, 2 quiz, 2 home work (sensors and actuators; comments on articles for mine automation systems)

Contribution of Course to Meeting the Professional Component

80% Mining Engineering Design (MT), 20 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	13
(b) an ability to design and conduct experiments, as well as to analyse and interpret data	8
(c) an ability to design a system, component, or process to meet desired needs	12
(d) an ability to function on multi-disciplinary teams	2
(e) an ability to identify, formulate, and solve engineering problems	12
(f) an understanding of professional and ethical responsibility	2
(g) an ability to communicate effectively	-
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	13
(i) a recognition of the need for, and an ability to engage in life-long learning	12
(j) a knowledge of contemporary issues	13
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	13
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	-

Prepared By

Doç. Dr. Cengiz KUZU 06/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 423 E, Flotation and Flocculation, 3+0 hour/week, 3 Credits, Elective, English

Course Description

Surface chemistry of flotation, Solid, liquid and gas phases, electrochemical potential, surfaces and interfaces, thermodynamics of interfaces, contact angles in three-phase systems. Flotation reagents, anionic and cationic collectors, non-ionizing collectors, control reagents, froths, interaction of reagents with minerals. Coagulation, flocculation and dispersion, aggregation with inorganic chemicals and organic polymers, selective flocculation. Flotation techniques, ore and pulp properties, flotation machines, flotation circuits, auxiliary apparatus. Flotation applications on naturally floatable minerals, sulfide, oxide and salt type minerals.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Lecture Notes, (main textbook)
J. Leja, Surface Chemistry of Froth Flotation, Plenum Press, 1982(1st ed) or the latest edition.
R.P. King, Principles of Flotation, S. African Mining and Metall., 1982.
R. D. Crozier, Flotation, Elsevier Science, January, 1992.
K.J. Ives, The Scientific Basis of Flotation, NATO Advanced Study Institute, 1982.
M.C. Fuerstenau et al., Chemistry of Flotation, SME Publication, 1985.
J.S. Laskowski, Coal Flotation and Fine Coal Utilization, Elsevier, 2001.
J. A. Finch,G. S. Dobby, Column Flotation, Elsevier Science,1990.
J. A. Herbst (Editor), Flotation operating practices and Fundamentals, SME Publication, 1995.
S. Atak, Fundamentals and Applications of Flotation, ITU Pub., Book No.34, Istanbul, 1990.

Course Objectives

The objective of flotation and flocculation course is to give both theoretical and applied knowledge on flotation and flocculation both of which are the most important mineral processing techniques for very finely liberated particles.

Topics Covered on a Weekly Basis

1.Historical development and importance of flotation, chemical bonds, gas, aqueous and solid phases in flotation, crystal structure, significance of pH.	(1 week)
2.Surface and colloid chemistry in flotation, chemical potential, electrical double layer, Exercise: composition of solutions; ideal solution, dissociation constant of water, pH calculations.	(1 week)
3.Zero point charge of minerals; Potential determining ions, zeta potential measurements; thermodynamics of interfaces. Exercise: dissolved species in flotation pulps; acids, bases, Salts, problems on solubility products.	(1 week)
4.Surface tension; Gibbs adsorption equation, definition and importance of contact; angle; wettability of surfaces **(Quiz I),** Exercise: definition of hydrolysis, dissolution and precipitation reactions and example problems, Laboratory I: Coal flotation	(1 week)
5.Equilibrium in mineral suspensions, principles of coagulation and flocculation; slime coating, Exercise: definition of hydrolysis, dissolution and precipitation reactions	(1 week)
6.Classification reagents; collectors, fatty acids, Laboratory II: oxide flotation	(1 week)
7.Anionic reagents; sulfates and sulfonates, xanthates, flotation of copper sulfides by xanthates, activation of sphalerite	(1 week)
8.Flotation of iron sulfides by xanthate, flotation of oxidized sulfides, cationic collectors using amine**(Quiz 2),** Laboratory III: Bulk sulfide flotation	(1 week)
9.Control of flotation by organic or inorganic salts and colloids, activation of quartz by metal ions Exercise	(1 week)
10.Frothers and formation of froth, Laboratory IV: Differential sulfide flotation	(1 week)
11.Flotation processes, properties of ore, liberation, pulp properties, control of flotation pulp, calculation of conditioner tank **(Mid-term Exam)**	(1 week)
12.Feed of reagents, flotation machines Flotation circuits, column and jet flotation, flotation cell design, Laboratory V: Flocculation	(1 week)
13.Principles of flocculation, flocculation mechanisms, DLVO theory, application of flocculation	(1 week)
14.Plant flowsheets on sulfides and oxides and industrial minerals, Exercise, Laboratory (make-up)	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 60 % (20 % Lab, homework and 10 % class attendance, 10 % quiz, 20 % mid-term exam) and 40 % final examination / Computer Usage : MS OFFICE programs like WORD and EXCEL for mid-term studies/ Field Schedule : None .

Contribution of Course to Meeting the Professional Component

80% Mining Engineering Design (MT), 20 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related
1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	8
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	10
(c) an ability to design a system, component, or process to meet desired needs	8
(d) an ability to function on multi-disciplinary teams	7
(e) an ability to identify, formulate, and solve engineering problems	6
(f) an understanding of professional and ethical responsibility	1
(g) an ability to communicate effectively	-
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	2
(i) a recognition of the need for, and an ability to engage in life-long learning	2
(j) a knowledge of contemporary issues	5
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	8
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	5

Prepared By

Prof. Dr. Mehmet S. Çelik 05/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

JEO 112 , General Geology, 3+0 hour/week, 3 Credit, Required, Turkish

Course Description

Introduction, Purpose, General Features of the Earth, Minerals and Crystalls, Classification of Rocks, Magmatic Rocks, Sedimentary Rocks, metamorphic Rocks, Magma Processes, Plutonism versus Volcanism, Metamorphic Processes, The Concept and Classification of Metamorphic Facies, Formation and Classification of Sedimentary Rocks, Depositional Environment of Sedimentary Rocks, Tectonic Deformation of Rocks, The Age and Time Concept in Geology, Plate Tectonics, History and Development of the Plate Tectonic Concept, Divergent Plate Boundary, Convergent Plate Boundary, Transform Plate Boundary, Active Tectonic, Earthquakes.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Lecture Notes, (main textbook)

Ketin, I., 1993, General Geology, Introduction to Geosciences, 4.Ed., ITU Foundation Publication, 563s., (in Turkish)

Lutgens, K. F., 1998, Essentials of Geology. 6th Edition, Prentice Hall New Jersey, 450p.

Atkin, B. C. And Johnson, J. A., 1988, The Earth - Problems and Perspectives. Blackwell Scientific Publications, 428p.

Keller, E A, And Pinter, N., 1996, Active Tectonics, Earthquakes, Uplift, and Lanscape. Prentice Hall new Jersey, 338p.

Erinc, S., 1996, Geomorphology, 4. Ed., Istanbul, 734s., (in Turkish)

Crawford, M. J., 1998, Physical geology. Cliffs Quick Review. Cliff Notes Incorporated Lincoln, Nebraska, 242p.

Snyder, R E., Mann, B. L., Ludwig, F, A., Brecht, W. A., 1991, Earth Science, The Challenge of Discovery. D. C. Heath and Company, Lexington, Massachusetts, 656p.

Course Objectives

The purpose of the course is to teach general geological concepts and crust of the earth to mining engineering students.

Topics Covered on a Weekly Basis	
1.Introduction, History, Purpose of the course, General Characteristicd earth crust	(1 week)
2.Minerals and Crystals	(1 week)
3.Classification of Rocks, Magmatic Rocks, Sedimentary Rocks, Metamorphic Rocks	(1 week)
4.Magma Processes, Plutonism and Volcanism	(1 week)
5.Metamorphic Processes, The Concept and Classification of Metamorphic Facies	(1 week)
6.The Concept and Classification of Metamorphic Facies, Formation and Classification of Sedimentary Rocks	(1 week)
7.Depositional Environment of Sedimentary Rocks	(1 week)
8.Tectonic Deformation of Rocks, (Field work at weekend)	(1 week)
9.The Age and Time Concept in Geology, (Field work at weekend)	(1 week)
10.Plate Tectonics, History and Development of the Plate Tectonic Concept, (Field work at weekend)	(1 week)
11.Divergent Plate Boundary, (Field work at weekend)	(1 week)
12.Convergent Plate Boundary, (Field work at weekend)	(1 week)
13. Transform Plate Boundary, (Field work at weekend)	(1 week)
14.Active Tectonic, Earthquakes, (Field work at weekend)	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 40 % (Field reports,mid-term exam) and final examination 60%
Computer Usage : None / Field Schedule : Field work on topics 8 to 14 .

Contribution of Course to Meeting the Professional Component

100 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related
1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	8
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	-
(c) an ability to design a system, component, or process to meet desired needs	-
(d) an ability to function on multi-disciplinary teams	7
(e) an ability to identify, formulate, and solve engineering problems	7
(f) an understanding of professional and ethical responsibility	8
(g) an ability to communicate effectively	7
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	7
(i) a recognition of the need for, and an ability to engage in life-long learning	9
(j) a knowledge of contemporary issues	8
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	7
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	-

Prepared By

Prof. Dr. Remzi Akkök 04/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

JEF 341 , Geophysics, 3+0 hour/week, 3 Credit, Required , Turkish

Course Description

Geophysical methods for mining exploration: Self-potential (origin, field array, typical anomalies, interpretation). Resistivity method (electrode arrays, field techniques, data processing and interpretation). Induced Polarization (IP) method (origin, techniques, data interpretation and field examples). Geo-electromagnetic methods (coil techniques, Slingram method, HLEM, VLF, CSAMT). Magnetic and Gravity method (basic principles, data corrections, typical anomalies, interpretations, field examples). Seismic methods and well-logging. Field examples on the mining exploration by combined geophysical methods.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Telford, W.M., Geldart, L.P. and Sheriff, R.H., 1990 (Second Edition) Applied Geophysics. Cambridge University Press, New York.

SEG, 1996, Mining Geophysics, SEG P.O. Box. 1067, Tulra Oklahama, U.S.A. Vol. I and II.

Çaglar, I., 1987, Elektromanyetik meyil açisi yönteminin kullanilmasi ile iletken cevherlesme kusaklarinin arastirilmasi: DOGA-TU Journal of Engineering and Environment, V.11, s. 334-343.

Çaglar, I., Denizlioglu, A.Z., and Ustalar, A., 1995, Self Potential Investigation of Boyali (Tasköprü) Copper Mineralization Site: 5th symposium on Mining Chemistry-MinChem'95, November 7-10, Istanbul, Türkiye. Proceedings, pp. 37-45.

Faculty of Mines Museum Web Site : www.mines.itu.edu.tr/muze/giris1.htm

Course Objectives

It is necessary to applied geophysical field methods for further detailed information about visually unobserved mineralization zones beneath subsurface. Applications of the geophysical methods in the frame of a mining exploration give useful criterions about the mining studies. Suitable modern geophysical methods can detect the presence of metallic or nonmetallic mineralization zones. They can also determinate depth, locations and extension of these zones. The findings obtained from mining geophysics serve to manage present mine bed as snowy. This course gives highlights clues about mining exploration by geophysical methods. The basic principles of main geophysical methods are briefly given.

Topics Covered on a Weekly Basis	
1.Geophysics, anomaly and the classifications of geophysical methods	(1 week)
2.Electrical and electromagnetic methods and their classifications	(1 week)
3.Direct current resistivity method and its applications	(1 week)
4.Electrical profiling method and its applications	(1 week)
5.Induced Polarization (IP) methods	(1 week)
6.Field examples on the Induced Polarization (IP) and Resistivity methods	(1 week)
7.Electromagnetic methods with induced sources	(1 week)
8.Electromagnetic methods with natural sources	(1 week)
9.Seismic methods and their applications	(1 week)
10.Gravity method	(1 week)
11.Mid-term examination	(1 week)
12.Magnetic method	(1 week)
13.Well-logs (classifications and SP log-resistivity log)	(1 week)
14.Case history for the geophysical methods	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies % 40 (35% mid-term exam, 5 % homeworks) and final examination 60% / Computer Usage : MS Word, Golden Software Inc. GRAPHER, Golden Software Inc. SURFER software packages / Field Schedule : None .

Contribution of Course to Meeting the Professional Component

100 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	10
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	11
(c) an ability to design a system, component, or process to meet desired needs	3
(d) an ability to function on multi-disciplinary teams	9
(e) an ability to identify, formulate, and solve engineering problems	8
(f) an understanding of professional and ethical responsibility	4
(g) an ability to communicate effectively	2
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	2
(i) a recognition of the need for, and an ability to engage in life-long learning	-
(j) a knowledge of contemporary issues	2
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	10
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	-

Prepared By

Prof. Dr. Ilyas Çaglar 04/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language
MAD 420 , Health And Safety in Mines, 3+0 hour/week, 3 Credit, Elective , Turkish
Course Description
Introduction and History. The basic Concepts connected with this Subject. Workers Health and Safety from the law point of view. The effects of Workplace on Workers (chemical, physical, biological and psychological Factors). The Health and Safety Problems and their solution Technics in Mining. Occupational diseases: definition, classification, causes, medical treatment and protection. Occupational accidents: definition, causes and prevention methods. Rescue and personal protectives. Technical inspection. Expertising on claims about occupational diseases and accidents.
Prerequisite(s)
None
Textbook(s) or Other Required Material
Ökten, G. "Health and Safety in Mines" lecture notes, 2002. (in preparing phase) Sanders, M.S., McCormick, E.J. (1993) :Humans Factors in Engineering and Design, Vol I-II, McGraw-Hill Inc. Erkan, N. (1995): Ergonomie, MPM Publication No. 373. Kimya Müh. Odasi (1994): Health and Safety Course, 1994. Milli Prodüktivite Merkezi (1987, 1989, 1991,…….) National Ergonomics Congress Maden Müh Odasi Zonguldak Sb. (1992): Health and Safety Problems in Zonguldak Coal Bassin and Solution alternatives
Course Objectives
The Mining Industry is a department which occurs intensively of occupational illnesses and accidents because of the difficult working and environmental conditions. Therefore, The Mining Engineers have to constitute a suitable working environment and protect health and safety of workers. This course contains enough information to reach the above requirements.

Topics Covered on a Weekly Basis	
1.Introduction, History.	(1 week)
2.The basic concepts about this subject. Health and safety by law	(1 week)
3.The properties of working environment and effects on workers (chemical, physical, psychological etc)	(1 week)
4.The properties of working environment and effects on workers (chemical, physical, psychological etc)	(1 week)
5.The health and safety problems in Mining and solution altenatives.	(1 week)
6.Ergonomic. The importance by health and safety.	(1 week)
7.Occupational illnesses. Defination, classification, causes, protection methods..	(1 week)
8.Accidents, defination, classification, causes, protection methods..	(1 week)
9.Mid-term exam	(1 week)
10.The results of occupational illnesses and accidents. Humanize of working life.	(1 week)
11.Rescue work	(1 week)
12.Individual protection materials.	(1 week)
13.Engineer in charge in mines	(1 week)
14.Expert in lawsuit about occupational illnesses and accidents.	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 40 % (10% homework and, 30% mid-term exam) and final examination 60 % / Computer Usage : MS OFFICE programs like WORD and EXCEL in order to do their mid-term studies/ Field Schedule : None .

Contribution of Course to Meeting the Professional Component

80% Mining Engineering Design (MT), 20 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	-
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	-
(c) an ability to design a system, component, or process to meet desired needs	4
(d) an ability to function on multi-disciplinary teams	1
(e) an ability to identify, formulate, and solve engineering problems	5
(f) an understanding of professional and ethical responsibility	4
(g) an ability to communicate effectively	1
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	-
(i) a recognition of the need for, and an ability to engage in life-long learning	-
(j) a knowledge of contemporary issues	2
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	2
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	5

Prepared By

Prof. Dr. Gündüz Ökten 04/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 342 E, Hydraulic Power Systems in Mines, 2+0 hour/week, 2 Credit, Required , English

Course Description

Some advantages and disadvantages of Hydraulics. Basic principles of fluid mechanics. Viscosity, turbulent and laminar flow, fluid frictions in pipes, Darcy and Hagen-Poiseuil Equations, cavitation, Bernouilli Equation, Pitote Tube, Venturi Meter. Fluid used in hydraulic systems.Fluid conditioning.Valves.Type of circuits. Cylinders.Accumulators. Pumps and Motors. Hydraulic circuits. Hydraulics applied to mining machinery.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Lecture Notes, (main textbook)
Evett, J.B.,Liu., C. Fluid Mechanics and Hydraulics, Schaum's Solved Problems, ISBN 0-07-019783-p787, 1989
Lang, R.A.,Basic Principles and Components of Fluid Power, Chpman Publications, ISBN 0-8273-6869-0, 1997
Turner, I., Engineering Application of Pneumatics and Hydraulics, Chapman Publications, ISBN 0-340-62526-0,1996
Özcan, F., Hydraulic Fluid Power, Mert Publications, 1982, (in Turkish)

Course Objectives

The first objective of the course is to give the student the basic principles of fluid mechanics and the ability of solving the basic engineering problems concerning the subject.
The second objective of the course is to provide the student with the knowledge of hydraulic to mining machinery i.e. hydraulic elements, hydraulic circuits, valves, cylinders etc

Topics Covered on a Weekly Basis

1. Introduction to hydraulics	(1 week)
2. Advantages , disadvantages, viscosity, dynamic and kinematic viscosity	(1 week)
3. Reynolds number, Darcy and Hagen Poiseuil Equation	(1 week)
4. Reynolds number, Dracy and Hagen-Poseuil Equation	(1 week)
5. Bernouilli Equation	(1 week)
6. Project about hydraulic transport	(1 week)
7. Fluids used in in hydraulic circuits	(1 week)
8. Valves, direction control valves, relief and pressure valve etc.	(1 week)
9. Open and closed circuits, cylinders, accumulators	(1 week)
10. Pumps and motors	(1 week)
11. Pumps and motors	(1 week)
12. Hydraulic circuits of some mine machines	(1 week)
13 Hydraulics applied to mining machinery	(1 week)

Class / Laboratory / Computer / Field Schedule	
Mid-term studies 40 % (10 % homework and a project, 30 % mid-term exam) and final examination 40 % / Computer Usage : MS OFFICE programs like WORD and EXCEL in order to do their mid-term studies/ Field Schedule : None .	
Contribution of Course to Meeting the Professional Component	
30% Mining Engineering Design (MT), 70 % Basic Engineering	
Relationship of Course Program to ABET Criterion 3 of 2000	
Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table. 0 week : No relation — 5 – 8 week : Related 1 – 4 week : Partly related — 9 – 14 week : Highly related	
(a) an ability to apply knowledge of mathematics, science, and engineering	4
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	0
(c) an ability to design a system, component, or process to meet desired needs	4
(d) an ability to function on multi-disciplinary teams	2
(e) an ability to identify, formulate, and solve engineering problems	5
(f) an understanding of professional and ethical responsibility	1
(g) an ability to communicate effectively	2
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	9
(i) a recognition of the need for, and an ability to engage in life-long learning	1
(j) a knowledge of contemporary issues	6
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	6
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	3
Prepared By	
Prof. Dr. Nuh Bilgin 04/06/2002	

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 318, Industrial Minerals , 3+0 hour/week, 3 Credit, Elective, Turkish

Course Description

Industrial raw materials:depends on ceramic, refractory, civil, fertilizer, abrasive, pin, detergent, glass, filling and filtration industry. Their properties, processing methods, specifications, flowsheets. Production and consumption of industrial raw materials.
Examples from industry

Prerequisite(s)

None

Textbook(s) or Other Required Material

Industrial raw material course notes, (In turkish, non published) (main textbook)
Industrial raw material and processing methods, Ali Akar, 9 Eylül University Publication, 1997, (in Turkish)
Proceedings of Industrial Raw Material Symposiums, 9 Eylül University Publications
Development Program of Turkey, State Planning Organization, 1996, (in Turkish)
Publications of Turkish Mining Export Uninon, (1995-1999), (in Turkish)
Different papers related to Industrial raw material

Course Objectives

The objective of this course, to teach the students, what are the industrial row materials, their using in different industries, specifications, production and consumption, processing methods and to give the flowsheet and examples from plants.

Topics Covered on a Weekly Basis

1. Introduction, The importance of industrial raw material in daily life	(1 week)
2. Ceramic raw material: Feldispar	(1 week)
3. Caolinite, clay minerals, vollastonite, talc, pyrofillite, zirconium	(1 week)
4. Refractory: Magnesite, Chromite, Refractory clays, mica, mid term works	(1 week)
5.Kyanite, Silimanite, Dolomite, boksite, grafite, olivin, Quiz I	(1 week)
6. Glass industry: quartz, trona, syenite, litium	(1 week)
7. Filling-Filtering Material: Sepiolite, zeolite, diatomite, bentonite, calsite	(1 week)
8. Civil-Cement: limestone, sand, crushed stone, aggregate, perlite, pumice	(1 week)
9. Chemistry-Painting-Detergent: Boron minerals, salt, sodium sulphate, Quiz II	(1 week)
10. Fluorite, Barite, Stronsium, Minerals with iron and titanium oxide	(1 week)
11. Mid-term exam	(1 week)
12. Fertilizer: Phosphate, apatite, sulphur, Quiz III	(1 week)
13. Abrasives: Corundum, garnet, spinel	(1 week)
14. Marble, semi valuable stones	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 50 % (20 % mid-term studies, 30 % mid-term exam) and final examination 5 50 %. / Computer Usage : MS OFFICE programs like WORD in order to do their mid-term studies/ Field Schedule : None .

Contribution of Course to Meeting the Professional Component

100% Mining Engineering Design (MT)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	6.5
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	12
(c) an ability to design a system, component, or process to meet desired needs	12
(d) an ability to function on multi-disciplinary teams	6
(e) an ability to identify, formulate, and solve engineering problems	12
(f) an understanding of professional and ethical responsibility	12
(g) an ability to communicate effectively	--
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	12
(i) a recognition of the need for, and an ability to engage in life-long learning	--
(j) a knowledge of contemporary issues	12
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	6
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	12

Prepared By

Prof. Dr. Gündüz Atesok 10/06/2002

Course Name	Advanced Writing
Department	Foreign Languages
Course Code	Ing 102
Course Hour/Credit	3 hours per week
Course Credit	3
Course Semester	One term of 14 weeks (can be taken in fall and spring)
Course Category	Students who get over 15 out of 20 on the Essay section of the Proficiency Exam register to 102
Prerequisite	Non
Course Language	English
Lecturer / Lecturers	Instructors in the Advanced English Department

Course Goals

At the end of this course students will have improved their :

1. reading ability
2. writing skills
3. effectiveness in written expression

Content in English

Building on English 101, English 102 is designed to expand the students knowledge of writing in preparation for the demands of the 201 Research Paper Writing course. It aims to achieve this by completing students knowledge of relational types of essays available, namely Cause and Effect, Comparison and Contrast and Argumenative. These essay types from the basis of homework projects and examinations. In addition to this, the course, through an integrated focus on reading skills assists students with the necessary for their faculty studies and their 201 Research Paper. Further integrated into course is the aim of providing students with language input.,especially in the form of subtechnical vocabulary that is applicable across faculty boundaries.

Course Book

Writing Academic English (3rd ed.)

Outcomes

1) an understanding of professional and ethical responsibility
2) an ability tocommunicate effectively
3) a recognition of the need for and an ability to engage in life long learning
4) a knowledge of contemporary issues
5) an ability to use limited resources in limited time
6) an ability to maintain our national reputation of excellence and strive for international
7) an eagerness to read and survey current technical literature to follow up the state of the art technical developments

Evaluation

Project 1	5%
Project 2	10%
Project 3	15%
Participation/Speaking	5%
Midterm	25%
Final	40%

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 111 E, Introduction to Mining Engineering, 1+0 hour/week, 1 Credit, Required, English

Course Description

Mining and mining engineering. History of mining. Mining operations. Mineral processing. Mining organization and administration. Turkish mineral industry.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Biron C., Atak S., Ergin H., Introduction to Mining Engineering and Turkish Mineral Industry, (main text book)

Biron C., Atak S., Introduction to Mining Engineering, 1986, Çaglayan Press, (main textbook), (in Turkish)

Hartman L. H., Introductory to Mining Engineering, 1987, John Wiley and Sons, New York

Peele R., Church J.A., Mining Engineers Handbook, 1941, John Wiley and Sons, New York

Taggart A. F., Handbook of Mineral Dressing, 1960, John Wiley and Sons, New York

Course Objectives

The objective of this course is to introduce mining topics to mining engineering students. Duties of mining engineers, working conditions and mining operations, Turkish mineral industry are given to students to get them familiar with their profession.

Topics Covered on a Weekly Basis	
1.Meeting of students	(1 week)
2.Mining, duties of mining engineers	(1 week)
3.Historty of mining	(1 week)
4.Exploration and evalution of mineral resources	(1 week)
5.Development work in mines	(1 week)
6.Excavation in mines, mining methods	(1 week)
7.Haulage, hoisting, drainage, energy in mines	(1 week)
8.Ventilation and safety in mines	(1 week)
9.Minerals, ores, mineral processing	(1 week)
10.Preparation, concentration	(1 week)
11.Mineral processing plants	(1 week)
12.Organization and administration in mines	(1 week)
13 Turkish mineral industry	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 60 % (homeworks and mid-term exam) and final examination 40% / Computer Usage : none / Field Schedule : 1 Technical trip .

Contribution of Course to Meeting the Professional Component

100% Mining Engineering (MT)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	11
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	1
(c) an ability to design a system, component, or process to meet desired needs	1
(d) an ability to function on multi-disciplinary teams	2
(e) an ability to identify, formulate, and solve engineering problems	-
(f) an understanding of professional and ethical responsibility	7
(g) an ability to communicate effectively	13
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	13
(i) a recognition of the need for, and an ability to engage in life-long learning	1
(j) a knowledge of contemporary issues	8
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	-
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	8

Prepared By

Prof. Dr. Cemal Biron and Prof.Dr. Suna Atak 04/06/2002

Course Name	Code	Regular Semester	Credit	Lecture	3
				Recitation	-
KNOWLEDGE, LANGUAGE AND LOGIC	ITB037E	-	3	Laboratory (Hour / Week)	-

Language	English
Type	Humanities Elective
Coordinator	Dr. Aydan Turanli, Lecturer
Course Description	The views on language changed greatly due to Wittgenstein and Austin in the twentieth century. They helped the linguistic turn. By explicating the concepts they used such as "form of life," "language-games," "performative utterances" the course aims to show in what sense the view on language changed in the twentieth century.
Objectives	1. To help improve the linguistic and logical abilities of students. 2. To help improve the ability to understand the social sphere. 3. To help improve the reasoning concerning social issues. 4. To help improve ethical responsibilities of students.
Outcomes	1. The ability to use logical reasoning in solving the problems of technical issues. 2. Considering the social sphere in solving the problems concerning technical issues. 3. The ability to understand the world nationally and globally. 4. The ability to communicate fluently. 5. The ability to understand the ethical responsibilities of their profession.
Textbook	Austin, J. L. *How to Do Things With Words.* Cambridge: Harvard U.Press. 1997 Wittgenstein, Ludwig. *Tractatus Logico-Philosophicus.* German Text with an English translation by C.K.Ogden. London: Routledge. (1922) 1999 Wittgenstein, Ludwig. *Philosophical Investigations*. Translated by G.E.M. Anscombe. New York: Macmillan Publishing. (1953) 1958.
Other References	Wittgenstein, Ludwig. *On Certainty.* Eds: G. E.M. Anscombe, and Wright. New York: Basil Blackwell. 1969. Kenny A. *Wittgenstein*. Suffolk: Penguin Press. 1976 Pears, D. *The False Prison*. Oxford: Oxford University Press. (1987) 1997
Prerequisite Courses	-
Prerequisites by Topic	-
Homeworks & Projects	Two quizzes besides exams.
Laboratory Work	-
Computer Use	Internet connection to get information about the cultural background of the issues.
Other Activities	Films related to the subjects are shown.

Assessment Criteria		**Quantity**	**Percentage**
	Midterm Exams	2	40
	Quizzes	2	+10

	Homeworks		
	Projects		
	Term Paper		
	Laboratory Work		
	Other		
	Final Exam	1	60
Course Category by Content, %	**Mathematics and Basic Sciences**		
	Engineering Science		
	Engineering Design		
	Social Sciences and Humanities	100	

Prepared by: Dr. Aydan Turanli	Date: March, 11, 2002

Course Name	Code	Regular Semester	Credit		
				Lecture	3
				Recitation	-
PHILOSOPHY OF TECHNOLOGY	ITB168E	-	3	**Laboratory** (Hour / Week)	-

Language	ENGLISH
Type	Humanities Elective
Coordinator	Dr. Aydan Turanli, Lecturer
Course Description	The course focuses on the views of philosophers and sociologists of technology. The nature of technology has been discussed by many philosophers including Martin Heidegger, Herbert Marcuse, Michel Foucault, Jurgen Habermas, and recently by Andrew Feenberg, Langdon Winner, Trevor Pinch, Bruno Latour, Richard Sclove and many others. These people do not agree on the nature of technology: some say that technology is autonomous, some say that it has essence, some say that even technological devices have connotations, some say that technology cannot be separated from cultural and political issues. During the course all of these issues and democratization of technology are discussed by giving examples from daily life.
Objectives	1. To help improve the linguistic and logical abilities of students. 2. To help improve the ability to understand the social sphere. 3. To help improve the reasoning concerning social issues. 4. To help improve ethical responsibilities of students.
Outcomes	1. The ability to use logical reasoning in solving the problems of technical issues. 2. Considering the social sphere in solving the problems concerning technical issues. 3. The ability to understand the world nationally and globally. 4. The ability to communicate fluently. 5. The ability to understand the ethical responsibilities of their profession.
Textbook	Selected readings from philosophers including Habermas, Heidegger, Latour, Richard Sclove, Andrew Feenberg, Wiebe Bijker and Ulrich Beck. A reader is prepared for students.
Other References	Feenberg, Andrew. *Questioning Technology*. New York: Routledge. 1999.
Prerequisite Courses	-
Prerequisites by Topic	-
Homeworks & Projects	-
Laboratory Work	-
Computer Use	Internet connection to get information about the cultural background of the issues.
Other Activities	Films related to the subject are shown

Assessment Criteria		**Quantity**	**Percentage**
	Midterm Exams	2	40
	Quizzes		

	Homeworks		
	Projects		
	Term Paper		
	Laboratory Work		
	Other		
	Final Exam	1	60
Course Category by Content, %	**Mathematics and Basic Sciences**		
	Engineering Science		
	Engineering Design		
	Social Sciences	100	

Prepared by: Dr. Aydan Turanli	Date: March, 11, 2002

Course Name	Code	Regular Semester	Credit	Lecture	3
				Recitation	-
PHILOSOPHY OF SCIENCE OF KARL POPPER	ITB035	-	3	Laboratory (Hour / Week)	-

Language	Turkish
Type	Humanities Elective
Coordinator	Dr. Aydan Turanli, Lecturer
Course Description	Popper is one of the most important philosophers of science of the twentieth century. He defended that the model of science should be deductive rather than inductive. He also applied this view to social sphere and proposed concepts such as "social engineering," "piecemeal engineering." The course aims to show how Popper applied his philosophy of science to social issues.
Objectives	1. To help improve the linguistic and logical abilities of students. 2. To help improve the ability to understand the social sphere. 3. To help improve the reasoning concerning social issues. 4. To help improve ethical responsibilities of students.
Outcomes	1. The ability to use logical reasoning in solving the problems of technical issues. 2. Considering the social sphere in solving the problems concerning technical issues. 3. The ability to understand the world nationally and globally. 4. The ability to communicate fluently. 5. The ability to understand the ethical responsibilities of their profession.
Textbook	Popper, Karl *Open Society and Its Enemies (Volume I,II)*. New York. Routledge. 1997. Marx, Karl. *Portable Marx*. Penguin Books. 1983
Other References	Popper, Karl. *Poverty of Historicism*. New York. Routledge. 1994.
Prerequisite Courses	-
Prerequisites by Topic	-
Homeworks & Projects	-
Laboratory Work	-
Computer Use	Internet connection to get information about the cultural background of the issues.
Other Activities	Films are shown related to the subjects

Assessment Criteria		**Quantity**	**Percentage**
	Midterm Exams	2	40
	Quizzes	2	+10
	Homeworks		
	Projects		
	Term Paper		
	Laboratory Work		
	Other		

	Final Exam	1	60
Course Category by Content, %	**Mathematics and Basic Sciences**		
	Engineering Science		
	Engineering Design		
	Social Sciences and Humanities	100	
Prepared by: Dr. Aydan Turanli		Date: March, 11, 2002	

Course Name	Code	Regular Semester	Credit	Lecture	3
				Recitation	-
PHILOSOPHY OF SCIENCE	ITB 001	-	3	Laboratory (Hour / Week)	-

Language	Turkish
Type	Humanities Elective
Coordinator	Dr. Aydan Turanli, Lecturer
Course Description	The course aims to offer an overview of what philosophers think science to be. Questions such as "What is the method of science?" "Is there a cumulative progress in science?" "What is scientific revolution?" will be discussed. The course examines the Logical Empiricist view, Sir Karl Popper's rejection of the Logical Empiricist methodology, T. S. Kuhn's and Feyerabend's objections to the Logical Empiricist view.
Objectives	1. To help improve the linguistic and logical abilities of students. 2. To help improve the ability to understand the social sphere. 3. To help improve the reasoning concerning social issues. 4. To help improve ethical responsibilities of students.
Outcomes	1. The ability to use logical reasoning in solving the problems of technical issues. 2. Considering the social sphere in solving the problems concerning technical issues. 3. The ability to understand the world nationally and globally. 4. The ability to communicate fluently. 5. The ability to understand the ethical responsibilities of their profession.
Textbook	Kuhn, T.S. *The Essential Tension*. Chicago: The University of Chicago Press. 1977 Thomas S. Kuhn. *The Structure of Scientific Revolutions*. Chicago: University of Chicago Press. 1970. _____ *The Essential Tension*. Chicago: University of Chicago Press. 1977.
Other References	M. Curd & J.A Cover (eds). *Philosophy of Science: The Central Issues*. New York: Norton. 1998 R. Boyd, P. Gasper, J.D. Trout (eds) *Philosophy of Science*. Cambridge: MIT Press, 1995
Prerequisite Courses	-
Prerequisites by Topic	-
Homeworks & Projects	-
Laboratory Work	-
Computer Use	Internet connection to get information about the cultural background of the issues.
Other Activities	Films related to subjects are shown.

Assessment Criteria		**Quantity**	**Percentage**
	Midterm Exams	2	40
	Quizzes	2	+10
	Homeworks		

	Projects		
	Term Paper		
	Laboratory Work		
	Other		
	Final Exam	1	60
Course Category by Content, %	**Mathematics and Basic Sciences**		
	Engineering Science		
	Engineering Design		
	Social Sciences	100	

Prepared by: DR. AYDAN TURANLI	Date: March, 11, 2002

Course Name	Code	Regular Semester	Credit	Lecture	3
				Recitation	-
TRAGEDY, CREATIVITY AND FREEDOM	ITB021E	-	3	Laboratory (Hour / Week)	-

Language	ENGLISH
Type	Humanities Elective
Coordinator	Dr. Aydan Turanli
Course Description	This course examines some major concepts such as freedom and determinism, creativity and the creation of values by the analysis of literary works including examples from the Greek and the Shakespearean tragedies. Aristotle's and Nietzsche's thoughts on these concepts are analyzed through the discussion of these literary texts.
Objectives	1. To help improve the linguistic and literary abilities of students. 2. To help improve the ability to understand the social realm by examples from literature. 3. To help improve the creativity, and interpretative quality of students. 4. To help improve ethical responsibilities of students.
Outcomes	1. To be more creative in solving the problems related to technical issues. 2. Considering the social sphere in solving the problems concerning technical issues. 3. The ability to understand the world nationally and globally. 4. The ability to communicate fluently. 5. The ability to understand the ethical responsibilities of their profession.
Textbook	Nietzsche, Friedrich. *The Birth of Tragedy*. New York: Anchor Books. 1956 J. Barnes (ed). "Poetics" in *The Complete Works of Aristotle*. Princeton: Princeton U. Press. 1984
Other References	Nietzsche, Friedrich. *Human, All Too Human: A Book for Free Spirits.* Cambridge: Cambridge University Press.1996. Shakespeare W. *Hamlet*. London: Penguin Books. 1994 Shakespeare W. *Macbeth.* London: Penguin Books. 1994.
Prerequisite Courses	-
Prerequisites by Topic	-
Homeworks & Projects	-
Laboratory Work	-
Computer Use	Internet connection to get information about the cultural background of the issues.
Other Activities	Films related to topics are shown.

Assessment Criteria		**Quantity**	**Percentage**
	Midterm Exams	2	40
	Quizzes	2	+10
	Homeworks		
	Projects		

	Term Paper		
	Laboratory Work		
	Other		
	Final Exam	1	60
Course Category by Content, %	**Mathematics and Basic Sciences**		
	Engineering Science		
	Engineering Design		
	Social Sciences and Humanities	100	

Prepared by: Dr. Aydan Turanli	Date: March, 11, 2002

Course Name	Code	Regular Semester	Credit	Lecture	3
				Recitation	-
THEORIES OF KNOWLEDGE	ITB011	-	3	Laboratory (Hour / Week)	-

Language	TURKISH
Type	HUMANITIES ELECTIVE
Coordinator	DR, AYDAN TURANLI, LECTURER
Course Description	This course aims to offer an overview of philosophical problems of various disciplines of philosophy such as epistemology, philosophy of science, philosophy of language, and philosophy of mind. The strategy employed to meet this objective is to examine the views of a large number of authors, who discuss the problems in one way or another. The course also engages in a close critical examination of them.
Objectives	1. To help improve the linguistic and logical abilities of students. 2. To help improve the ability to understand the social sphere. 3. To help improve the reasoning concerning social issues. 4. To help improve ethical responsibilities of students.
Outcomes	1. The ability to use logical reasoning in solving the problems of technical issues. 2. Considering the social sphere in solving the problems concerning technical issues. 3. The ability to understand the world nationally and globally. 4. The ability to communicate fluently. 5. The ability to understand the ethical responsibilities of their profession.
Textbook	L. Bowie , M. Michaels, R. Solomon (eds). *Twenty Questions*. Florida: Harcourt Brace & Company. 1996 Descartes René. A. Yardimli (Çeviren). *Meditasyonlar*. Ìstanbul: Ìdea Genclik Arsivi. 1997
Other References	Jostein Gaarder. *Sophie's World*. New York: Berkley Books, 1994 George Orwell. N. Akgören (Çeviren). *1984*. Ìstanbul: Can Yayinlari, 1999
Prerequisite Courses	-
Prerequisites by Topic	-
Homeworks & Projects	-
Laboratory Work	-
Computer Use	-
Other Activities	Films related to the topics are shown

Assessment Criteria		**Quantity**	**Percentage**
	Midterm Exams	2	40
	Quizzes	2	+10
	Homeworks		
	Projects		
	Term Paper		
	Laboratory Work		
	Other		

	Final Exam	1	60
Course Category by Content, %	**Mathematics and Basic Sciences**		
	Engineering Science		
	Engineering Design		
	Social Sciences and Humanities	100	
Prepared by: Dr. Aydan Turanli		Date: March, 11, 2002	

Dersin Adi	Kodu	Normal Yariyili	Kredisi	Ders	3
				Uygulama	-
BILGI, DIL, MANTIK	ITB 037E	-	3	Laboratuar (Saat/Hafta)	-

Dersin Dili	INGILIZCE
Dersin Türü	BESERI BILIMLER (Seçmeli)
Dersin Koordinatörü	Dr. Aydan Turanli, Ögretim Görevlisi
Dersin Içerigi	Austin ve Wittgenstein dolayisiyla dil üzerine görüsler 20. yüzyilda ciddi bir degisime ugramistir. Dersin amaci bu dil felsefecilerinin temel kavramlarini kullanarak bu degisimi nasil sagladiklarini göstermektir. "Yasam biçimleri," "söz edimleri," "dil oyunlari" analiz edilecek kavramlar arasindadir.
Dersin Amaci	1. Ögrencilerin dilsel ve mantiksal yeteneklerini gelistirmek 2. Ögrencilerin toplumsal yasami anlamasini saglamak. 3. Sosyal konularla ilgili akil yürütme yeteneklerinin gelistirilmesi. 4. Ögrencilerin topluma karsi ahlaksal sorumluluklarinin bilincine varmasini saglamak.
Dersin Kazandiracagi Bilgi ve Beceriler	6. Mantiksal uslamlamanin teknik problemlerin çözümünde kullanilmasi 7. Teknik problemlerin çözümünde toplumsal yasaminda gözönünde bulundurulmasi 8. Dünyanin yerel ve global olarak anlasilmasi. 9. Daha etkin sözlü ve yazili iletisim becerisi. 10. Meslegin gerektirdigi etik sorumlulugun kavranmasi.
Ders Kitabi (Notu)	Austin, J. L. *How to Do Things With Words.* Cambridge: Harvard U.Press. 1997 Wittgenstein, Ludwig. *Tractatus Logico-Philosophicus.* German Text with an English translation by C.K.Ogden. London: Routledge. (1922) 1999 Wittgenstein, Ludwig. *Philosophical Investigations*. Translated by G.E.M. Anscombe. New York: Macmillan Publishing. (1953) 1958.
Yararlanilacak Diger Kaynaklar	Wittgenstein, Ludwig. *On Certainty.* Eds: G. E.M. Anscombe, and Wright. New York: Basil Blackwell. 1969. Kenny A. *Wittgenstein*. Suffolk: Penguin Press. 1976 Pears, D. *The False Prison*. Oxford: Oxford University Press. (1987) 1997
Ön Kosul Dersleri	-
Ön Kosul Konulari	-
Ödev ve Projeler	Sinavlara ilave olarak iki quiz.
Laboratuvar Deneyleri	-
Bilgisayar Kullanimi	Konuyla ilgili kültürel bilgi edinmek için internet baglantisi.
Diger Uygulamalar	Konuyla ilgili filmlerin gösterilmesi.

Basari Degerlendirme Sistemi		**Adedi**	**Etki Orani %**
	Ara sinavlar	2	40
	Kisa Sinavlar	2	+10
	Ödevler		

	Projeler		
	Dönem Ödevi		
	Laboratuar		
	Diger		
	Final Sinavi	1	60
Ders Guruplarina Göre Ders Kredisinin Dagilimi, %	**Temel Bilimler**		
	Temel Mühendislik		
	Mühendislik Tasarim		
	Insan ve Toplum Bilimler	100	

Düzenleyen: Dr. Aydan Turanli	Tarih: 11 Mart 2002

Dersin Adi	Kodu	Normal Yariyili	Kredisi	Ders	3
				Uygulama	-
TEKNOLOJI FELSEFESI	ITB 168E	-	3	Laboratuar (Saat/Hafta)	-

Dersin Dili	INGILIZCE
Dersin Türü	BESERI (SEÇMELI)
Dersin Koordinatörü	DR. AYDAN TURANLI
Dersin Içerigi	Teknolojinin dogasi çesitli filozoflar ve sosyologlar tarafindan tartisilmistir. Martin Heidegger, Herbert Marcuse, Michel Foucault, Jurgen Habermas, ve günümüzde Andrew Feenberg, Langdon Winner, Trevor Pinch, Bruno Latour, Richard Sclove bu konuda görüs belirten filozoflar ve sosyologlar arasindadir. Teknolojinin otonomisi, teknolojinin özü, teknolojinin demokratiklestirilmesi bu derste tartisilacak konular arasindadir.
Dersin Amaci	1. Ögrencilerin dilsel ve mantiksal yeteneklerini gelistirmek 2. Ögrencilerin toplumsal yasami anlamasini saglamak. 3. Sosyal konularla ilgili akil yürütme yeteneklerinin gelistirilmesi. 4. Ögrencilerin topluma karsi ahlaksal sorumluluklarinin bilincine varmasini saglamak.
Dersin Kazandiracagi Bilgi ve Beceriler	1. Mantiksal uslamlamanin teknik problemlerin çözümünde kullanilmasi 2. Teknik problemlerin çözümünde toplumsal yasaminda gözönünde bulundurulmasi 3. Dünyanin yerel ve global olarak anlasilmasi. 4. Daha etkin sözlü ve yazili iletisim becerisi. 5. Meslegin gerektirdigi etik sorumlulugun kavranmasi.
Ders Kitabi (Notu)	Habermas, Heidegger, Latour, Richard Sclove, Andrew Feenberg, Wiebe Bijker ve Ulrich Beck gibi teknoloji felsefesi ve sosyolojisi yapan yazarlardan derlenmis metinler.
Yararlanilacak Diger Kaynaklar	Feenberg, Andrew. *Questioning Technology*. New York: Routledge. 1999.
Ön Kosul Dersleri	-
Ön Kosul Konulari	-
Ödev ve Projeler	-
Laboratuvar Deneyleri	-
Bilgisayar Kullanimi	Konuyla ilgili kültürel bilgi edinmek için internet baglantisi.
Diger Uygulamalar	Konuyla ilgili filmlerin gösterilmesi.

Basari Degerlendirme Sistemi		**Adedi**	**Etki Orani %**
	Ara sinavlar	2	40
	Kisa Sinavlar		
	Ödevler		
	Projeler		
	Dönem Ödevi		

	Laboratuar		
	Diger		
	Final Sinavi	1	60
Ders Guruplarina Göre Ders Kredisinin Dagilimi, %	**Temel Bilimler**		
	Temel Mühendislik		
	Mühendislik Tasarim		
	Insan ve Toplum Bilimler	100	

Düzenleyen: Dr Aydan Turanli	Tarih: 11 Mart 2002

COURSE NAME	GEOPHYSICS
COURSE NAME IN TURKISH/ENGLISH	JEOFIZIK /GEOPHYSICS
DEPARTMENT	GEOPHYSICAL ENGINEERING DEPARTMENT
CODE	JEF 341
HOURS PER WEEK	3+0
CREDITS	3
COURSE TYPE (MANDATORY OR ELECTIVE)	MANDATORY
SEMESTER	SEMESTER VI
PREREQUISITES	NO
COURSE LANGUAGE	TURKISH
INSTRUCTOR (S)	PROF. DR. ILYAS ÇAGLAR

SCOPE OF THE COURSE

It is necessary to applied geophysical field methods for further detailed information about visually unobserved mineralization zones beneath subsurface. Applications of the geophysical methods in the frame of a mining exploration give useful criterions about the mining studies. Suitable modern geophysical methods can detect the presence of metallic or nonmetallic mineralization zones. They can also determinate depth, locations and extension of these zones. The findings obtained from mining geophysics serve to manage present mine bed as snowy. This course gives highlights clues about mining exploration by geophysical methods. The basic principles of main geophysical methods are briefly given.

CONTENTS IN TURKISH

Maden arama jeofizigi yöntemleri: Dogal polarizasyon (kökeni, ölçü düzenegi, kuramsal anomaliler, arazi örnekleri, degerlendirmeler). Elektrik özdirenç yöntemi (elektrod dizilimleri, ölçü teknikleri, veri isleme ve yorumlama, elektrik kaydirma). Yapay polarizasyon (kökeni, ölçü teknikleri ve düzeni, veri yorumlama, arazi örnekleri). Elektromanyetik yöntemler (bobin teknikleri, Slingram, HLEM, VLF, CSAMT). Manyetik ve Gravite yöntemi (temel kavramlar, verilerde düzeltmeler, tipik anomaliler, yorumlama, arazi örnekleri). Sismik yöntem ve kuyu loglari. Kombine yöntemler ile maden arama örnekleri.

CONTENTS IN ENGLISH

Geophysical methods for mining exploration: Self-potential (origin, field array, typical anomalies, interpretation). Resistivity method (electrode arrays, field techniques, data processing and interpretation). Induced Polarization (IP) method (origin, techniques, data interpretation and field examples). Geo-electromagnetic methods (coil techniques, Slingram method, HLEM, VLF, CSAMT). Magnetic and Gravity method (basic principles, data corrections, typical anomalies, interpretations, field examples). Seismic methods and well-logging. Field examples on the mining exploration by combined geophysical methods.

WEEK	TOPIC	PROGRAM OUTCOMES (ABET EC 2000 CRITERION 3 a-m)												
		a	B	c	d	e	f	g	h	i	j	k	l	m
1	Geophysics, anomaly and the classifications of geophysical methods			✓				✓			✓			
2	Electrical and electromagnetic methods and their classifications			✓			✓	✓			✓			✓
3	Direct current resistivity method and its applications		✓	✓										
4	Electrical profiling method and its applications	✓	✓				✓					✓		
5	Induced Polarization (IP) methods	✓	✓		✓				✓			✓		
6	Field examples on the Induced Polarization (IP) and Resistivity methods	✓	✓		✓	✓	✓		✓			✓		
7	Electromagnetic methods with induced sources	✓	✓		✓	✓	✓					✓	✓	
8	Electromagnetic methods with natural sources	✓	✓		✓	✓						✓	✓	✓
9	Seismic methods and their applications	✓	✓		✓	✓						✓	✓	
10	Gravity method	✓	✓		✓	✓						✓	✓	
11	MID-TERM EXAMINATION													
12	Magnetic method	✓	✓		✓	✓						✓	✓	✓
13	Well-logs (classifications and SP log-resistivity log)	✓	✓		✓	✓						✓	✓	✓
14	Case history for the geophysical methods	✓	✓		✓	✓						✓	✓	✓

TEXTBOOK													
Telford, W.M., Geldart, L.P. and Sheriff, R.H., 1990 (and Edition) Applied Geophysics. Cambridge University Press, New York.													
OTHER SOURCES													
SEG, 1996, Mining Geophysics, SEG P.O. Box. 1067, Tulra Oklahama, U.S.A. Vol. I and II. Çaglar, I., 1987, Elektromanyetik meyil açisi yönteminin kullanilamsi ile iletken cevherlesme kusaklarinin arastirilmasi: DOGA-TU Journal of Engineering and Environment, V.11, s. 334-343. Çaglar, I., Denizlioglu, A.Z., and Ustalar, A., 1995, Self Potential Investigation of Boyali (Tasköprü) Copper Mineralization Site: 5th symposium on Mining Chemistry-MinChem'95, November 7-10, Istanbul, Türkiye. Proceedings, pp. 37-45. Maden Fakültesi tas müzesi WEB sitesi: www.mines.itu.edu.tr/muze/giris1.htm												
INSTRUCTOR'S SUGGESTIONS													
COMPUTER USE													
MS Word, Golden Software Inc. GRAPHER, Golden Software Inc. SURFER software packages													
HOMEWORKS													
HOMEWORK					PURPOSE								
1-The processing and evaluating of the geophysical field data taken from a mining geophysics project					1-Determination of the location and other physical parameters of ore bed								
PROJECTS													
PROJECT					PURPOSE								
MID-TERM EXAMINATIONS													
A mid-term examination as %35 effective, and homework as %5 effective. Total mid-term impact = %40													
FINAL EVALUATION													
MID-TERM					FINAL								
%40					%60								
RELATION BETWEEN THE COURSE AND PROGRAM OUTCOMES													
COURSE	PROGRAM OUTCOMES (ABET EC 2000 CRITERION 3 a-m)												
	a	b	c	d	e	f	g	h	i	j	k	l	m
	10✓	11✓	3✓	9✓	8✓	4✓	2✓	2✓		2✓	10✓	7✓	5✓

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 413 E Large Section Underground Openings 3+0 hour/week, 3 Credit, Elective , English

Course Description

A general view to large section underground openings, metro stations, underground caverns for waste storage, oil and gas storage. New Austrian Tunneling Methods, typical examples in the world. Large section hard rock tunnel boring machines. Earth balance and slurry type tunnel boring machines. A project example. Drilling machine and drilling patterns in classical tunnel boring methods. Blasting, work organization. The application of shotcrete and jet grouting. Numerical modelling. A project example. A visit to Metro.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Lecture Notes, (main textbook)
Maidl, B. Herrenknecht, M. Anheuser, L. Mechanized Shield Tunnelling, Erns and Suns Limited, ISBN3-433-01292-X, p. 428, 1996.
Puller,M. Deep Excavations, A practical Manual, Thomal Telford, ISBN 07277 1987 4, p. 435, 1966
Reith, J.L. Underground Tranportation Infrastuctures, Balkema, ISBN 90 5410 315 9, p 451, 1993
IACES, University of Technology Vienna, New Austrian Tunneling Method, 1995

Course Objectives

Turkey is a developing country, many metro projects ; like in Ankara, Istanbul and Izmir, are going on. There are a big potential for mining engineers to work in large section underground openings. In Turkey there is also a big potential for underground gas, petroleum storage also. The main objective of this course is to give the students basic knowledge of excavation , support modelling of large section underground openings in hard and soft ground.

Topics Covered on a Weekly Basis	
1. A general view to large section underground openings, metro stations, underground caverns for waste storage, oil and gaz storage	(1 week)
2. New Austrian Tunneling Methods, typical examples in the world	(1 week)
3. . Large section hard rock tunnel boring machines.	(1 week)
4 Earth balance and slurry type tunnel boring machines	(1 week)
5. A project example.	(1 week)
6. Drilling machine and drilling paterns in classical tunnel boring methods	(1 week)
7. Blasting, work organization	(1 week)
8. Muck transportation and ventilation.	(1 week)
9. The application of shotcrete and jet grouting.	(1 week)
10. Numeric Modelling	(1 week)
11. Numeric Modelling	(1 week)
12. A typical project	(1 week)
13. Technical visit to Istanbul Metro	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 40 % (20% homework and 20% mid-term exam) and final examination 50 % / Computer Usage :Flac, MS OFFICE programs like WORD and EXCEL in order to do their mid-term studies/ Field Schedule : None .

Contribution of Course to Meeting the Professional Component

70% Engineering Design (MT), 30 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	7
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	0
(c) an ability to design a system, component, or process to meet desired needs	6
(d) an ability to function on multi-disciplinary teams	4
(e) an ability to identify, formulate, and solve engineering problems	9
(f) an understanding of professional and ethical responsibility	1
(g) an ability to communicate effectively	3
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	2
(i) a recognition of the need for, and an ability to engage in life-long learning	2
(j) a knowledge of contemporary issues	7
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	4
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	3

Prepared By

Prof.Dr. Nuh Bilgin and Prof. Dr. Erkin Nasuf 04/06/2002

NAME OF DEPARTMENT					
Course Name	**Code**	**Regular Semester**	**Credit**	**Lecture**	**3**
				Recitation	
Operations Research	**MAD 222 E**	Spring	**3**	**Laboratory (Hour/Week)**	

Course Language	English
Course Type	Compulsary
Course Description	Introduction to OR, Basic OR concepts, Introduction to Linear Programming, Modelling (Formulation in LP), The Simplex Algorithm, The Big M Method, Sensitivity Analysis and Duality, Software packages for OR, Formulating transportation problems, Finding bfs for transportation, The Transportation Simplex Method, Transshipment problems, Assignment problems.
Course Objectives	Learn the methodology of OR and various techniques of mathematical modeling and finding optimal solutions to problems: Linear Programming (including sensitivity and duality) and Transportation, Assignment, and Transshipment Problems. We will use the computer software package LINDO and Microsoft Excel add-in package Solver to solve these models.
Outcomes	(a) an ability to apply knowledge of mathematics, science, and engineering (c) an ability to design a system, component, or process to meet desired needs (d) an ability to function on multi-disciplinary teams (e) an ability to identify, formulate, and solve engineering problems (i) a recognition of the need for, and an ability to engage in life-long learning (j) a knowledge of contemporary issues (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
Textbook	Winston W.L. (1999) "Operations Research: Applications and Algorithms", Duxbury Press, Wadsworth Inc., Belmont, USA., (main text book)
Other References	Hesse, R. (1997), Managerial Spreadsheet Modeling and Analysis, Irwin, Chicago Lawrence, J.A. Jr., PAsternack, B.A. (1998), "Applied Management Science: A Computer-Integrated Approach for Decision Making", John Wiley&Sons Inc., New York Robson , A.J. (1995), "Designing and Building Business Models using Microsoft Excel", McGraw Hill, London Beasley J.E. (1996) "Advances in Linear and Integer Programming", Oxford University Press OR journals (see web site of the course)
Prerequisite (s)	None

TOPICS COVERED

Week	Topics
1	Introduction to OR
2	Basic OR concepts
3	Introduction to Linear Programming
4	Modelling
5	The Simplex Algorithm
6	The Big M method
7	Sensitivity Analysis and Duality
8	Lindo software package and Solver Add-in
9	MIDTERM
10	Formulating transportation problems, finding bfs
11	The transportation simplex method
12	Transshipment problem
13	Assignment problems
14	Review

Course Evaluation Method		Quantity	Percentage
	Midterm Exams	1	25%
	Quizzes	2	15%
	Homeworks	6	20%
	Projects		
	Term Paper		
	Laboratory Work		
	Other		
	Final Exam	1	40%
Contribution of course to meeting the professional component	**Mathematics and Basic Science**		
	Engineering Science		
	Engineering Desing	100%	
	Social Sciences		
Prepared by: Assoc.Prof.Dr Yusuf Ilker Topçu		**Date:** 04/06/2002	

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 422, Mine Planning and Design, 3 hours/week, 2 Credits, Compulsory, Turkish

Course Description

In this course, The data about metallic, coal, quarry, marble or other building stones deposits will be given to students in groups. Each group will model the deposit and calculate the reserve. Then the production method will be detemined and mine plans will be prepared. Production planning, equipment selection, support design, haulage, drainage, ventilation, surface and underground facilities, mineral processing plant design studies will be carried out. Students will also perform Feasibility studies. At the end a project containing all the work will be presented verbally and in a written form.

Prerequisite(s)

None.

Textbook(s) or Other Required Material

1. H.L. Hartman, SME Mining Engineering Handbook, Vol 1-2, 1992
2. W.A. Hustrulid, Underground Mining Methods handbook, 1982.
3. B.A. Kenedy, Surface Mining, 1989.
4. R. Stefanko, Coal Mining Technology, 1983.

Course Objectives

In this course, students will carry out all necessary engineering work to design a mine by using the knowledge obtained from other courses. They will present the project verbally and in written form.

Topics Covered on a Weekly Basis

1. Ore body modelling and reserve calculations	(1 week)
2. Ore body modelling and reserve calculations	(1 week)
3. Determining production method, pre-production work ank drawing plans	(1 week)
4. Determining production method, pre-production work ank drawing plans	(1 week)
5. Equipment selection, Support and haulage design	(1 week)
6. Equipment selection, Support and haulage design	(1 week)
7. Ventilation, Drainage, Electrics	(1 week)
8. Ventilation, Drainage, Electrics	(1 week)
9. Surface and underground mine and mineral processing plant design	(1 week)
10. Pre-Report presentation and discussions	(1 week)
11. Feasibility studies	(1 week)
12. Feasibility studies	(1 week)
13. Final report preparation	(1 week)
14. Final report presentation and discussions	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid term studies (20% homeworks) and final examination (80%) / Computer Usage: SURFER, VULCAN / Field Schedule : None.

Contribution of Course to Meeting the Professional Component

100 % Mining Engineering Design (MT)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation
1 – 4 week : Partly related
5 – 8 week : Related
9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs	
(d) an ability to function on multi-disciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	

Prepared By

Prof. Dr. Nuh Bilgin 07/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 441 E, Mine Systems Analysis, 3 hour/week, 2.5 Credits, Compulsory, English

Course Description

System analysis techniques, and mining applications. Lineer programming, basic assumptions and modelling. Simplex technique, duality and sensitivity analysis. Transportation problem. Integer programming. Dynamic programming. Graphical techniques, Shortest path, Facility location. Maksimum flow, minimum cut problems. Critical path and project planning. Inventory problems. Queueing and reliability theories. Maintenance theory. Simulation.

Prerequisite(s)

MAT 271 EStatistics, MAT 261 Lineer Algebra.

Textbook(s) or Other Required Material

1. Levary, R. R., Engineering Design-Better Results through Operations Research Methods, Nort-Holland, 1990.
2. Cummins, A. B. and I. A. Given, Mining Engineering Handbook, SME Publishing, 1993.
3. Ravindran, A., Phillips D. T. and J. J. Solberg, Operations Research- Principles and Practice, John Wiley and Sons, 1987.
4. Several papers about mining applications of system analysis.

Course Objectives

System analysis problem is an important aspect in mining and challenge to mining engineers. During decision making process it is necessary to achieve maksimum profit or maksimum benefit by using modern analysis techniques. Therefore it is necessary to teach these techniques to the mining engineering students.

Topics Covered on a Weekly Basis

1. System analysis techniques, and mining applications	(1 week)
2. Lineer programming, basic assumptions and modelling. Mining examples	(1 week)
3. Simplex technique, duality and sensitivity analysis	(1 week)
4. Transportation problem	(1 week)
5. Integer programming	(1 week)
6. Dynamic programming	(1 week)
7. Shortest path, and Facility location in mining	(1 week)
8. Midterm exam	(1 week)
9. Maksimum flow, minimum cut problems	(1 week)
10. Critical path and project planning	(1 week)
11. Inventory problems	(1 week)
12. Queueing theory and optimum truck allocation to shovels	(1 week)
13. Reliability and Maintenance theories	(1 week)
14. Simulation and mining applications	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid term studies (30% homeworks, 30% mid term exam) and final examination (40%) / Computer Usage: Using several programs such as Lindo and Lingo / Field Schedule: None.

Contribution of Course to Meeting the Professional Component

50 % Mining Engineering Design (MT), 50 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation
1 – 4 week : Partly related
5 – 8 week : Related
9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	14
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	1
(c) an ability to design a system, component, or process to meet desired needs	10
(d) an ability to function on multi-disciplinary teams	14
(e) an ability to identify, formulate, and solve engineering problems	14
(f) an understanding of professional and ethical responsibility	2
(g) an ability to communicate effectively	3
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	7
(i) a recognition of the need for, and an ability to engage in life-long learning	10
(j) a knowledge of contemporary issues	5
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	10
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	10

Prepared By

Assoc.Prof. Dr. Selamet Gürbüz Erçelebi 07/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language
MAD 418, Marble Technology, 3+0 hour/week, 3 Credit, Elective, Turkish
Course Description
In this lecture definitions of marble, marble properties, production methods, marble cutting and processing techniques, The use of marbles, marble and environment, marble economy and marble potentials of Turkey are explained
Prerequisite(s)
None
Textbook(s) or Other Required Material
"Marble", Turgay Onargan and Halil Köse, Book published by University of Dokuz Eylül, Engineering Faculty No. 220 (main textbook) Barton, W.R., Marble U.S. Burenu of Mines, I.C. 8391, 1968. Bowles, O., Dimension Stone U.S. Bureau of Mines, I.C. 7829, 1958. Sentürk, A., Marble Technology, Ministry of Trade, Research Report Aralik 1995
Course Objectives
Turkey is a rich country as far as marble deposites are concerned. The use of marble in the country and the share of marble in country's export is increasing rapidly. The subject is mostly related with mining engineering. Marble production and the required equipment selection are all mining enginering subjects. It is, therefore, this course should be mining engineering curricullum. Student who elect this couse will gain an extra knowledge about marble mining, marble in general and the Turkey's marble potential and also increase their employment chances

Topics Covered on a Weekly Basis	
1. Definition and the geology of marble	(1 week)
2. Classification of marbles	(1 week)
3. Properties of marbles	(1 week)
4. Production methods of marbles	(3 weeks)
5.Marble cutting and processing techniques	(1 week)
6. The use of marbles	(1 week)
7. Mid-term exam	(1 week)
8. Evaluation of marble wastes	(1 week)
9. Use of marble as a decoration material	(1 week)
10. Marble and environment	(1 week)
11. Marble economy	(1 week)
12. Marble Potential in the world and Turkey	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 50 % (10 % Mid-term project and 10 % class attendance, 30 % mid-term exam) and final examination 50 %. / Computer Usage : Student prepare a web site or a presentation about marbles of Turkey and the World using PowerPoint and any webpage editor. / Field Schedule : 1 trip to a marble mine if possible.

Contribution of Course to Meeting the Professional Component

90 % Mining Engineering Design (MT), 10 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation
1 – 4 week : Partly related
5 – 8 week : Related
9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	4
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	
(c) an ability to design a system, component, or process to meet desired needs	7
(d) an ability to function on multi-disciplinary teams	
(e) an ability to identify, formulate, and solve engineering problems	5
(f) an understanding of professional and ethical responsibility	
(g) an ability to communicate effectively	
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	
(i) a recognition of the need for, and an ability to engage in life-long learning	
(j) a knowledge of contemporary issues	6
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	1
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	7

Prepared By

Prof. Dr. Erkin Nasuf 04/06/2002

Course Name	Code	Regular Semester	Credit	Lecture	4
				Recitation	2
Mathematics 1	MAT101	1	5	Laboratory (Hour / Week)	

Language	English
Type	Compulsory
Coordinator	Doç.Dr Ugur DURSUN
Course Description	Limits and Continuity;Derivatives;Applications of Derivatives ;Integration;Application of Integrals;Transcendantal Functions;Techniques of Integration
Objectives	
Outcomes	
Textbook	Calculus and Analytic Geomerty 9th Edition/ Thomas and Finney, Addison-Wesley Publishing Company
Other References	
Prerequisite Courses	None
Prerequisites by Topic	Basic Mathematics
Homeworks & Projects	All homeworks are to be **HANDED IN** a week after they are assigned Homeworks may be used as a source for exams.
Laboratory Work	None
Computer Use	None
Other Activities	A midterm exam will be held on a date previously metioned to the students.

Assessment Criteria		**Quantity**	**Percentage**
	Midterm Exams	1	%40
	Quizzes		
	Homeworks	6	
	Projects		
	Term Paper		
	Laboratory Work		
	Other		
	Final Exam		%60

Course Category by Content, %	**Mathematics and Basic Sciences**	%50
	Engineering Science	%50
	Engineering Design	
	Social Sciences	

COURSE PLAN

Week	Topics
1	Orientation
2	Limits and Continuity
3	Limits and Continuity
4	Derivatives
5	Derivatives
6	Applications of Derivatives
7	Applications of Derivatives
8	Integration
9	Integration//////**MIDTERM**
10	Applications of Integrals
11	Applications of Integrals/Transcendental Functions
12	Transcendental Functions
13	Techniques of Integration
14	Techniques of Integration

Prepared by:Doç.Dr. Ugur DURSUN	Date26/03/2002

Course Name	Code	Regular Semester	Credit	Lecture	4
				Recitation	2
Mathematics 2	MAT102	2	5	Laboratory (Hour / Week)	

Language	English
Type	Compulsory
Coordinator	Yar.Doç.Dr Esin Kaneti Gidon
Course Description	Infinite series,Conic Sections,Parametrized Curves,Polar Coordinates,Analytic Geometry in Space,Vector-Valued Functions,Multivarible Functions and Partial Derivatives,Multiple Integrals,Line Integrals
Objectives	
Outcomes	
Textbook	Calculus and Analytic Geomerty 9th Edition/ Thomas and Finney, Addison-Wesley Publishing Company
Other References	
Prerequisite Courses	MAT101 MIN FF or MAT101E MIN FF or MAT103 MIN FF or MAT103E MIN FF .
Prerequisites by Topic	Basic Mathematics
Homeworks & Projects	All homeworks are to be **HANDED IN** a week after they are assigned Homeworks may be used as a source for exams.
Laboratory Work	None
Computer Use	None
Other Activities	A midterm exam will be held on a date previously metioned to the students

Assessment Criteria		**Adedi**	**Etki Orani %**
	Midterm Exams	1	%40
	Quizzes		
	Homeworks	6	
	Projects		
	Term Paper		
	Laboratory Work		
	Other		
	Final Exam		%60

Course Category by Content, %	**Mathematics and Basic Sciences**	%50
	Engineering Science	%50
	Engineering Design	
	Social Sciences	

COURSE PLAN

Week	Topics
1	Infinite Series
2	Infinite Series
3	Infinite Series
4	Conic Sections,Parametrized Curves,Polar Coordinates
5	Conic Sections,Parametrized Curves,Polar Coordinates
6	Analytic Geometry In Space
7	Analytic Geometry In Space
8	Vector-Valued Functions
9	Vector-Valued Functions
10	Multivarible Functions and Partial Derivatives
11	Multivarible Functions and Partial Derivatives
12	Multiple Integrals
13	Multiple Integrals
14	Line Integrals

Prepared by:Doç.Dr. Ugur DURSUN	Date26/03/2002

NAME OF DEPARTMENT					
Course Name	**Code**	**Regular Semester**	**Credit**	**Lecture**	3
				Recitation	
NUMERICAL METHODS	MAT201	1	3	**Laboratory (Hour/Week)**	

Course Language	Turkish
Course Type	Compulsory
Course Description	How to solve nonlinear systems by Numerical Techniques, Convergence and sensitivity analysis. Interpolation. Differentiation with finite differences. Numerical integration (improper integrals, rapidly oscillating integrals). Matrix computations (decomposition, factorisation, iterative methods). Approximate solutions for ordinary differential equations. Partial differential equations; parabolic (explicit and implicit methods, finite difference formulations), elliptic (Jacobi, point and line Gauss-Seidel methods, PSOR, LSOR, and ADI methods).
Course Objectives	The numerical techniques has been a vital tool for engineers in a wide range of modeling engineering problems and examining experimental results. The opportunity to combine the theoretical calculations with the opportunities and capabilities brought by today's computer technology with a more appropriate type. In this course's content, the basic and advanced numerical calculation techniques will be tought and some applications will be made.
Outcomes	Students will gain:1. ability to develop computer algorithms for various engineering problems, 2. ability to show experimental results using numerical techniques.
Textbook	Cheney, W. and Kincaid, D., Numerical Methods and Computing, Brooks-Cole, Publishing Company 1999.
Other References	1) Asaithambi, N.S., 1995 Numerical Analysis: Theory and Practice, Saunders College Publications. 2) Greenspan, D. and Casulli, V., 1988 Numerical Analysis for Applied Mathematics, Science and Engineering, Addison-Wesley.
Prequisite (s)	Basic Courses on Mathematics (MAT 101)

TOPICS COVERED

Week	Topics
1	Introduction: Computer Arithmetic
2	Convergence and Stability Analysis
3	Solution of Linear Systems
4	Direct Methods for Solving Linear Systems
5	Indirect Methods
6	Nonlinear Systems
7	Interpolation and Polynomial Approximation
8	Iterative Techniques in Matrix Algebra
9	Approximating Eigenvalues
10	Differentiation with Finite Differences
11	Numerical Integration
12	Approximate Solutions for Ordinary Differential Equations
13	Boundary-Value Problems for Ordinary Differential Equations
14	Numerical Solutions to Partial Differential Equations

Course Evaluation Method		**Quantity**	**Percentage**
	Midterm Exams	2	30
	Quizzes	8 to 10	10
	Homeworks	5 to 8	20
	Projects	-	-
	Term Paper	-	-
	Laboratory Work	-	-
	Other	-	-
	Final Exam	1	40
Contribution of course to meeting the professional component	**Mathematics and Basic Science**	100	
	Engineering Science	-	
	Engineering Design	-	
	Social Sciences	-	
Prepared by: Prof. Mehmet KARACA		**Date: 01.06.2002**	

RELATIONSHIP BETWEEN THE COURSE AND CIRRICULUM

	Program Outcomes and Assessment	1	2	3
1	An ability to apply knowledge of mathematics, science and engineering			X
2	An ability to design and conduct experiments, as well as to analyze and interpret data		X	
3	An ability to design a system, component, or process to meet desired needs	X		
4	An ability to function on multi-disciplinary teams			X
5	An ability to identify, formulate, and solve engineering problems			X
6	An understanding of professional and ethical responsibility		X	
7	An ability to communicate effectively		X	
8	The bord education necessary to understand the impact of engineering solutions in a global and societal context	X		
9	A recognition of the need for, and an ability to engage in life -long learning		X	
10	A knowledge of contemporary issues	X		
11	An ability to use techniques, skills, and modern engineering tools necessary for engineering practice	X		
12				
13				

Contribution of the course: 1: Non, 2: Partially, 3: Completely.

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 412 E, Mechanization In Mining And Tunnelling Excavations, 3+1 hour/week, 3.5 Credits, Required , English

Course Description

Historical background and importance of mechanized excavation: Principles and applications of coal ploughs, shearers, continuons miner and other excavation machines. Roadheaders, tunnel boring machines, shielded excavation machines, earth pressure balance machines, soft and hard ground roadway and tunnelling machines, pipe jacking / microtunneling, back up and auxillary equipments, examples from the applications. Comparison of mechanized and classical excavation methods, costs, performance prediction methods. Mechanization of metro and large section of underground openings. Cutters used in mechanized excavation, cutting theories. Latest developments in mechanical excavation.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Lecture Notes (main textbook)

Stack, B., Encyclopedia of Tunneling, Mining and Drilling Equipment, Muden Publishing Company, Australia ISBN 09587 1l 2X, 1995.

Hartman, H.L., SME Mining Eng. Handbook, USA ISBN 0873335-100-2, 1992.

Wagner., Tunnel Boring Machines, A.A Balkema, Publications, Limited ISBN 0905410/G 08118, 1996.

Maidl, Mechanized Shield Tunneling, ISBN 343301292X, Wiley Publishers.

Bilgin, N., Applied Rock Cutting Mechanics for Civil and Mining Engineers, 1989. Pub: Birsen Yayinevi, ISBN 97S-Sl1-O10-0, 1995. (Turkish)

Eskikaya, S., Mechanization of Coal Excavation, Pub. ITU Yayinlan, 1969 (Turkish)

Course Objectives

Mechanization is unavoidable for fast, productive and economical excavations. The principles of mechanical rock excavation should be known by mining engineers working in both mining and tunnelling excavations. The objective of this course is to teach these principles and introduce the features of the mechanical miners.

Topics Covered on a Weekly Basis	
1. Historical Background, Advantage and Disadvantages of Mechanized Excavation, Requirements for Mechanized Excavation, Face Establishment, Coal Cutters	(1 week)
2. Classification of Cutters, Cutting Theories and Applications	(1 week)
3. Performance Prediction Applications (Specific Energy Method, Rock Mass Cuttability Index Method)	(1 week)
4. Roadheaders, Working Principles and Applications	(1 week)
5. Continuous Surface Miners, Working Principles and Applications	(1 week)
6. Continuous Miners (Underground), Working Principles and Applications	(1 week)
7. Impact Hammers, Working Principles and Applications	(1 week)
8. Hard Rock Tunnel Boring Machines (TBMs), Working Principles and Applications	(1 week)
9. Coal Ploughs, Working Principles and Applications	(1 week)
10. Shearers, Working Principles and Applications	(1 week)
11. Soft Ground TBMs, Working Principles and Applications	(1 week)
12. Backup and Auxiliary Equipment for TBMs	(1 week)
13. Microtunneling Methods	(1 week)
14. Emerging Mechanical Excavation Technologies	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 40 % (10% homework, 15 % pop quiz, 15% mid-term exam) and final exam 60 %. / Computer Usage : MS OFFICE programs like WORD and EXCEL in order to do their mid-term studies / Field Schedule : None .

Contribution of Course to Meeting the Professional Component

90% Mining Engineering Design (MT), 10 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	3
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	3
(c) an ability to design a system, component, or process to meet desired needs	9
(d) an ability to function on multi-disciplinary teams	5
(e) an ability to identify, formulate, and solve engineering problems	13
(f) an understanding of professional and ethical responsibility	8
(g) an ability to communicate effectively	3
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	13
(i) a recognition of the need for, and an ability to engage in life-long learning	3
(j) a knowledge of contemporary issues	13
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice	5
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society	7

Prepared By

Prof. Dr. Nuh Bilgin and Asst.Prof.Dr. Hanifi Çopur 05/06/2002

NAME OF DEPARTMENT					
Course Name	**Code**	**Regular Semester**	**Credit**	**Lecture**	**3**
				Recitation	
ENGINEERING MECHANICS	**MEK 205**		**3**	**Laboratory (Hour/Week)**	

Course Language	Turkish
Course Type	Compulsory, TM
Course Description	Statics and dynamics of rigid bodies.
Course Objectives	Introduction to engineering analysis.
Outcomes	Preparation to advanced engineering analysis.
Texbook	Mühendislik Mekanigi (S.P. Timoshenko)
Other References	1. Rijit Cisimler Dinamigi (Erdogan Suhubi) 2. Dinamik (F.P. Beer, E.R. Johnston) 3. Statik ders notlari (Mustafa Inan) 4. Çözümlü statik problemleri (Hasan Engin, Ertaç Ergüven)
Prequisite (s)	None

TOPICS COVERED

Week	Topics
1	Introduction to statics.
2	Principles of statics.
3	Forces on plane.
4	Forces on plane.
5	Center of mass.
6	Structures on plane.
7	Friction.
8	Principles of dynamics.
9	Kinematic : motion on straight line.
10	Kinematic : motion on plane.
11	Kinetic: Newton's law, De Alembert principle.
12	Kinetic: Frictional systems.
13	Kinetic: Conservation of momentum and impulse.
14	Kinetic: Vibrations of single degree of freedom of systems.

Course Evaluation Method		**Quantity**	**Percentage**
Two midterm exams each %15, two homeworks required for final exam each %10 and final exam %50, total %100.	**Midterm Exams**	2	30
	Quizzes	-	0
	Homeworks	2	20
	Projects	-	
	Term Paper	-	
	Laboratory Work	-	
	Other	-	
	Final Exam	1	50
Contribution of course to meeting the professional component	**Mathematics and Basic Science**	20	
	Engineering Science	40	
	Engineering Design	40	
	Social Sciences	-	
Prepared by: Assistant Prof.Dr. Abdullah Gedikli		**Date:** July 2002	

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 315 E, Metallurgy, 3+0 hours/week, 3 Credits, Elective, English

Course Description

Definition and classification of metallurgy, basic processes in mineral preparation and concentration processes, pyrometallurgy (roasting, smelting, refining), hydrometallurgy (leaching, precipitation, cementation, solvent extraction, ion exhange), electrometallurgy (electrolysis, electrolytic refining), and physical metallurgy, manufacturing processes (casting, rolling, forging, etc.), examples from industrial applications (iron and steel, copper, zinc, aluminum, gold and silver).

Prerequisite(s)

None

Textbook(s) or Other Required Material

Handouts given periodically during semester, (main textbook)
B.A. Wills (1985) Mineral Processing Technology, 3rd Edition, Pergamon Press, New York-London-Paris.
J.D. Gilchrist (1980) Extraction Metallurgy, 2nd Edition, Pergamon Press, New York-London-Paris.
T. Rosenqvist (1974) Principles of Extractive Metallurgy, McGraw-Hill Book Company, New York-London.
F. Habashi (1970-86), Principles of Extractive Metallurgy, Volume 1, *General Principles*, Gordon and Breach Science Publishers Inc., New York-London.
F. Habashi (1970-86), Principles of Extractive Metallurgy, Volume 2, *Hydrometallurgy*, Gordon and Breach Science Publishers Inc., New York-London.
F. Habashi (1970-86), Principles of Extractive Metallurgy, Volume 3, *Pyrometallurgy*, Gordon and Breach Science Publishers Inc., New York-London.
S. Cankut (1972) Extractive Metallurgy, Istanbul Technical University–Gümüssuyu (in Turkish).
F.Y. Bor (1979) Principles of Extractive Metallurgy, Part I, Istanbul Technical University–Gümüssuyu (in Turkish).
F.Y. Bor (1989) Principles of Extractive Metallurgy, Part II, Istanbul Technical University –Gümüssuyu (in Turkish).
V. Aytekin, E. Tulgar, E. Çavusoglu, F. Dikeç, A.F. Çakir (1976) Metallurgy Technology, Istanbul (in Turkish).
B.H. Amstead, P.F. Ostwald, M.L. Begeman, Manufacturing Processes, 7th addition, John Wiley&Sons, New York, 1977.
H.F. Taylor, M.C. Flemings, J. Wulff, Foundary Engineering, John Wiley&Sons, New York, 1959.

Course Objectives

Metallurgy and mining sectors are closely related science and technology areas. Metallurgy covers the production of metals from ores and manufacturing of metals and alloys. The main objectives of this course are:

- to give some information on basic metallurgical processes and their relations to mining, examples of industrial applications,
- to develop students research skills and critical thinking,
- to make students develop an ability for continuous learning by asking them to search and follow new developments in metallurgical processes,
- to create an opportunity for students to work in teams,
- to provide means to students to gather and combine information about a given subject from other sources in appropriate ways in writing technical reports and ability of presentation in a certain time,
- to provide students to involve in the class by asking questions and evaluation of others' presentations.

Topics Covered on a Weekly Basis

1.	Meeting with the students, Introduction, definition and classification of metallurgy	(1 week)
2.	Summary of ore preparation and concentration processes, Visiting Mineral Processing Laboratories in the Mining Engineering Department	(1 week)
3.	Agglomeration: nodulizing, briquetting, sintering, pelletizing	(1 week)
4.	Definition and classification of pyrometallurgy, drying, calcination, roasting, Quiz	(1 week)
5.	Smelting and fire-refining	(1 week)
6.	Iron and Steel Production	(1 week)
7.	Copper smelting and refining	(1 week)
8.	Mid-term exam	(1 week)
9.	Hydrometallurgy-definition and classification, types of leaching reagents and methods, solid/liquid separation	(1 week)
10.	Recovery of metals from leach solutions, examples from hyrometallurgical plants, Quiz	(1 week)
11.	Electrometallurgy – electrowining and electrorefining, Student presentations	(1 week)
12.	Physical metallurgy, manufacturing processes, Student presentations	(1 week)
13.	Visiting Laboratories in Metallurgical Engineering Department	(1 week)
14.	Student presentations	(1 week)

Class / Laboratory / Computer / Field Schedule

1 Mid-term (20%), 2 Quizes (10%), 1 term project (5% writing, 10% presentation), Final Exam (55%).
Course web adress: http:/courses/yahoo.com/course/metallurgy
Computer usage is required in order to prepare their term projects (writing, searching through internet, preparation of presentation).

Contribution of Course to Meeting the Professional Component

100% Basic Concepts in Metallurgical Engineering (MT)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related
1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	11
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	-
(c) an ability to design a system, component, or process to meet desired needs	-
(d) an ability to function on multi-disciplinary teams	3
(e) an ability to identify, formulate, and solve engineering problems	-
(f) an understanding of professional and ethical responsibility	3
(g) an ability to communicate effectively	3
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	2
(i) a recognition of the need for, and an ability to engage in life-long learning	5
(j) a knowledge of contemporary issues	9
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	3
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	9

Prepared By

Prof. Dr. Fatma Arslan 06/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 411, Mine Machinary, 3+1 hour/week, 3,5 Credit, Required, Turkish

Course Description

Compressed air: Isothermic and adiabatic compression. Works in compressors and engines, cooling systems. Network calculations. Compressed air engines. Pneumatic stowing machinery and pipes. Air requirement and power calculation. Examples of applications. Haulage installations. Cage and skip systems. Drum and Koepe hoists. Towers and head frame arrangements. Dynamics of haulage installations. Ropes, types, characteristics and maintenance. Rope calculations. Force, power calculations. Examples from applications.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Lecture Notes (main textbook)
Hartman, H.L., SME Mining Engineering Handbook, Volume 1 and 2 ISBN 0.087335-100-2, Published, by Society for Mining, Metallurgy and Exploration, Inc., Littleton, Colorado, USA, 1992.
Khadzhikov, S., Butakov, S., Mining Mechanical Engineering. ISBN No. 5-03-000039-9, Mir Publishers, Moscow, 1988.
Ramble, M.A., Mine Hoisting. ISBN No. 90-5410-2985, Published by A.A. Balkema /Rotterdam, 1996.
Britton, S.G., Construction Engineering in Underground Coal Mining, ISBN 0-89520-403-7 Published by Sou

Course Objectives

The main objective of this course is to teach students shat hoisting, compressed air and in some extend pneumatic stowing. Shaft hoist systems and compressed air are important subjects in mining activities. Both are required correct design and calculation because of their high costs. An error or mistake in selection or designing of the systems may result very high cost. Also pneumatic stowing, which is very costly, has to be applied only where necessary and designed correctly. All these should be known by a mining engineer.

Topics Covered on a Weekly Basis	
1.a)Introduction, general descriptions of the subjects. Characteristics of hoists and hoisting systems. Types of shafts, circular, square and elliptic cross section. b)Units of pressure and heat, Torr, physical atmosphere, pascal, bar, meter water equivalent, joule, calorie	(1 week)
2.a)Shaft equipment, rigid and rope guides, emergency winding system, various types of towers : wood, steel and concrete. b)Basic laws of thermodynamics; Laws of Gay-Lussac and Boyle-Mariotte	(1 week)
3.a)Type of hoists, drum hoists, friction hoists, basic design, Advantages and disadvantages b)Basic terms, density, specific volume, fixed volume, PV diagrams	(1 week)
4.a)Drum hoists, single drum hoists, double drum hoists, split-differential diameter hoists. Pulleys. b)Changes of phases of gasses, isochor, isobar, isothermic, adiabatic and politropic changes	(1 week)
5.a)Conical drum hoists. Balance rope, counterweight. Multidrum hoists calculation. b)Calculation of work and energy in isothermic phase changes. Calculation of work done by absolute isothermic compression, by absolute expansion.	(1 week)
6.a)Friction hoists, basic principles, general equation. Friction wheel. Angle of wrap, coefficient of friction. Single and multi rope friction hoists. b)Calculation of work and energy by adiabatic change. Calculation of work done by absolute adiabatic compression an expansion.	(1 week)
7.a)The limiting criterion for slippage, calculation . Ground mounted and tower mounted friction hoists Fleet angles. b)Basic principles about compressors. Thermodynamic losses. Safety rules. Compression by stages. Ratio of pressures in stages. Intercoolers.	(1 week)
8.a)Decking and wagon circulation systems in hoisting. Design principles : underground and surface b)Basic structures of compressors. Piston compressors, rotary screw compressors, reciprotating compressors, turbo compressors. Comparison of various type compressors.	(1 week)
9.a)Hoist ropes, round-strand, flattened-strand and locked-coil ropes. Safety factor. Maintenance . Calculation. b)Basic principles of compressed air motors. Thermodynamic losses, calculation of motor works. Specific air consumption.	(1 week)
10.a)Selection of hoisting system. Technical consideration. b)Structures of compressed air motors. Piston motors, screw motors, lamell motors.	(1 week)
11.a)Duty-cycle and pay load determination. b)Basic principles of fluid mechanics. Bernoulli law, Reynold rule and different flow regimes. Laminar and turbulent flow. Friction in pipes.	(1 week)
12.a)Drum diameter / drum-face width determination. b)Calculation of friction loss. General equations regarding to compressed air Friction loss in fittings, valves and bents.	(1 week)
13.a)Braking torque and clutch torque. Equivalent effective weight. Inertia of hoist mechanical and motors. b)Calculation of compressed air network. Air consumption of compressed air machines. Pressure drops.	(1 week)
14.a)Pneumatic stowing. Stowing machines. Stowing material. Calculation. Examples of applications. b)Worked example of compressed air network design and calculation.	(1 week)

Class / Laboratory / Computer / Field Schedule	
Mid-term studies 60 % (homework and 36 %, 9 %quiz, 15% mid-term exam) and final examination 40 %. / Computer Usage : MS OFFICE programs like WORD and EXCEL in order to do their mid-term studies/ Field Schedule : None .	
Contribution of Course to Meeting the Professional Component	
80% Mining Engineering Design (MT), 20 % Basic Engineering (TM)	
Relationship of Course Program to ABET Criterion 3 of 2000	
Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table. 0 week : No relation — 5 – 8 week : Related 1 – 4 week : Partly related — 9 – 14 week : Highly related	
(a) an ability to apply knowledge of mathematics, science, and engineering	14
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	-
(c) an ability to design a system, component, or process to meet desired needs	8
(d) an ability to function on multi-disciplinary teams	9
(e) an ability to identify, formulate, and solve engineering problems	14
(f) an understanding of professional and ethical responsibility	-
(g) an ability to communicate effectively	1
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	14
(i) a recognition of the need for, and an ability to engage in life-long learning	-
(j) a knowledge of contemporary issues	-
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	14
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	6
Prepared By	
Prof. Dr. Sinasi Eskikaya and Assoc. Prof. Dr. Ismail Ugur 04/06/2002	

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 326, Mining Laws, 3+0 hour/week, 3 Credit, Elective, Turkish

Course Description

Historical summary of Turkish mining legislations. Other regulations related to mining industry. The new Mining Legislation No.3213 and related regulations. Application for Exploration Licenses, Pre-exploitation Licenses, Exploitation Licenses. Authorities and responsibilities of the Mining Engineers in charge. Royalties, Taxes, Duties. Deposits. Amendments of Mining Code.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Melih Turhan, Mining Laws Course Notes (in Turkish), 2001 (main textbook)
Mining Law No.3213 and Related Regulations (in Turkish), Ministry of Energy and Natural Resources
Nizamettin Ekemen, Commentary and Explanation of Mining Legislation (in Turkish), No:5305 , 1957
Assoc.Prof.Dr. Atilla Özer, Constitution of 1982 (in Turkish)
Summary of Mining and Petroleum Legislations, U.S. Bureau of Mines, 1954
Related Official Gazettes, 1985-2001, (in Turkish)

Course Objectives

Mining engineering applications is directly related with the knowledge of Mining regulations and legislations. It is not possible to obtain any mining right and to follow any procedure during the exploitation stages without knowing mining regulations. Mining laws and other regulations put an extra responsibility for Mining engineers. It is, therefore, they must have good knowledge about their responsibilities and mining legislation and regulations.

Topics Covered on a Weekly Basis	
1.Explanation of mining rights and mining laws. Historical development of mining legislations in Turkey. Other regulations related with mining.	(1 week)
2.Mining Law No : 3213, Aim, Contents, Definitions, Rule and possession of the state	(1 week)
3.Mining rights, Restricted areas, Encouragement measures, Control of mining activities.	(1 week)
4.Weighing cards and dispatch documents, Duties and Deposits, Royalty, First notification and discovery rights.	(1 week)
5.Application for exploration license, Coordinates, Exploration permit	(1 week)
6.Periods of exploration license, Activity reports, Pre-exploitation license, Period and activity reports.	(1 week)
7.Exploitation License, Exploitation permit, Exploitation project.	(1 week)
8.Exploitation permit activities, Reports, Maps, Balance sheet, production program.	(1 week)
9.Public Auction, Responsibilities of Mining Engineers in charge, Abandonment, Transfer of installations, Mining Fund.	(1 week)
10.Protection of tailings, Rejects and slags, Suspension of work, Register, Pledging the areas.	(1 week)
11.Mid-term exam.	(1 week)
12.Personal responsibilities, Expropriation (Act No : 2840).	(1 week)
13.Amendments on Mining Law and Related Regulations.	(1 week)

Class / Laboratory / Computer / Field Schedule
Mid-term studies + homework : 40 % and final examination : 60 % / Lab. Schedule : None / Computer Usage : None / Field Schedule : None

Contribution of Course to Meeting the Professional Component
90% Mining Engineering (MT), 10 % Social Science (TB)

Relationship of Course Program to ABET Criterion 3 of 2000	
Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table. 0 week : No relation — 5 – 8 week : Related 1 – 4 week : Partly related — 9 – 14 week : Highly related	
(a) an ability to apply knowledge of mathematics, science, and engineering	-
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	-
(c) an ability to design a system, component, or process to meet desired needs	-
(d) an ability to function on multi-disciplinary teams	-
(e) an ability to identify, formulate, and solve engineering problems	2
(f) an understanding of professional and ethical responsibility	13
(g) an ability to communicate effectively	-
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	1
(i) a recognition of the need for, and an ability to engage in life-long learning	-
(j) a knowledge of contemporary issues	2
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	1
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	3

Prepared By
MSc. Melih Turhan 04/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 320, Mine Organization, 3+0 hour/week, 3 Credit, Elective, Turkish

Course Description

Main aspects related to Mine Organization, Main Principles of Management. Examples of the organizational schemes of state owned and private mining establishment. Authority and responsibility. Examples of calsour team formation in mines. Basic principles of planning and organizing of mining activities. Mining Rights. Aspects related to first application, exploration and pre-production, factors affecting to choose the mining site. Possibilities of getting labour, energy and necessary material. Conditions concerning water, mine waste, placing of surface plants and buildings. Organization of valuation affairs of the products. Selling and marketing. Penalties and primes. Related law affairs. Obtaining the mining rights: Application for mineral Exploration, related situations with pre-exploitation period. Factors affecting plant and workshop sites. Layout of surface buildings. Possibilities of labour, energy and material supply. Water and tailing disposals. Product evaluation and organization of related works. Sales and marketing business. Bonus and penalties. Supervise companies and their working types. Related laws and regulations with all these subjects.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Lecture Notes, (main textbook)
Douglas, A.Sloan., Mine Management, Chapman and Hall, London and Newyork, 1983.
R.M.Wamless, Finance for Mine Management, Partner, Coppers-Lybrand, London, Newyork, Chapman and Hall
Hatipoglu Z., Introduction to Business Administration, I.T.U. Pub. No. 1200,1981, (in Turkish)
Hatippglu Z., Strategical Management of Enterprises, Basic Research Pub. No:4, 1986, (in Turkish)
Weiss H. D., Effective Management Techniques, Management Series, 1993, (in Turkish)
Weiss H. D., Strategy for High Efficiency, Management Series, 1993, (in Turkish)
S.W. Mudd Series., SME Mineral Processing Handbook, Weiss, Editor, 1985.
Metall Bulletin, World Steel and Metal News.
Chromium-US Bureau of Mines, Minerals Year Book, 1964.
Karayalçin. I, Planning of Organization, I.T.U. Pub., 1966, (in Turkish)
Mining Law No.3213 and related regulations, 1985, (in Turkish), Ministry of Energy and Natural Resources.

Course Objectives

Mining companies, due to their own characters, do not have much similarity to the others companies with regard to management and organization. First of all, they have quite a high risk and therefore, it is very difficult to compensate any mistake which would be made at beginning. The aim of this lecture is to teach the students the basic principal of management and organization with particular reference to mining companies.

Topics Covered on a Weekly Basis	
1.General Descriptions and fundamental principles of Mine Organization.	(1 week)
2.Outlines of some small mine organization some typical corporate structures.	(1 week)
3.Functions of administrative staff and manager in various steps of organization. Shaft groups management.	(1 week)
4.Importans of planning in Organization GANNT diagrams and CPM, PERT methods.	(1 week)
5.Theories of classical and modern organization othonities and responsibilities. Controls.	(1 week)
6.Grouping in organisation, Various grouping methods.	(1 week)
7.Labour organization in mining companies	(1 week)
8.Planing and organization works of mine establishment obtaining mining rights. Application for mineral Exploration permit, Pre-exploration right an concession.	(1 week)
9.Factors affecting workshops and plant site selection. Layout of surface buildings. Labour, energy and material supply. Water and tailing disposal.	(1 week)
10.Feasibility studies for mining. What should include F.S. Examples of typical F.S.	(1 week)
11.Production project for Mine Organization. Contents of production, project. Some project examples.	(1 week)
12.End product evaluation and related work. Sales and marketing. Sales agreements.	(1 week)
13.Supervise companies. Duties and responsibilities Mostly on mineral exports.	(1 week)
14.Mineral and Metal Prices in the domestic and international markets, Pricing. Bonus and penalties.	(1 week)
15.Laws and related regulations.	(1 week)

Class / Laboratory / Computer / Field Schedule
Mid-term studies 60 % (homework and 36 %, 9 %quiz, 15 % mid-term exam) and final examination 40 %. / Computer Usage : MS OFFICE programs like WORD and EXCEL in order to do their mid-term studies/ Field Schedule : None .

Contribution of Course to Meeting the Professional Component
80% Mining Engineering Design (MT), 20 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000	
Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table. 0 week : No relation — 5 – 8 week : Related 1 – 4 week : Partly related — 9 – 14 week : Highly related	
(a) an ability to apply knowledge of mathematics, science, and engineering	-
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	-
(c) an ability to design a system, component, or process to meet desired needs	2
(d) an ability to function on multi-disciplinary teams	1
(e) an ability to identify, formulate, and solve engineering problems	3
(f) an understanding of professional and ethical responsibility	1
(g) an ability to communicate effectively	-
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	3
(i) a recognition of the need for, and an ability to engage in life-long learning	-
(j) a knowledge of contemporary issues	2
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	3
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	-

Prepared By
Prof. Dr. Sinasi Eskikaya and Melih Turhan 04/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 331, Mine Transport and Water Drainage, 3+1 hour/week, 3,5 Credit, Required, Turkish

Course Description

Mineral transport through chutes and inclined galleries. Stationary and spiral conveyors. Chain conveyors, structure, calculation. Rope haulage. Monorail, scrapes : application and calculation. Load-Haul-Dump machines and their applications. Various type of loading machines. Rail haulage : cars, railway and locomotives. Power and capacity calculation. Haulage organization. Belt conveyors : elements, pulling forces, tension forces, power calculation. Water handling : main principles, origin of mine waters, underground water barrier and water doors. Pumps : piston, centrifugal and other type of pumps. Structure, application and calculation. Pumping systems, pump connections Air-lift pumps and their application in open pit mines.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Lecture Notes (main textbook)

Hartman, H.L., SME Mining Engineering Handbook, Volume 1 and 2 ISBN 0-087-335-100-2, Published by Society for Mining, Metallurgy and

Exploration. Inc. Littleton, Colorado, USA, 1992.

Khadzhitov, S., Butakov, S., Mining Mechanical Engineering. ISBN No. 5-03-000039-3, Mir Publishers, Moscow, 1988

Karassik, etc, Pump Handbook. Published by Madean Hunter Publishing Company, 1986.

Anon., Mechanical Conveying Transporting and Feeding. ISBN 0-87849-066-3, Published by Trans Tech Publications PO Box 266, D-3392 Claushal-Germany, 1986.

Course Objectives

Transport is one of the most important subject in mining. Either in underground or in surface mining, machines and equipments for transport both mineral and waste and also personnel greatly differ from theconventional machines and equipment. Furthermore transport cost is one of the very important fraction of total cost. Also mine water is one of the subject almost all mining engineer has to be faced while working in a mine. As to transport, cost of water drainage is also important. A mining engineer, therefore, must learn how to tackle these problems.

Topics Covered on a Weekly Basis	
1.a)Introduction, general descriptions for the subjects. Chutes, raises, stationary and spiral conveyors. b)Comparison of rail and belt conveyor transport.	(1 week)
2.a)Chain conveyors structure, types, application. b)Various resistances in rail haulage, rolling resistance. Friction between axes and wheel. Characteristics of moving resistance, its determination by test.	(1 week)
3.a)Calculation of chain tension, stress distribution in chains. b)Mechanics of train movement, resistances, inertia. Calculation of power slippage, brake force.	(1 week)
4.a)Chain elongation, pretension, Calculation of forward pushing. Calculation of motor power. Motor selection. b)Calculation of number of wagon in one train. Criteria of power, brake and slippage	(1 week)
5.a)Scrapers, structure, application, types, power and capacity calculation. b)Mechanics of mine locomotive movement. Types of locomotives, diesel and electrical locomotives	(1 week)
6.a)Transport by LHD. Structure and types of LHD. Diesel and electrical LHD's. Application. Criteria of economical application. b)Electrical and battery locomotives, structures, application, criteria of safety.	(1 week)
7.a)Basic principles of rope haulage. Endless rope haulage. Rope haulage in inclines. Main and tail rope haulage. Balanced rope haulage. b)Types and structures of mine wagons.	(1 week)
8.a)Rope haulage, power and capacity calculations. Measures of safety during rope haulage. Monorail. b)Rail, structures, inclination. Determination of minimum turning radius.	(1 week)
9.a)General outline of the subject of mine water. Origin of mine waters. b)Organization of rail transport. Shuttle transport, star transport and combined types of rail transport.	(1 week)
10.a)Underground mine water barrier and water doors. Water reservoirs and pump chambers. b)Characteristics of belt transport. Structure of belt. Types, loading and cleaning systems.	(1 week)
11.a)Pumps. Structures. Centrifugal and axial flow pumps. Air lift pumps. Submergible pumps. Characteristics of the pumps in series and parallel operation. b)Factors affecting belt transport capacity, pulley diameter, angle of repose, angle of surcharge.	(1 week)
12.a)Calculation of piping systems. Types of piping. Selection of pumps and motors. Charts. b)Mechanics of belt conveying, resistances, tensions, calculation of pulling force and selection of motors.	(1 week)
13.a)Hydraulic transport, examples of applications in other countries. Comparison with other transport systems. Calculations pressure drop, power required and capacities. b)Tension affecting belt movement, Eitelwein rule, Various systems of belt tension.	(1 week)
14.a)Review of main items regarding mine transport and mine water drainage. b)Calculation of belt strength, carcass of various type of belts, characteristics of steel cord belts.	(1 week)

Class / Laboratory / Computer / Field Schedule	
Mid-term studies 60 % (homework and 36 %, 9 %quiz, 15 % mid-term exam) and final examination 40 % / Computer Usage : MS OFFICE programs like WORD and EXCEL in order to do their mid-term studies/ Field Schedule : None .	
Contribution of Course to Meeting the Professional Component	
80% Mining Engineering Design (MT), 20 % Basic Engineering (TM)	
Relationship of Course Program to ABET Criterion 3 of 2000	
Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table. 0 week : No relation — 5 – 8 week : Related 1 – 4 week : Partly related — 9 – 14 week : Highly related	
(a) an ability to apply knowledge of mathematics, science, and engineering	14
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	-
(c) an ability to design a system, component, or process to meet desired needs	-
(d) an ability to function on multi-disciplinary teams	14
(e) an ability to identify, formulate, and solve engineering problems	14
(f) an understanding of professional and ethical responsibility	-
(g) an ability to communicate effectively	14
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	14
(i) a recognition of the need for, and an ability to engage in life-long learning	-
(j) a knowledge of contemporary issues	-
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	14
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	-
Prepared By	
Prof. Dr. Sinasi Eskikaya and Assoc. Prof. Dr. Ismail Ugur 04/06/2002	

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 421, Mine Ventilation and Safety, 3+1 hour/week, 3,5 Credit, Required , Turkish

Course Description

Characteristics of mine atmosphere. Ventilation surveys. Gases and dust in mine atmosphere. Coal dust and explosions, sources of dust and prevention. Mine fires, classification and prevention. Mine climate. Airway resistance, friction factors, equivalent orifice and mine characteristics. Natural ventilation, mechanical ventilation. Fans and characteristics. Auxiliary ventilation. Determination of air quantity. Planning air flow. Solution of ventilation network problems.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Ayvazoglu E., "Mine Ventilation and Safety", ITU Publication, 1986, (in Turkish), (main textbook)

Mc Pherson,M.J. "Sub. Surface Ventilation and Environmental Engineering" Chapman and Hall, First Edition, 1993.

Hartman, H.L. "Mine Ventilation and Air Conditioning" John Wiley & Sons, 1982.

Sengupta,M. "Mine Environmental Engineering" Vol. I,II,CRC Press,Inc. Boca Raton, Florida,

Bickel, O.J. at.all. "Tunnel Engineeering Handbook" Chapman&Hall,

Saltoglu,S. "Ventilation and Safety in Mines" ITU Publication, 1983, (in Turkish)

Güyagüler, T." Mine Ventilation" Chamber of Mining Engineering Press, 1991, (in Turkish)

Course Objectives

Air quality and quantity in underground mining and tunneling effect the health of workers. Therefore, physical properties of mine air (density, temperature, humidity, pressure) are investigated. In addition to these, determination of air quantity, the planning airflow and the solution of ventilation networks are required. Also the limit events that gas and dust explosion, gas and coal outburst and mine fires are investigated.

Topics Covered on a Weekly Basis	
1.The importance of ventilation, physical properties of mine air.	(1 week)
2.To determine the physical properties of air, applied methods.	(1 week)
3. Measurement of air velocity and cross section area, calculation of air quantity.	(1 week)
4. Classification of mine air and properties of gases in mine air, methods of gas measurement	(1 week)
5. Occurrence of methane gas, properties, emanation. Struggle methods with methane gas.	(1 week)
6. Dust in mine air, classification, properties, struggle methods with dust.	(1 week)
7. Mine fires, classification, struggle methods.	(1 week)
8. Ventilation resistance, equivalent orifice and mine characteristics	(1 week)
9. Mid-term exam	(1 week)
10. Naturel and mechanical ventilation, classification of fans, properties, fan laws.	(1 week)
11. Main and auxiliary fans, selecting of fan and establishment.	(1 week)
12. Determination of required air quantity, ventilation safety coefficient.	(1 week)
13. Arranging air flow in mines, applied methods in air quantity calculation.	(1 week)
14. Calculation of ventilation network. Calculation methods, solution of network problems to checking air quantities.	(1 week)

Class / Laboratory / Computer / Field Schedule
Mid-term studies 40 % (10 % homework and 30 % mid-term exam) and final examination 60 %. / Computer Usage : MS OFFICE programs like WORD and EXCEL in order to do their mid-term studies / Field Schedule : None .

Contribution of Course to Meeting the Professional Component
75% Mining Engineering Design (MT), 25 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000	
Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table. 0 week : No relation — 5 – 8 week : Related 1 – 4 week : Partly related — 9 – 14 week : Highly related	
(a) an ability to apply knowledge of mathematics, science, and engineering	3
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	3
(c) an ability to design a system, component, or process to meet desired needs	4
(d) an ability to function on multi-disciplinary teams	1
(e) an ability to identify, formulate, and solve engineering problems	9
(f) an understanding of professional and ethical responsibility	1
(g) an ability to communicate effectively	-
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	6
(i) a recognition of the need for, and an ability to engage in life-long learning	2
(j) a knowledge of contemporary issues	5
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	1
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	2

Prepared By
Prof. Dr.Erdil Ayvazoglu, Prof.Dr. Gündüz Ökten 05/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 321 , Mineral Deposits, 3+0 hour/week, 3 Credit, Required , Turkish

Course Description

Definition of ore, ore deposit, grade, reserve. Classification of ore deposits. Plate tectonics and ore deposits. Ortomagmatic deposits. Pegmatitic deposits. Pneumatolitic deposits. Pyrometasomatic deposits. Hydrothermal deposits. Carbonatitic deposits. Volcanogenic deposits. Metamorphism related deposits. Lateritic deposits. Oxidation and cementation zones deposits. Placer deposits. Sedimentary deposits. Various examples from Turkey and the world. Resolution of typical problems concerning position, grade and reserve of ore deposits

Prerequisite(s)

None

Textbook(s) or Other Required Material

Lecture Notes, (main textbook)
Gümüs, A, 1987, Metallic Mineral Deposits, Çaglayan Press, (in Turkish)
Park C.F., Barnes J.W., 1996, Ore and Minerals, John Wiley and Sons

Course Objectives

The main aim of this course is to equip students with knowledge and methods for exploration, evaluation and exploitation in an mining organization. The objectives of the class are as follows:

- A good knowledge of geology of ore deposits
- A good knowledge of characteristic examples of deposits from Turkey and the world
- An appreciation and good understanding of various problems concerning ore deposits in mining organisation, including exploration, evaluation and exploitation as well as computer applications.
- An ability to analyse system requirements before choosing appropriate research and operational methods and tools
- The development of skills that will be of use to graduates in their future engineering role is seen as vital.

Topics Covered on a Weekly Basis

1.Definition of ore, ore deposit, grade, reserve. Classification of ore deposits.	(1 week)
2.Plate tectonics and ore deposits.	(1 week)
3.Ortomagmatic deposits.	(1 week)
4.Pegmatitic deposits. Pneumatolitic deposits.	(1 week)
5.Pyrometasomatic deposits.	(1 week)
6.Hydrothermal deposits.	(1 week)
7.Porphyritic deposits, Carbonatitic deposits.	(1 week)
8.Volcanogenic deposits.	(1 week)
9.Massive sulfade deposits	(1 week)
10.Metamorphism related deposits.	(1 week)
11.Lateritic deposits.	(1 week)
12.Oxidation and cementation zones deposits.	(1 week)
13.Placer deposits	(1 week)
14. Sedimantary deposits	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 50 % (10 % Lab and homework, 40 % mid-term exam) and final examination 50 %. / Computer Usage : MS OFFICE programs like WORD and EXCEL in order to do their mid-term studies/ Field Schedule : None .

Contribution of Course to Meeting the Professional Component

100% Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	14
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	3
(c) an ability to design a system, component, or process to meet desired needs	3
(d) an ability to function on multi-disciplinary teams	4
(e) an ability to identify, formulate, and solve engineering problems	14
(f) an understanding of professional and ethical responsibility	14
(g) an ability to communicate effectively	4
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	14
(i) a recognition of the need for, and an ability to engage in life-long learning	2
(j) a knowledge of contemporary issues	14
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	14
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	14

Prepared By

Prof. Dr. Atasever Gedikoglu 04/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 341, Mineral Processing I, 1+3 hour/week, 2,5 Credit, Required , Turkish

Course Description

Introduction to ore dressing, definition and purposes of size reduction, size reduction ratio, specific energy calculation for size reduction, crushing, classification of crushers, jaw crushers (single and double tag type)roll crushers, impact crushers, design of crushing flowsheets (open and closed crushing circuits) and calculations, grinding, wet-dry, open-closed mill circuits, classification of mills, road, ball, pebble mills, autogenous, semi-autogenous mills, design of mill circuits, calculation of mill parameters (rotating and critical speed, grinding media, circulating load), new developments on size reduction and particle separation, new aged crushers, grinders and size separation units, example of industrial applications, screening laboratory type screening, sieve-band analysis and calculations, Gaudin-Schumann function and its uses, industrial screening, screen types, properties and calculations, classifications, definitions, flow types and separation characteristics of particles in water system, mechanical classifiers, hydrocyclones, design and opreation parameters.

Prerequisite(s)

None

Textbook(s) or Other Required Material

T.C.Bayraktar; Ore Dressing Methods before beneficiation, ITÜ Gümüssuyu Press, 1979 (In Turkish)
Y.Kaytaz; Mineral Processing, ITU Publication, 1990
Handbook of Mineral Processing, Weiss, N.L. "SME Mineral Processing Handbook", Chapter: 2-1/2-17; 3-1; 3A-1/3A-55; 3B-1/3B-86; 3C-1/3C-137; 3D-1/3D-59; 3E-1/3E-41, AIME, New York;1985
F.W.McQuiston, Jr., R.S.Shoemaker, "Primary Crushing Plant";Society of Mining Engineers, AIME, New York 1978.
Selection Guide for Process Equipment, Swedala, Denver Sala Basic, Second Edition, 1994.
Handbook Mechanical Processing Technology; Alpine Aktiengesellschaft,1990
N.Yildiz; "Grinding Theory, Applications, Mills and Classifiers", Kozan Ofset Matbaacilik, ISBN 975-96779-0-3, Ankara (1999)
Prasher, C.L., "Crushing and Grinding Process Hanbook", J.Wiley, New York, 1987
Manufacturer Catalogs and web sites related to crushing, screening, milling and classifier equipments

Course Objectives

Ore dressing-I with size reducton and sizing of the ores is the first process steps for mineral processing and to be known as energy-intensive processes which should be controlled very carefuly in order to optimise size reduction before mineral benefication. Mechanical behaviour of particles during comminution processes depend on both crushing and grinding units as well as mineralogical composition of the ores. In this lecture; basic concept of comminution, sizing and classification criterias and design of optimal flowsheet options are examined. It is, therefore, lecture is very important and should be taught the mining engineers in undergraduate levels.

Topics Covered on a Weekly Basis	
1. Introduction to ore dressing, definition and purposes of size reduction, size reductipon ratio, spesific energy calculation for size reduction	(1 week)
2. Crushing, classification of crushers, jaw crushers, roll crushers,	(1 week)
3. Roll crushers, impact crushers, design of crushing flowsheet	(1 week)
4. Grinding, wet-dry, open-closed mill circuits, classification of mills, road, ball and pebble mills	(1 week)
5. Autogenous, semi-autogenous mills, design of mill circuits, calculation of mill parameters	(1 week)
6. New developments on crushing, grinding and classifications, examples of industrial uses	(1 week)
7. Screening, definitions, sieve band analysis and calculations, Gaudin-Schumann function and its use, Industrial screening, properties, types and calculations	(1 week)
8. Classification, definitions, flow regimes and particule behaviours in fluids	(1 week)
9. Classifiers, types, properties and selection criterias, calculations, hydrocyclones, design and operation parameters	(1 week)
10. Mid-term exam	(1 week)
11. Laboratory project study-I(Crushing, screening)	(1 week)
12. Laboratory project study-II (Grinding, classification)	(1 week)
13. Laboratory project study-III (Hydrocyclone separation and report preparation)	(1 week)
14. Mid-term group seminar presentations and discussion	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 40 %; (20 % class attendance, 20 % Lab attendance and project, 20% mid-term seminar and 60% mid-term exam) and final examination 60 % Computer Usage: MS OFFICE programs like WORD and EXCEL in order to do their mid-term studies, seminar and laboratory works

Contribution of Course to Meeting the Professional Component

80% Mineral Processing Engineering Design (MT), 20 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	7
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	3
(c) an ability to design a system, component, or process to meet desired needs	3
(d) an ability to function on multi-disciplinary teams	3
(e) an ability to identify, formulate, and solve engineering problems	4
(f) an understanding of professional and ethical responsibility	5
(g) an ability to communicate effectively	7
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	13
(i) a recognition of the need for, and an ability to engage in life-long learning	3
(j) a knowledge of contemporary issues	13
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	8
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	3

Prepared By

Assoc.Prof. Dr. A.Ekrem Yüce; Prof.Dr.Yalçin Kaytaz 07/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 332, Mineral Processing II, 2+2 hour/week, 3 Credit, Required, Turkish

Course Description

Description and importance of mineral processing, Purpose of mineral processing, methods, Selection of concentration methods, Basic properties flow sheets of concentration operations, Evaluation of concentration results, Particle liberation, Concentration by size classification , concentration by hand sorting, Gravity separation, Magnetic separation, Electrostatic separation, Concentration by flotation, Chemical Processing. Application fields of mineral processing, Mineral Properties used in mineral processing, Concentration.

Laboratory practices of particle liberation, jigging, shaking table, Wet and Dry magnetic separation, electrostatic separation, Flotation and spiral concentration tests, Exercises for solution of Mineral Processing Problems and one-two days technical trips are the practical abilities included into the programme of Mineral Processing II lecture.

Prerequisite(s)

Mineral Processing I

Textbook(s) or Other Required Material

Prof.Dr. Güven ÖNAL, "Mineral Processing Methods Except Flotation", I.T.U. Faculty of Mines Publication, 1985, Istanbul (in Turkish), (main textbook)
Prof.Dr. Neset ACARKAN, "Mineral Processing Problems", Y.M.G.V. Publication, 2000, Istanbul (in Turkish), (main textbook)
Gaudin A.M., "Principles of Minerals Dressing", Mc Graw Hill Book Com. Inc., New York, 1939.
Taggart A.F., "Handbook of Mineral Dressing", John Wiley and Sons. Inc., 7.Edt., New York, 1960.
Pryor E.J., "Mineral Processing", 3. Edt., Elsevier Pub.Com Ltd., Amsterdam, 1965.
Habashi F., "Principles of Extractive Metallurgy", Vol.2, Gordon and Breach Science Publishers Inc.,New York., 1970.
Merrit R.C., "The Extractive Metallurgy of Uranium", U.S. Atomic Energy Com, 1971.
Bor F.Y., "Principles of Extractive Metallurgy", Part I, I.T.U Library, No:1079, 1977, (in Turkish)
Schubert H., "Aufbereitung Fester Mineralischer Rohstoffe", Band 1, Band 2, Band 3, VEB Deutscher Verlag Für Grundstoffindustrie, Leipzing, 1988.
Wills B.A., "Mineral Processing Technology", 4. Edt., Pergamon Press, Oxford, 1988.
Yannopoulos J.C., "The Extractive Metalurgy of Gold", Van Nostrand Reinhold, New York, 1991.
Güven Ö., Atesok G., "Mineral Processing Handbook", Y.M.G.V. Publication, Istanbul, 1994,(in Turkish)
"6. International Mineral Processing Symposium", A.A.Balkema, Rotterdam, Holland, 1996.
"20. International Mineral Processing Congress ", GMDB Gesellcshaft für Bergbau, Metallurgie, Rohstoff-und Umweltechnik Clausthal-Zellerfeld, Germany, 1997.
"7. International Mineral Processing Symposium ", A.A.Balkema, Rotterdam, Holland, 1998.
"Innovation In Physical Separation Technologies", Richards Mozley Symposium Volume, IMM, London, 1998.
"8. International Mineral Processing Symposium ", A.A.Balkema, Istanbul, Türkiye, 1998.

Course Objectives

Mineral Processing is very important processing of the raw minerals to obtain marketable products, therefore the objective of this course is to teach concentration methods in mineral processing, concentration teories and principles, and industrial applications of mineral processing.

Topics Covered on a Weekly Basis	
1. Description and importance of mineral processing, Purpose of mineral processing, Application fields of mineral processing	(1 week)
2. Mineral Properties used in mineral processing, Concentration methods, Selection of concentration methods	(1 week)
3. Basic properties flow sheets of concentration operations, Evaluation of concentration results	(1 week)
4. Particle liberation	(1 week)
5. Concentration by size classification	(1 week)
6. Concentration by hand sorting	(1 week)
7. Mobility of particules in the fluidized media and importance in gravity concentration, Concentration by heavy media separators	(1 week)
8. Concentration by heavy media separators, Mid-term Exam	(1 week)
9. Concentration by Jigging	(1 week)
10. Concentration by flowing film	(1 week)
11. Magnetic separation	(1 week)
12. Electrostatic separation	(1 week)
13. Concentration by flotation	(1 week)
14.Chemical Processing.	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 50 % (35 % exams, % 15 laboratory studies + homeworks + Technical trip) and final examination 50 %.

Contribution of Course to Meeting the Professional Component

85% Mining Engineering Design (MT), 15 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 1 – 8 week : Related

0 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	13
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	13
(c) an ability to design a system, component, or process to meet desired needs	12
(d) an ability to function on multi-disciplinary teams	8
(e) an ability to identify, formulate, and solve engineering problems	12
(f) an understanding of professional and ethical responsibility	1
(g) an ability to communicate effectively	-
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	14
(i) a recognition of the need for, and an ability to engage in life-long learning	8
(j) a knowledge of contemporary issues	13
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	13
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	13

Prepared By

Prof. Dr. Güven Önal & Prof. Dr. Neset Acarkan 07/06/2002

C - Department Curriculum Vitae

1. Name and Academic Rank Bektas UZ ***(Prof. Dr.)***

Date of Birth 25.07.1942

2. Degrees with fields, institution and date

Degrees	fields	institution	date
Bsc	Geology	ITU Mining Faculty	1966
Msc	Geology	Nancy Univ. France	1969
PhD	Geology	Nancy Univ. France	1973
Diploma	Petrology	Nancy Univ.France	1973
Ass. Prof. Diploma:		ITU.	1977

(Docteur essciences Naturelles or Doctorat d' ETAT)

3. Number of years service on this Department

1973-1978 Research Assistant
1978-1988 Assist. Prof.
1988- Prof. Dr.

4. Other related experience - teaching, industrial etc.

I was a geology engineer as a worker (civil service) in Institution of EIEI since 1966 to 1967 in Turkey.

5. Consulting , patents etc.

- **Doctorate adviser**
- **Master adviser**
- **Licence thesis adviser**

6. State (s) in which registered. Istanul/Turkey

7. Principal publications in the last five years.

- **ESENLI F., UZ B., EREN R H., ÇOBAN F., MANAV H., YAVUZ O., KUMBASAR I., (1997),** Alteration Products of Pyroclastic rocks in Thrace, Turkey, Mineral Deposits, Papunean (ed)11-13 August 1997, Balkema, Rotterdam

- **MANAV H., UZ B., SUNER F., (1997).,** Genesis of Magnesit Deposits in Harmancik Region (West. Anatolia), Mineral Deposits, A.BALKAMA, PP.471-474.

- **ESENLI F., UZ B., KUMBASAR I., (1997),** Morderite Type Zeolite Occurence In The Upper Creteceous Volcanics of Sile Region Istanbul-Turkey-Geological Bulletin of Turkey. V. 40 N: 43-49.

- **ESENLI F., UZ B., EREN R.H. ÇOBAN F., MANAV H., YAVUZ O and KUMBASAR I., (1997),** Alteration Pruducts of pyroclastic rocks in Thrace, Turkey, SGA Meeting Mineral Deposits PP. 713-716, Turku/FINLAND,

- **UZ B., ECE Ö. I and ÇOBAN F., (1997),** Clay Mineralogy of Underclay Horizan In Güney Formation, Sile Region, TURIYE, The 11th International Clay Conference, Carleton University Ottawa, Ontario, CANADA.

- **ESENLI F., UZ B., KUMBASAR I., (1997),** Sile Bölgesi (Istanbul) Üst Kretase Volkaniklerinde Mordenit türü zeolit olusumu TJK Bülteni. C 40 Sayi 1, 49-56. (Subat 1997).

- **UZ B., (1997),** Ege Bordo Marble, A typical Example (Milas-Mugla), Geological, Petrographical, Chemical, Technological Studies on Evoluation. Mermer Dogaltas Sektörünün Dergisi, yil 2, sayi 10.

- **UZ B., ÇOBAN F., EREN R., EREN R. H., (1997),** Yatagan (Mugla) Bölgesi Mermerleri, Mermer, Dogaltas Sektörünün Dergisi Yil 2, Sayi 11, Mart 1997, 159-160.

- **UZ B., ÇOBAN F., EREN R. H., (1998),** Marbles of Turkey, Mermer-Natural Stone Magazine.

- **UZ B., ÖZDAMAR S., (1998),** Yatagan (Mugla) Mermerleri, Jeolojik-Petrografik-Kimyasal Etüd ve Degerlendirilmesi, Mermer Dergisi, Sayi 60, Sayfa 42-52.

- **UZ B., ESENLI F., ÖZDAMAR S., (1998),** Sile Bölgesi "Domali-Dogancili-Avcikoru" Arasi Kömüralti killerinin mineralojik-fiziksel parametreleri ve kullanim alanlari. Çini 98, 2. Uluslar arasi Kütahya Çini Sempozyumu.

- **SUNER, F., UZ B., ESENLI., EREN R. H., (1999),** A REE Approach to the genesis of magnesite deposits in Orhaneli Region, NW Turkey. Mineral Deposits: Process to processing Volume 2, Balkema, Rotterdam.

- **ÖZPEKER, I., EREN R.H., YILMAZ Y., UZ B., AYKOL A., ÇOBAN,MANAV H., (1999),** Platinum group metal contents of the peridodites of the Mugla-Fethiye-Köycegiz area, southwestern-Turkey, Mineral Deposits Processes to processing, Balkema Proceeding of 5th Biennial SGA meeting.

- **UZ B., (1999),** Kaya tuzu, Türkiye Endüstriyel Mineraller Envanteri, Istanbul Maden Ihracatcilari Birligi, S 90-92.

- **DOGAN Z., UZ B., FIRAT C., (1999),** Fosfat, Türkiye Endüstriyel Mineraller Envanteri, Istanbul Maden Ihracatcilari Birligi, 57-60

- **UZ B., (1999),** Potas (Alunit), Türkiye Endüstriyel Mineraller Envanteri, Istanbul Maden Ihracatcilari Birligi, S 173-176

- **UZ B., ESENLI F., ÖZDAMAR S., (1999),** Sile Bölgesi "Domali-Dogancili-Avcikoru" Arasi Kömüralti killerinin mineralojik-fiziksel parametreleri ve kullanim alanlari. 9. Ulusal Kil Sempozyumu 15-18 Eylül 1999. Istanbul.

- **UZAL M., UZ B., (1999),** Kirmatas Olusturma Öncesi Petrografik Analizin Önemi "Pirinççiköy Civarinin (Eyüp-Istanbul) Jeolojik-Petreografik ve Kirmatas Yönünden Degerlendirilmesi, 2. Ulusal Kirmatas Sempozyumu,

- **UZ B., (1999),** Bazaltlarin Kirmatas Yönünden Degerlendirilmesi "Trakya-Tekirdag Yöresi Bazaltlari Örnegi, 2. Ulusal Kirmatas Sempozyumu/Istanbul.

- **KAYNARKAN S., UZ B., DURAL C., (1999),** Cendere (Kemerburgaz-Ayazaga-Istanbul) Kirmatas –Beton ve Asfalt Üretim Havzasinin Etüd ve Degerlendirirlmasi, 2. Ulusal Kirmatas Sempozyumu, S 55-67.

- **UZ B., BACAK G., (2001),** Mineralogical Physico-chemical and Geological Characteristics of The Kargali Bentonite Deposits (Kocaeli-Turkey), 4th. Int. Symp. On Eastern Mediterranean Geology , Isparta/TURKEY.

- **UZ B., ESENLI F., ÖZDAMAR S., (2001),** Fatsa (Ordu) Güneyindeki Çaltumar ve Hoylu Bentonit Olusumlarinin Kristobalit yapisindaki düzenlilik açisindan karsilastirilmasi, 10. Ulusal Kil Sempozyumu, S 221-227 Konya

- **UZ B., ESENLI F., YAVUZ O., MANAV H., BACAK G., (2001),** Sert mermer grubuna ait bir örnek; Karacadag (Diyarbakir) Bazaltlarinin "Mermer" Açisindan Incelenmesi, Afyon Kocatepe Üniversitesi Sempozyumu.,Mayis 2001.

- **Esenli F., Uz B., Esenli V., Ece I., Kumbasar I., (2002)**, The Zeolitization of Tuffaceous rocks in Kesan Region, Thrace, Turkey.

Section in some books or magasine

- **M. Zeki DOGAN, Bektas UZ, Cihat FIRAT; (1999)**, Fosfat Kayaçlari-Apatit, Türkiye Endüstriyel Mineraller Envanteri, Istanbul Maden Ihracatçiler Birligi (IMMIB-YMGV) Sayfa 57-60.

- **Bektas UZ (1999);** Kayatuzu, Türkiye Endüstriyel Mineraller Envanteri, Istanbul Maden Ihracatçileri Birligi (IMMIB-YMGV), Sayfa 90-92.

- **Bektas UZ (1999);** Potas (Alunit), Endüstriyel Mineraller Envanteri, Istanbul Maden Ihracat. Birligi (IMMIB-YMGV) Sayfa 173-176.

Selected BOOKS Of Prof. Dr. Bektas Uz, in last 5 years

- Uz, B., Mineraller, Kurtis Matbaasi (2000), Istanbul.

- Uz. B., Maden ve Jeoloji Mühendisliginde Petrografi Prensipleri, (2000), Kurtis matbaasi, Istanbul

8. Professional societies of which a member

- Chamber of Geological Engineers
- Membership of decleration committee of "Natural Stone" magasine (Dogal Tas sektörünün dergisi, Yenisehir-Ankara.
- Membership of decleration committee of "Geosound" Geology and marble magasine.
- Membership of the management of Turkish seramics assamble

9. Honors and awards

- 30 th years prize for the contribution to Geology Chamber of TMMOB-JMO/Turkey.

10. Institutional and professional service in the last five years

- The head of the Dept. of Mineralogy and Petrography in ITU Geology .

11. Professional development activities in the last five years

- Contribution of the education of Geology eng. In Faculty of Mines.
- Contribution to international and national symposium, congress and meetings.
- Adviser of Doctorate students and some Doctorate project investigations (about ophiolites geology, clay mineralogy and industrial raw maretials and zeolites...)

Appendix I

B. Course Syllabi

1. **Course No. and Name : MINERALOJI / MAD 211**

   MADEN MÜH. BÖL.

2. **Course Description:** Özet içerik

Fiziksel Mineraloji, dilinim, kiriklik, sertlik, minerallerin yogunlugu, renk, fluoresans, piezzoelektriksite, piroelektriksite, minerallerin manyetik karakteri, Kimyasal Mineraloji, Koordinasyon prensipleri, kati eriyik, izomorfizma, polimorfizma, psöidomorfizma, Tanimsal Mineraloji: Minerallerin siniflamasi, silikat yapilari, minerallerin tanitici özellikleri

2. **Prerequisite (s) :** (Ön sart) : Devam + Ödev, teslim etme + SINAVLAR

3. **Textbook(s) and/ or other required materials :**

(Ders Notu ve gerekli diger materyaller)

- Uz, B., Mineraller, Kurtis Matbaasi (2000)
- Uz, B., Mineral ve Kayaç tayininde Optik Mineraloji Kurtis Matbaasi (1987).
- Kumbasar, I, Aykol, A., Mineraloji, ITÜ, (1993)
- Kumbasar, I., Kristallografi ders notlari
- Kumbasar, I Silikat Mineralleri, ITÜ, (1977)
- SAGIROGLU, G., Kristallografi , ITÜ,
- Inan K., Tanyolu E., Mineraloji, (Cornelius S & Hurlbut Jr. Çeviri), 1982, Doyuran Matbaasi., Istanbul.
- Üsenmez, S., Mineraloji ve Mineraller Teknolojisi, Gazi Üniv. Müh.- Mim. Yayini, Ankara
- Klein, C., Hurlbut, S .,Manual of Mineralogy, Hohn Wiley and Sons, (1985)
- William, D. N., Introduction to mineralogyOxford Univ. Press., (2000).

4. **Course objectives : (Amaçlar)**

Mineral ve kristal tanimlamasi, Kristallografi ve Mineralojide kullanilan terimlerin açiklanmasi ve kavranmasi, Mineralo-kimyasal kurallarin, ve tanimlarin kavranmasi, Minerallerin siniflandirilmasi ve Minerallerin tanitici özelliklerinin ögretilmesi.

5. **Topics covered on a weekly basis : (Hafta bazinda ders programi)**

KONU
DERS IÇERIGININ TANITIMI
Mineralojiye giris, dersin tanimi, özellikleri, islenis ve uygulama
Kristal ve özellikleri
Kristallerde simetri
Kristal sekilleri
Kristal izdüsümleri
Kristallerde dis ve iç görünümler
Yil içi sinavi
Deskriptif Mineralojiye giris
Minerallerin genel özellikleri
Minerallerin kimyasal özellikleri
Minerallerin Fiziksel özellikleri 1
Minerallerin Fiziksel Özellikleri 2
Minerallerin optik özellikleri, minerallerin iç yapi ve siniflandirmasi

6. Class / Laboratory / Computer/ Field Schedule : (Haftalik bazda Ders, Lab., Bilgisayar ve arazi takvimi

KONU LABORATUVAR	HAFTA
Çesitli kristal örnekleri	1
Kristal siniflari ve tahta sekiller	2
Kristallografik eksenler	3
Kristal sekilleri	4
Kristal iz düsümleri (Kübik, Hekzagonal, Tetragonal)	5
Kristal izdüsümleri (Romboerdik, Monoklinik, Ortorombik, Triklinik)	6
Ikiz kristaller ve x isinlari çekimi	7
Mineral tanim yöntemleri	8
Minerallerin fiziksel özelliklerinin tanimive tayini	9
Mikroskop tanimi ve mineral tanimi	10
Mineraller (Nabit, sülfür, sülfotuzlari)	11
Mineraller (Oksitler, hidroksitler)	12
Mineraller (Karbonat, borat, fosfat, wolframat)	13
Silikatlar	14

KONU DERS	HAFTA
Mineralojiye giris, dersin tanimi, özellikleri, islenis ve uygulama	1
Kristal ve özellikleri	2
Kristallerde simetri	3

Kristal sekilleri	4
Kristal izdüsümleri	5
Kristallerde dis ve iç görünümler	6
Yil içi sinavi	7
Deskriptif Mineralojiye giris	8
Minerallerin genel özellikleri	9
Minerallerin kimyasal özellikleri	10
Minerallerin Fiziksel özellikleri 1	11
Minerallerin Fiziksel Özellikleri 2	12
Minerallerin optik özellikleri,	13
Minerallerin iç yapi siniflandirmasi	14

7. **Contribution of course to meeting the professional component :** (Dersin yeraldigi grup) ((MT, TM, TB)

MT

8. **Relationship of course to program objectives : (Ders amaçlarinin program amaçlari ile iliskisi, uyumu)**

2, 4, 5, 11

9. **Prepared by : (Hazirlayan)**

Prof. Dr: Bektas UZ

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 211 , Mineralogy, 2+1 hour/week, 2,5 Credit, Required , Turkish

Course Description

Physical mineralogy, cleavage, fracture, fenacity, hardness, density of minerals, color, fluoresance and phosporesance, piezoelectricity, magnetic characteristics of minerals, chemical mineralogy, coordination principles, solid solution, isomorphism, polymorphism, pseudomorphism. Descriptive mineralogy, classification of minerals, structure of silicates and study of diagnostic properties of some important minerals.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Uz. B., Minerals, Crystallography – Mineralogy, Kurtis Press, 2000, (in Turkish),

(main textbook)

Çogulu E., Mineralogy Course Notes, ITU, Faculty of Mines, (1999), (in Turkish)

Kumbasar-Aykol A., Mineralogy, ITU Publication, (1993), (in Turkish)

Klein, C., Hulburt, S. C, Manual of Mineralogy (After J. D. Dana): New York, John Wiley and Sons, (1992)

Ness, W. D., Introduction to Mineralogy, Oxford University Press, (2000).

Course Objectives

Description and classification of crystals, minerals and various methods (Field and laboratory) for classifications. How can we find them (how and which conditions of their formation), how can we get them from the rock with gang and where can we use them? We learn to answer these 3 questions in the complementary of the course.

Topics Covered on a Weekly Basis	
1.Introduction to mineralogy, Description of the course	(1 week)
2.Crystals and their properties	(1 week)
3.Symmetry within crystals (axis, plain and centre of symmetry) and their formulas	(1 week)
4.Shapes of the crystals	(1 week)
5.Projections of crystals	(1 week)
6.Inside and outside image of the crystals	(1 week)
7.Mid-term exam.	(1 week)
8.Introduction to descriptive mineralogy	(1 week)
9.General properties of the minerals	(1 week)
10.Chemical characteristics of minerals	(1 week)
11.Physical characteristics of minerals	(2 week)
12.Optical characteristics of minerals	(1 week)
13.Inner structure of minerals and their classifications	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 60 % (mid-term exam + 5 quiz) and final examination 40% / Computer Usage : MS OFFICE programs like WORD and EXCEL in order to do their mid-term studies/ Field Schedule : None .

Contribution of Course to Meeting the Professional Component

100 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation
1 – 4 week : Partly related
5 – 8 week : Related
9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	1
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	9
(c) an ability to design a system, component, or process to meet desired needs	5
(d) an ability to function on multi-disciplinary teams	7
(e) an ability to identify, formulate, and solve engineering problems	2
(f) an understanding of professional and ethical responsibility	4
(g) an ability to communicate effectively	11
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	12
(i) a recognition of the need for, and an ability to engage in life-long learning	-
(j) a knowledge of contemporary issues	-
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	-
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	-

Prepared By

Prof. Dr. Bektas Uz & Ass. Prof. Dr. S. Altinkaynak 04/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 324, Mining And Environment , 3+0 hour/week, 3 Credit, Elective , Turkish

Course Description

Ecology, mine planning and related terms, open pit – underground activities and their relations with environment, environmental issues on working areas (noise, dust, vibration etc.) and the effects on human health, population growth and needs of source, protection of environment, long term environmental planning, ore dressing and concentration plants tailing definitions classifications, solid, liquid waste, discharge limits, investigation of national and international standards, tailing disposal, tailing dams construction and management, dam accidents, and environmental effects, kinds of energy and environment, hydraulic geothermal, solar energy, oil, natural gas, wind and biomass as energy sources, national sources for planning of nuclear energy and environment, subjects and policies of clean coal technology, combustion of coal, fluidized bed, gasification of coal, briquetting of coal, Environmental legislation, Environmental Risk Assessment Report.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Lecture Notes, (main textbook)
Scheiner, Chatwin, Kawatra, "New Remediation Technology in the Changing Environmental Arena" Intertec Publishing Mining Information, Overland Park, USA, 1995.
Sengupta M., "Environmental Impacts of Mining Monitoring Restoration and Control", Intertec Publishing Mining Information, Overland Park, USA, 1993.
Ersoy A., "Mining and Environment" (in Turkish), University of Çukurova , Engineering and Architecture Faculty", Adana, 2000.
Stephen E. Kesler, Mineral Resources, Economics and the Environment, 1994
Kural O., Coal Resources, Utilization, Pollution, Özgün Ofset, Istanbul, 1994
Chapman W.R., Jones D.C. The Removal of Sulfur from Coal, U.S. Bureau of Mines IC 8163, 1955
Cooper B.R., Ellingson, W.A., The Sciences and Technology of Coal Utilization, Plenim Press, 1983
Wen, C.Y., Lee, E.S. Coal Conversion Technology, Adision Wesley Publishing Company, 1979

Course Objectives

The importance of environment in mining activities is increasing day by day therefore it is necessary to teach mining engineering students mining activities and their relations with environment. Mining and environment is also one of the main course in abroad. Mining activities should take into account the environmental aspects both in design and production steps in order to prevent environmental problems. Therefore, mining and environment should be considered together.

Topics Covered on a Weekly Basis	
1. Mine planning and environment terms, effects of mining activities in mining activities.	(2 weeks)
2. Reclamation activities after mininng operations	(1 week)
3. Effects of power plants in environment (noise, dust, gas, vibration)	(1 week)
4. Ore dressing operations and their effects in environment	(1 week)
5. Mid-term exam	(1 week)
5. Limits of solid and liquid wastes, their standarts both in Turkey and the world	(1 week)
6. Gold Mining and ore dressing wastes and waste dumps	(1 week)
7. Waste manangement, case studies in Turkey and in the world.	(1 week)
8. Definition of environment environment legislation. Envronmental Risk Assesment Report.	(1 week)
9. Air pollution and its effects in ecosystem	(1 week)
10. Acid rains and global warming	(1 week)
11. Clean coal Technologies.	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 50 % (10% homeworks, 40% mid-term exam) and final examination 50%.

Contribution of Course to Meeting the Professional Component

80% Mining Engineering Design (MT), 20 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	7
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	2
(c) an ability to design a system, component, or process to meet desired needs	5
(d) an ability to function on multi-disciplinary teams	1
(e) an ability to identify, formulate, and solve engineering problems	9
(f) an understanding of professional and ethical responsibility	11
(g) an ability to communicate effectively	2
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	8
(i) a recognition of the need for, and an ability to engage in life-long learning	4
(j) a knowledge of contemporary issues	10
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	7
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	11

Prepared By

Prof. Dr. Orhan KURAL, Assoc. Prof. Dr. Hasan ERGIN, Assoc. Prof. Dr. Ekrem YÜCE

11.06.2002

Appendix I

B. Course Syllabi

1. **Course No. and Name : (MAD 212) Petrografi**

2. **Course Description:)** Özet içerik

Yerkabugunun yapisi, magma, magmanin olusumu, kristallenme evreleri, magmatik kayalarin siniflandirilmasi. Farkli türdeki magma kayalarinin petrografik özellikleri. Metamorfizma çesitleri ve olusumlari.

3-Prerequisite (s) : (Ön sart) : yok

4-Textbook(s) and/ or other required materials :

(Ders Notu ve gerekli diger materyaller)

Uz, B., Maden-Jeoloji-Jeofizik Mühendisliginde petrografi prensipleri 335pp.
Bard, J.P., 1987, Microtextures of igneous and metamorphic rocks, Kluver Academic Press, 264pp.
•**Barker, A.J.,** 1990, Introduction to metamorphic textures and micro-structures, Balckie&Son LTD., 162pp.
•**Bucher, K. & Frey, M.**, 1994, Petrogenesis of metamorphic rocks, Springer-Verlag, 318pp.
•**Cas, R.A.F. & Wright, J.V.,** 1987, Volcanic successions-Modern and ancient, Unwin Hyman Press, 528pp.
•**Hatch, F.H., Wells, A.K. & Wells, M.K.,** 1972, Petrology of the igneous rocks, Thomas Murby & Co., 551pp.
•**MacKenzie, W.S., Donaldson, C.H. & Guilford,** C., 1991, Atlas of igneous rocks and their textures, 148pp.
•**Mason, R.,** 1990, Petrology of the Metamorphic rocks, Unwin Hyman, Press, 230pp.
•**Miyashiro, A.,** 1973, Metamorphism and metamorphic belts, George Allen & Unwin, London, 492pp.
•**Miyashiro, A.,** 1994, Metamorphic petrology, UCL Press, London, 404pp.
•**Nicholas, A.,** 1989, Structure of the ophiolites and dynamics of oceanic lithosphere, Kluwer Academic Press, 360pp.
•**Spry, A., 1969,** Metamorphic textures, Pergamon Press, 350pp.
•**Turner, F.J., 1968-1981,** Metamorphic petrology, 1st and 2nd edns. McGraw-Hill, New York.

•**Williams, H., Turner, F.S. & Gilbert, C.M., 1958,** Petrography.
•**Wilson, M.,** 1989, Igneous petrogenesis, Unwin Hyman Press, 465pp.
•**Yardley, B.W.D.,** 1989, An introduction to metamorphic petrology, John Wiley & Sons, Inc., 248pp.
•**Yardley, B.W.D., MacKenzie, W.S. & Guilford, C.,** 1990, Atlas of metamorphic rocks and their textures, Longmann Scientific&Technical, N.Y., John Wiley & Sons Inc., 120pp.

Yilmaz, Y., 1979, Granit magmasinin yerlesme sorunu

JOURNALS

Acta Volcanologia, Geol. Soc. London, Geol. Soc. America, Lithos, Earth and Planetary Sci. Let., Geology .Journal of Petrology, Geological Journal, Journal of Volcanology and Geothermal Research

5-Course objectives : (Amaçlar)

Yerbilimlerinin temel derslerinden birisidir. Dersin ana amaci ögrencinin magmatik ve metamorfik kayalari tanimasini saglamaktir. Petrografi yerkabugunu olusturan kayalari tanimlar. Magmanin özelliklerini, nasil olustugunu, magmatik ve metamorfik kayalarin hangi yöntemlerle nasil siniflandirildigini inceler. Yerbilimlerinin ana konusu olan yerkabugunun nasil bir evrim geçirdigini , kabugun yapisini anlayabilmek, buna bagli olarak magmatik ve metamorfik olaylarla iliskili olarak olusan maden yataklarinin anlasilmasi için petrografinin bilinmesi gereklidir.

6-Topics covered on a weekly basis : (Hafta bazinda ders programi)

TOPICS
Petrografiye giris
Kayaç yapici mineraller
Magmatik kayaçlarin siniflandirilmasi
Magmatik kayaçlarda yapi ve doku özellikleri
Magma ve magmatik olaylar
Derinlik kayaçlari
Ofiyolit Birligi
Yari derinlik kayaçlari
Volkanik kayaçlar
Metamorfik kayaçlar petrografisine giris, indeks mineraller

,Metamorfizma etkenleri, yapi-doku özellikleri
Metamorfizma siniflamalari
Bölgesel, dinamik ve kontak metamorfizma
Yiliçi ödevi ve sinavlar

7-Class / Laboratory / Computer/ Field Schedule : (Haftalik bazda Ders, Lab., Bilgisayar ve arazi takvimi

Ödevler: Her hafta derste anlatilacak konu, ögrencinin derse katilimini saglamak amaci ile ögrenci gruplarina ödev olarak verilir. Ayrica her bir ögrenciye Türkiyede yeralan magmatik ve metamorfik alanlarin petrografik özelliklerinin arastirilmasi ile ilgili dönem ödevleri verilir.

Dönem sonunda ögrenciler Sile ve civarinda arazi gezisine götürülür.

8-Contribution of course to meeting the professional component : (Dersin

yeraldigi grup) ((MT, TM, TB)

MT

9-Relationship of course to program objectives : (Ders amaçlarinin program amaçlari ile iliskisi, uyumu)

1/4//8/9/10/11

10- Prepared by : (Hazirlayan)

Y.Doç.Dr. Safak Altunkaynak

C - Department Curriculum Vitae

1. Name and Academic Rank Safak ALTUNKAYNAK**, Assist.Prof. Dr.**
Date of Birth 10 November 1967

2. Degrees with fields, institution and date

Degrees	fields	institution	date
Bsc	Geology	IU Engineering Faculty	1988
Msc	Geology	IU Inst. Sci&Tech	1990
PhD	Geology	ITU Inst. Sci&Tech	1996
Diploma	Volcanology	METU-MONASH Univ	2001

3. Number of years service on this Department

1989-2000 Research Assistant
2000- Assist. Prof.

4. Other related experience - teaching, industrial etc.

5. Consulting , patents etc.

6. State (s) in which registered.

7. Principal publications in the last five years.

Altunkaynak, S., Yilmaz, Y., The Kozak magmatic complex; western Anatolia. Journ. Volcan. Geothr. Res. 85/1-4, s: 211-231 (1998).

Altunkaynak, S., Yilmaz, Y. The Kozak Pluton and its emplacement. Geological

Journal. 34, 257-274. (1999)

Yilmaz, Y., Genç, S.C., Gürer, Ö.F., Bozcu, M., Yilmaz, K., Karacik, Z., Altunkaynak, S., A. Elmas,. When did the western Anatolian grabens begin to develop? *Geol. Soc. London.* 173, 353-384 (2000)

Altunkaynak, S., Yilmaz, Y.. The Turgutresi stratovolcano of the Bodrum, SW Anatolia. International earth sciences colloquim on the Aegean Region. (IESCA 2000), Proceedings.39-46 (2001)

Genç, S.C**.,** Altunkaynak, S., Karacik, Z., Yazman, M., Yilmaz, Y., The Çubukludag graben, south of Izmir: its tectonic significance in the Neogene geological evolution of the western Anatolia, *Geodinamica Acta.* 14, 1-12 (2001)

Yilmaz, Y., Genc, S.C., Karacik, Z., Altunkaynak, S**.** Two contrasting magmatic associations of NW Anatolia and their tectonic significance. Journal of Geodynamics. 31/3, 1-29.(2001)

Genç, C., Karacik, Z., Altunkaynak, S., Yilmaz, Y., Geology of the magmatic complex in Bodrum peninsula, SW Turkey. International earth sciences colloquim on the Aegean Region. (IESCA 2000), Proceedings.63-68 (2001)

8. Professional societies of which a member

Chamber of Geological Engineers

9. Honors and awards

10. Institutional and professional service in the last five years

11. Professional development activities in the last five years

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

JEO 331 , Petrography, 2+1 hour/week, 2,5 Credit, Required , Turkish

Course Description

Earthcrust, magma, magma formation, classification of magmatic rocks, petrographical aspects of magmatic rocks, metamorphism, petrographical aspects of metamorphic rocks.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Uz B., Principles of Petrography for Mining, Geological and Geophysical Engineers, (main textbook)

Bard, J.P., 1987, Microtextures of igneous and metamorphic rocks, Kluver Academic Press, 264pp.

Barker, A.J., 1990, Introduction to metamorphic textures and micro-structures, Balckie&Son LTD., 162pp.

Bucher, K. & Frey, M., 1994, Petrogenesis of metamorphic rocks, Springer-Verlag, 318pp.

Cas, R.A.F. & Wright, J.V., 1987, Volcanic successions-Modern and ancient, Unwin Hyman Press, 528pp.

Hatch, F.H., Wells, A.K. & Wells, M.K., 1972, Petrology of the igneous rocks, Thomas Murby & Co., 551pp.

MacKenzie, W.S., Donaldson, C.H. & Guilford, C., 1991, Atlas of igneous rocks and their textures, 148pp.

Mason, R., 1990, Petrology of the Metamorphic rocks, Unwin Hyman, Press, 230pp.

Miyashiro, A., 1973, Metamorphism and metamorphic belts, George Allen & Unwin, London, 492pp.

Miyashiro, A., 1994, Metamorphic petrology, UCL Press, London, 404pp.

Nicholas, A., 1989, Structure of the ophiolites and dynamics of oceanic lithosphere, Kluwer Academic Press, 360pp.

Spry, A., 1969, Metamorphic textures, Pergamon Press, 350pp.

Turner, F.J., 1968-1981, Metamorphic petrology, 1st and 2nd edns. McGraw-Hill, New York.

Williams, H., Turner, F.S. & Gilbert, C.M., 1958, Petrography.

Wilson, M., 1989, Igneous petrogenesis, Unwin Hyman Press, 465pp.

Yardley, B.W.D., 1989, An introduction to metamorphic petrology, John Wiley & Sons, Inc., 248pp.

Yardley, B.W.D., MacKenzie, W.S. & Guilford, C., 1990, Atlas of metamorphic rocks and their textures, Longmann Scientific&Technical, N.Y., John Wiley & Sons Inc., 120pp.

Course Objectives

Petrography is one of the mandatory courses of the earth sciences. The main purpose of the course is to assure that description of igneous and metamorphic rocks which are the fundamental subjects for understanding earth crust.

Topics Covered on a Weekly Basis

1.Introduction	(1 week)
2.Rock forming minerals	(1 week)
3.Classification of igneous rocks	(1 week)
4.Textural features og igneous rocks	(1 week)
5.Magma and magmatic processes	(1 week)
6.Plutonic rocks	(1 week)
7.Ophiolite	(1 week)
8.Hypabbyssal rocks	(1 week)
9.Volcanic rocks	(1 week)
10.Introduction to metamorphic petrography and index minerals of metamorphism	(1 week)
11.Textural and structural features of metamorphic rocks	(1 week)
12.Classification of metamorphism	(1 week)
13.Regional, dinamic and contact metamorphism	(1 week)
14.Mid-term examination and homeworks	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 40 % (30% mid-term exam, 5 % quiz, 5 % homeworks) and final examination 60% / Computer Usage : MS OFFICE programs like WORD and EXCEL in order to do their mid-term studies/ Field Schedule : None .

Contribution of Course to Meeting the Professional Component

100% Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation
1 – 4 week : Partly related
5 – 8 week : Related
9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	8
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	-
(c) an ability to design a system, component, or process to meet desired needs	-
(d) an ability to function on multi-disciplinary teams	1
(e) an ability to identify, formulate, and solve engineering problems	-
(f) an understanding of professional and ethical responsibility	-
(g) an ability to communicate effectively	-
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	1
(i) a recognition of the need for, and an ability to engage in life-long learning	1
(j) a knowledge of contemporary issues	
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	13
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	-

Prepared By

Assoc. Prof. Dr.Safak Altunkaynak, Prof. Dr. Bektas Uz 04/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language
MAD 428 , Plant Design In Mineral Processing , 3+0 hour/week, 3 Credit, Elective , English
Course Description
Definition of process and plant design;. Importance of mineralogy on process and plant design; economy of process. Factors affecting location of plant and consideration of plant location on design. Design of crushing and sieving circuits. Selection and sizing of sieves and crushers, and design of crushing units. Design of grinding circuits. Selection, sizing and design of grinding and classification. Design of physical concentration circuits. Selection, sizing and design of concentration equipments.
Prerequisite(s)
None
Textbook(s) or Other Required Material
Lecture Notes, (main textbook) A.L.Mular and R.B.Bhappu., "Mineral Processing Plant Design", Socety of Mining Engineers of AIME New York, U.S:A. 1978; P.Blazy., "La Valorisation Des Minerais", Press Universitaire de Paris, 1970; A.F.Taggart., "Hand book of Mineral Dressing", AIME, 1974; N.L.Weiss Editor., "SME Mineral Processing Hand book, Society of Mining Engineers of AIME, U.S:A, 1985; "Denver Sala Basic Selection Guide for Process Equipment", 2 nd Edition, Denver Sala, 1994; A.B.Cummins and I.A. Gven., "SME Mining Engineering Hand book" Society of Mining Engineers of AIME, Vol. Section 27 Mineral Processing and Section 28 Mill Design, New York U.S.A. 1973.Wills, B.A., Mineral Processing Technology. 4. edt., Pergamon Press, 1988,UK
Course Objectives
Principals of mineral processing and its industrial applications exist in the required courses of mining engineering department. Besides, subjects of plant design in mineral processing have been found few amount. So, lack of plant design can be compensated and design ability of the courser can be developed by this course

Topics Covered on a Weekly Basis

1. Introduction to plant design in mineral processing (1 week)
2. Definition of stage of plant design (1 week)
3. Studies of process design (2 weeks)
4. Calculations of material balances (2 weeks)
5. Selection of equipments of the plant (4 weeks)
6. Plant design and drawing (4 weeks)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 60 % (50 % homework and 10 % mid-term exam) and final examination 40 %. / Computer Usage : MS OFFICE and AUTOCAD programs in order to do their mid-term studies/ Field Schedule : None .

Contribution of Course to Meeting the Professional Component

90% Mining Engineering Design (MT), 10 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation
1 - 4 week : Partly related
5 – 8 week : Related
9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	12
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	8
(c) an ability to design a system, component, or process to meet desired needs	10
(d) an ability to function on multi-disciplinary teams	12
(e) an ability to identify, formulate, and solve engineering problems	12
(f) an understanding of professional and ethical responsibility	2
(g) an ability to communicate effectively	-
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	14
(i) a recognition of the need for, and an ability to engage in life-long learning	12
(j) a knowledge of contemporary issues	12
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	14
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	6

Prepared By

Prof. Dr. Neset Acarkan and Prof. Dr. Ali Güney 06/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 416, Post Concentration Processes, 3+0 hour/week, 3 Credit, Elective , Turkish

Course Description

Agglomeration, Pelletizing, briquetting, carbonization, flocculation-polymers, coagulation, dewatering and its methods, sedimantation (gravity sedimantation), thickeners, lamella thickeners, filtration (the filter medium, filtration tests, types of filters such as pressure filters, batch vacuum filters, continuous vacuum filters, the rotary drum filters, disc filters) and thermal drying.

Applications in industry

Prerequisite(s)

None

Textbook(s) or Other Required Material

Lecture Notes (main textbook)
Handbook for Mineral processing, (Published by, Turkish Mining Development Foundation 1994)
Agglomeration and Environment (ISBAN-99)
Mineral Processing Technology (B.A. Wills-1979)

Course Objectives

Each product, obtained from mineral processing have different properties. This products need to be post concentration processes such as filtration, pelletizing, dewatering etc for the use of different industrial areas. It is the objective of this course to teach the students what the post concentration methods are and how these methods are applied to the products after concentration.

Topics Covered on a Weekly Basis	
1. Determination of agglomeration	(1 week)
2. Vander Waals bonding,attraction between atom and molecules	(1 week)
3. Pelletizing, history of pelletizing, cold and hot pelletizing processes, flowsheet for the pelletezing	(1 week)
4. Sintering, development in sintering, industrial applications, briquetting and its applications	(1 week)
5. Agglomeration: appliying to dewatering of fossil fuels, Quiz 1	(1 week)
6. Flocculation and using of polymers	(1 week)
7. Mineral suspensions, relations between particles, behaviour of particles inthe liquids	(1 week)
8. The methods of dewatering, thickeners,	(1 week)
9. The type of thickeners, cantrifugal dewatering, Quiz II	(1 week)
10. Hydrocyclones, Cantrifigues	(1 week)
11. Mid-term exam	(1 week)
12. Methods that using pressure differences, Theory of filtration,	(1 week)
13. The type of filters, Industrial applications, mid term studies	(1 week)
14. Drying of the mineral processing products and dryers	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 50 % (20 % mid-term studies, 30% mid-term exam) and final examination 50 %. / Computer Usage : MS OFFICE programs like WORD in order to do their mid-term studies/ Field Schedule : None .

Contribution of Course to Meeting the Professional Component

100% Mining Engineering Design (MT)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	12
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	10
(c) an ability to design a system, component, or process to meet desired needs	5
(d) an ability to function on multi-disciplinary teams	5
(e) an ability to identify, formulate, and solve engineering problems	7.5
(f) an understanding of professional and ethical responsibility	7
(g) an ability to communicate effectively	1
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	--
(i) a recognition of the need for, and an ability to engage in life-long learning	--
(j) a knowledge of contemporary issues	4
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	5
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	4.5

Prepared By

Prof. Dr. Gündüz Atesok 10/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language
MAD 426, Reclamation in Surface Mining, 3+0 hour/week, 3 Credit, Elective , Turkish
Course Description
Mining and environment, environmental effects caused by open pit an underground mines, environmental effects regulations in mining and environmental law, mining and environmental impact assessments, reclamation, restoration and rehabilitation, types of reclamation planing; agricultural, forestry, residential, industrial, recreational etc., the role of natural and cultural factors, basic reclamation works, alternatives for land use, using of abandoned mine spaces for waste storage, reclamation examples from other countries.
Prerequisite(s)
MAD 242 Surface Mining
Textbook(s) or Other Required Material
Lecture Notes (main textbook) Kuzu, C., Ökten, G., Nasuf, E.: Reclamation in Coal Mines, Coal Book, Özgün Offset, Istanbul, 1998, (in Turkish) Marriott, B. B.: Practical guide to environmental impact assessment, Mc Graw-Hill, New York, 1997. Pflug, W.: Braunkohlentagebau und Rekultivierung, Springer Verlag, Berlin, 1998. Steubing, L. Buchwald, K., Braun, E.: Natur- und Umweltschutz - Ökologische Grundlagen, Methoden, Umsetzung, Gustav Fischer Verlag, Stuttgart, 1995
Course Objectives
Mine reclamation is a special work, which requires multidiciplinary knowledge. On the other hand the historical developments in reclamation are linked closely to the regulatory systems to control environmental effects of mining. Therefore it is necessary to fill these requirements in a mine under leadership of the mining engineers. For that reason, it is intended to give the basic knowledge of reclamation to the mining students through this course.

Topics Covered on a Weekly Basis

1. Environmental issues from open pit mines (soil pollution and soil degradation, loss of soil, loss of wildlife and habitat, loss of valuable vegetative communities, water resource impacts, air pollution, noise impacts, blast induced vibrations, fly rock, air blast, adverse visual effects, traffic impacts)	(1 week)
2. Environmental issues from underground mines (mine subsidence effects, impacts on water resources, solid waste and slurry waste problem, adverse visual effects, traffic impacts)	(1 week)
3. Multi disciplinary characteristic of reclamation, restoration, rehabilitation in mining	(1 week)
4. Planing of reclamation I –II (land use planning, natural factors, cultural factors)	(1 week)
5. Mid-term exam	(1 week)
6 Environmental impact assessment in mining I, EIA process and EIA preliminary study report	(1 week)
7. Environmental impact assessment in mining II, EIA process and EIA report	(1 week)
8. Reclamation for forestry and rural uses, I Quiz	(1 week)
9. Reclamation for residential, industrial and agricultural uses	(1 week)
10. Waste disposal and waste storing in open pit mines	(1 week)
11 Waste disposal and waste storing in underground mines, II. Quiz	(1 week)
12. Quarries in Istanbul and environmental aspects	(1 week)
13. Case studies from other countries, III. Quiz	(1 week)
14. Visiting the north Istanbul reclamation areas	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 40 % (%10 homework, %10 quiz, % 20 mid-term exam); 1 mid-term exam, 2 quiz, 2 home work (sensors and actuators; comments on articles for mine automation systems)

Contribution of Course to Meeting the Professional Component

80% Mining Engineering Design (MT), 20 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	13
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	8
(c) an ability to design a system, component, or process to meet desired needs	12
(d) an ability to function on multi-disciplinary teams	2
(e) an ability to identify, formulate, and solve engineering problems	12
(f) an understanding of professional and ethical responsibility	2
(g) an ability to communicate effectively	-
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	13
(i) a recognition of the need for, and an ability to engage in life-long learning	12
(j) a knowledge of contemporary issues	13
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	13
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	-

Prepared By

Doç. Dr. Cengiz KUZU 06/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 417 E, Recycling of Mineral Processing Plant Tailings, 3+0 hour/week, 3 Credits, Elective English

Course Description

Significance of plant wastes to environmental pollution. Effect of plant wastes on biological Life. Remediation of flotation reagents and oil-based chemicals. Effect of suspended solids and metal ion contamination from plant wastes. Waste generated out of stack gases and dusts. Techniques developed to reduce environmental pollution in coal and mineral processing plants. Examples on waste free technologies: coal, flyash, sulfide minerals, phosphate, boron, rare earth minerals, hydrometalluirgical plants. Description of waste disposal systems.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Lecture Notes (main textbook)

Ritchey, G.R., Tailings Management, Elsevier, 1989.
Smith, R.W., Liquid and Solid Wastes from Mineral processing Wastes, Mineral processing and Extractive Metallurgy Review, 16, 1-22(1996).
Hill, R.D. and Auerbach, J.L., Solid Waste Disposal in the Mining Industry, Fine Particles Processing, Ch. 87, AIME Publication, p. 1731-1753 (1980).
Moudgi, B.M., Handling and Disposal of Coal Preparation Plant Refuse, Fine Particles Processing, Ch. 88, AIME Publication, p. 1754-1779 (1980).
Mishra, S.K., Flotation Process as a Waste Management Option, in Advances in Coal and Mineral Processing Using Flotation AIME (1989) p. 243-254.
Hanna, H.S., Rampacek, C., Resources Potential of Mineral and Metallurgical Wastes, Fine Particles Processing, Ch. 87, AIME Publication, p. 1709-1730 (1980).
Taylor, R.K., Liquefaction Characteristics of Coal-Mine Tailings With Respect to storage and Use Proceedings of XIII IMPC, Warshowa p. 761-779, 1979.
Davis, F.T., et al, Environmental Problems of Flotation Reagents in Mineral Processing Plant Tailings Water, Flotation in A.M. Gaudin Memorial Volume, Ch., 48, p. 1307-1341, 1976.
Pushkarev, V.V., Yuzhaninov, A.G., Men, S.K., Treatment of Oil-Containing Wastewater Allerton Press, 1983.

Course Objectives

Mineral and coal processing plants exhibit large amount of fine particles and significant quantity of chemicals which may be disposed into the environment. The type and characteriazation of these wastes, their discharge limits, and the effect of these pollutants on ecologic life is of utmost importance. The objective of this course is to teach the charasteristics of these wastes and the techniques of both reducing and/or eliminating these wastes along with development of waste-free technologies from solid, liquid and gaseous wastes.

Topics Covered on a Weekly Basis	
1.Significance of plant wastes to environmental pollution. Effect of plant wastes on biological Life.	(1 week)
2.Effect of remediation of flotation reagents and oil-based chemicals (Term Project)	(1 week)
3.Effect of suspended solids and metal ion contamination from plant wastes.	(1 week)
4.Waste generated out of stack gases and dusts (Quiz 1)	(1 week)
5.Techniques developed to reduce environmental pollution in mineral processing plants.	(1 week)
6.Techniques developed to reduce environmental pollution in coal processing plants.	(1 week)
Examples on waste free technologies:	
7.Coal and flyash	(1 week)
8.Boron (Mid-term Exam)	(1 week)
9.Sulfide minerals	(1 week)
10.Phosphates	(1 week)
11.Rare earth minerals (Quiz 2)	(1 week)
12.Hydrometalluirgical plants.	(1 week)
13.Design of waste disposal systems	(1 week)
14.Economics of waste disposal systems	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 50 % (homework, seminar and class attendance 20 %, 2 quiz 10 %, mid-term exam 20 %) and 50 % final examination) / Computer Usage : MS OFFICE programs like WORD and EXCEL for mid-term studies/ Field Schedule : None

Contribution of Course to Meeting the Professional Component

50% Mining Engineering Design (MT), 50 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	8
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	9
(c) an ability to design a system, component, or process to meet desired needs	5
(d) an ability to function on multi-disciplinary teams	7
(e) an ability to identify, formulate, and solve engineering problems	6
(f) an understanding of professional and ethical responsibility	5
(g) an ability to communicate effectively	-
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	4
(i) a recognition of the need for, and an ability to engage in life-long learning	4
(j) a knowledge of contemporary issues	5
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	8
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	9

Prepared By

Prof. Dr. Mehmet S. Çelik 05/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language
MAD 221 E, Rock Mechanics, 2+1 hour/week, 2,5 Credit, Required , English
Course Description
Introduction to rock mechanics. Rock engineering problems. Stress, Deformation. Stress-deformation relationships. Special stress conditions. Physical and mechanical properties of rocks. In-situ and laboratory testing of rocks. Rock classification systems. In situ stress and stress fields. Stress distributions around underground openings and the design principles. Field stresses around room and pillar and longwall mining methods and the design principles. Subsidence. Stress analysis and numeric modeling studies in rock mechanics. Rock and gas bursts. Slope stability analysis in open pit mining (Types of failure, soil and rock slope stability analysis methods, Numerical examples).
Prerequisite(s)
None
Textbook(s) or Other Required Material
B.H.G. Brady and E.T. Brown., Rock Mechanics for Underground Mining, George Allen and Unwin, 527 pp. 1995. (main textbook) Herget, G., Stresses in Rock Balkema Publications, Canada, 1988. (main textbook) J.C., Jaeger and M.G.W. Cook., Fundamentals of Rock Mechanics, Methuen Co., Ltd.,1970. F.G. Bell., Engineering in Rock Masses, Butterwath-Heinemann, 1994. J.A. Hudson., Rock Mechanics Principles in Engineering Practice, 1993. T.R. Stacey and C.H. Doge., Practical Handbook for Underground Mechanics, 1986. A.Jumikis., Rock Mechanics Trans Tech. Publications, 1979. D.F.Coates., Rock Mechanics Principles, Mines Branch Monograph 874, 1970.
Course Objectives
Physical and mechanical properties of rocks need to be known to keep the stability and safety and also for better design calculations both in underground mines and tunells and also in the slopes of open pit mines. These properties, as they usually determined in the field, should be known by a mining engineer. Knowing the rock properties will also help mining engineers to get to know the quality of the rock (ore, marble, granite, aggregates etc) they are mining. It is, therefore, rock mechanics lecture is very important and should be taught to the mining engineers in undergraduate and post graduate levels. It is the objective of this course to teach the students what the rock properties are and how they are determined.

Topics Covered on a Weekly Basis	
1. Introduction to rock mechanics and applications in mining and tunelling	(1 week)
2. Stress and strain (definitions and calculations)	(1 week)
3. Stress strain relations (hook's law)	(1 week)
4. Engineering properties of rocks (physial prop., index prop., mechanical	(1 week)
prop., time dependant prop., stress-strain relations of rocks)	(1 week)
5. Rock failure and failure criterias	
6. Rock testing methods (intact rock properties)	(1 week)
7. Rock classification systems (rock mass properties)	(1 week)
8. Stress around underground openings and structures	(1 week)
9. Mining methods and rock mechanics /room and pillar and longwall mining	(1 week)
methods stress distribution and design principals)	
10. Mining subsidence	(1 week)
11. Mid-term exam	(1 week)
12. Rock burst and gas outburst	(1 week)
13. Numerical methods in rock mechanics	(1 week)
14. Slope stability in open pit mines	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 50 % (10% Lab and homework and 10 % Lab and class attendance, 30% mid-term exam) and final examination 50% / Computer Usage : MS OFFICE programs like WORD and EXCEL in order to do their mid-term studies/ Field Schedule : None .

Contribution of Course to Meeting the Professional Component

80% Mining Engineering Design (MT), 20 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	10
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	9
(c) an ability to design a system, component, or process to meet desired needs	6
(d) an ability to function on multi-disciplinary teams	6
(e) an ability to identify, formulate, and solve engineering problems	7
(f) an understanding of professional and ethical responsibility	1
(g) an ability to communicate effectively	-
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	1
(i) a recognition of the need for, and an ability to engage in life-long learning	1
(j) a knowledge of contemporary issues	3
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	8
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	3

Prepared By

Prof. Dr. Erkin Nasuf 04/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 328, Shaft and Roadway Drivages in Mines, 3+0 hour/week, 3 Credit, Elective , Turkish

Course Description

Excavation. Rock characteristics. Manual excavation, compressive air hammer. Explosives and their use, storage of explosives. Other blasting techniques. Drilling, drilling equipment, dry and wet drilling. Other excavation methods. Roadway drivage in rock. V cut methods, determination of hole numbers. Blasting - loading organisation. Drivage of inclined drifts in rock, large section drifts. Excavation of drifts in ore deposits, Normal shaft sinking method, Special shaft sinking methods.

Prerequisite(s)

MAD 231 Underground Mining

Textbook(s) or Other Required Material

Saltoglu, S., Excavation and Development in Mines, ITU Publication, 1987, (in Turkish), (4^{th} Edition), (main textbook)

Hartman, H.L., SME Mining Engineering Handbook, 2^{nd} Edition Vol 1-2. Port City Press Inc. Baltimore, 1992.

Saltoglu, S., Development and Excavation Operations in Mines, ITU Publication 1987 (4^{th}. Edition).

Bickel, J.O. Tunnel Engineering Handbook, Chapman – Hall UK, 1995.

Rowe, P.A., Blind Shaft Drilling, EG and Reynolds Co. Inc. PO Box 497395, 1995.

Köse,H., Gürgen.S., Onargan T., Tunnel and Shaft Sinking, 9 Eylül University Publication No.145, 1992.

Course Objectives

Two main operations of development in underground mining are shaft sinking and roadway drivage. This course is designed to transfer the knowledge to the mining students and it is intendent the grouping in explosive and nonexplosive excavation methods. It is also added the case studies from Turkey and abroad.

Topics Covered on a Weekly Basis

1. Introduction. General information. Physical and mechanical properties of rocks. Relationship between rock properties and cutability. (1 week)
2. Piece works in mining. Application of mannual excavation and using equipments. (1 week)
3. General information about mechanical excavation. Explanation of equipment used in mechanical excavation. (1 week)
4. General information about blasting agent. Properties and varieties of blasting agents.. Blasting agents produced in Turkey. (1 week)
5. Ignition type. Properties and application of wicked and electric ignition. Comparison of wicked and electric ignition. Ignite and take measures. Blasting agent stores. Destruction of blasting agents. (1 week)
6. Other ignition methods. Mannual and mechanical drilling of holes. Dry and wet drilling (1 week)
7. Other excavation methods. Roadway drivage of development galleries. Roadway drivage of drift in rock. Determination of hole number and advance quantity. Calculation of blasting agent quantity. (1 week)
8. Ignition. Support and other operation. Organization of roadway drivage operations. Roadway drivage of steep gallery and drift in rock. (1 week)
9. Mid-term exam (1 week)
10. Roadway drivage of large section gallery in rock. Organization of work in large section galleries. Roadway drivage drift and inclined drift in ore. Determination of section of inclined drifts and organization of work. (1 week)
11. General information about shaft sinking. Normal shaft sinking methods and using excavation techniquies. Phases of normal shaft sinking. (1 week)
12. Deepening of existed shaft. Special shaft sinking methods. Explanation of methods. (1 week)
13. Main safety regulations about shaft sinking and roadway drivage. (1 week)
14. Examples about roadway drivage and shaft sinking from Turkey and other Country. (1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 40 % (10% homework and 30% mid-term exam) and final examination 60 %. / Computer Usage : MS OFFICE programs like WORD and EXCEL in order to do their mid-term studies/ Field Schedule : A technical excursion.

Contribution of Course to Meeting the Professional Component

80% Mining Engineering Design (MT), 20 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related
1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	2
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	1
(c) an ability to design a system, component, or process to meet desired needs	3
(d) an ability to function on multi-disciplinary teams	2
(e) an ability to identify, formulate, and solve engineering problems	9
(f) an understanding of professional and ethical responsibility	3
(g) an ability to communicate effectively	-
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	5
(i) a recognition of the need for, and an ability to engage in life-long learning	3
(j) a knowledge of contemporary issues	5
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	4
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	6

Prepared By

Prof. Dr. Senai SALTOGLU, Prof.Dr. Gündüz Ökten 04/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 419 E, Simulation in Mineral Processing Plants, 3+0 hour/week, 3 Credit, English

Course Description

Using Excel spread sheet for calculations. Mathematical models of size reduction processes; matrix model, kinetic model. Mathematical models of some industrial size reduction machines; cone crushers, rod mills, ball mills. Mathematical models of hydrocyclones; form of the model, behaviour of mixtures of minerals, effect of cone angle and cyclone length on cyclone performance. Mathematical models of screens; vibrating screens.

Prerequisite(s)

Mineral Processing I

Textbook(s) or Other Required Material

A.J. Lynch, Mineral Crushing and Grinding Circuits: Their Simulation, Optimisation, Design and Control, Julius Kruttschnitt Mineral Research Centre, University of Queensland, Australia, 1989, (main textbook)

Mineral Comminution Circuits: Their Operation and Optimization. T.J. Napier-Munn; S. Morrell; R.D. Morrison; T. Kojovic

JKMRC Monograph Series in Mining and Mineral Procesing 2, Julius Kruttschnitt Mineral Research Centre, The University of Quennsland, 1996

Course Objectives

The simulation and modelling of comminution circuits were started well before the widespread use of computers. Studies on modelling and simulation were substantially accelerated following the development of computers in 70's. Long and complex calculation procedures were significantly shortened by the help of computers hence the use of simulation and modelling in mineral processing became more practicle. In the scope of this course modelling and simulation of comminution circuits where energy is intensively consumed will be tought. It is undoubted that this course will contribute to the most efficient operation of size reduction circuits and thus effective use of energy.

Topics Covered on a Weekly Basis	
1. Introduction to Simulation and Modelling	(1 week)
2. Introduction to Calculation in Excel	(1 week)
3. Mathematical Modelling of Size Reduction Processes	(1 week)
4. Mathematical Modelling of Size Reduction Processes	(1 week)
5. Mathematical Modelling of Size Reduction Processes	(1 week)
6. Mid-Term Examination	(1 week)
7. Mathematical Modelling of Cone Crushers	(1 week)
8. Mathematical Modelling of Rod Mills	(1 week)
9. Mathematical Modelling of Ball Mills	(1 week)
10. Mid-Term Examination	(1 week)
11. Mathematical Modelling of Hydrocyclones	(1 week)
12. Mathematical Modelling of Screens	(1 week)
13. Simulation of Size Reduction Circuits	(1 week)
14. Simulation of Siz Reduction Circuits	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term examinations 30%
Homework 20%
Final Examination 50%
Extensive Computer Usage is Necessary for the Calculations
Field Schedule : None.

Contribution of Course to Meeting the Professional Component

80% Mining Engineering Design (MT), 20 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation
1 – 4 week : Partly related
5 – 8 week : Related
9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	9
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	2
(c) an ability to design a system, component, or process to meet desired needs	7
(d) an ability to function on multi-disciplinary teams	-
(e) an ability to identify, formulate, and solve engineering problems	7
(f) an understanding of professional and ethical responsibility	-
(g) an ability to communicate effectively	-
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	-
(i) a recognition of the need for, and an ability to engage in life-long learning	-
(j) a knowledge of contemporary issues	5
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	2
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	2

Prepared By

Associate Prof. Dr. Ayhan A. Sirkeci 12/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 330, Size Reduction And Mineral Liberation, 3+0 hour/week, 3 Credit, Elective, Turkish

Course Description

Introduction to comminution, definition and purposes of comminution, spesific energy calculation for size reduction. Classification of comminution units, selection criterias. Design of size reduction flowsheets. New developments on size reduction, New aged comminution units. Mechanical behaviour of multiphase mineral structures under the size reduction. Definition of sizing, classification of sizers, size distribution functions, calculation of size distribution. Introduction to size liberation, Definitions and physical, structural and mechanical properties of minerals. Measurement methods of particle liberation. Grain counting methods, Float/sink analysis in heavy liquid, Image analysis methods. Methods for particle composition distribution or liberation from measurements on section (Petruk, Jones and Horton, Lin, Hill, Barbery). Liberation in physical separation processes: Process efficiency and analysis. Laboratory study-I (Particle liberation ratio and shape factor). Laboratory study-II (Heavy liquid analysis). Mid-term group seminar presentations and discussion.

Prerequisite(s)

None

Textbook(s) or Other Required Material

T.C.Bayraktar; Ore Dressing Methods before beneficiation, ITÜ Gümüssuyu Press, 1979 (In Turkish)

Handbook of Mineral Processing, Weiss, N.L. “SME Mineral Processing Handbook”, Chapter: 2-1/2-17; 3-1; 3A-1/3A-55; 3B-1/3B-86; 3C-1/3C-137; 3D-1/3D-59; 3E-1/3E-41, AIME, New York;1985

Selection Guide for Process Equipment, Swedala, Denver Sala Basic, Second Edition, 1994.

Handbook Mechanical Processing Technology; Alpine Aktiengesellschaft,1990

Gilles Barbery, Mineral Liberation: Measurement, simulation and practical use in mineral processing.

Prasher, C.L., “Crushing and Grinding Process Hanbook”, J.Wiley, New York, 1987

Austin, L.G., Klimpel, R.R., and Luckie, P.T., Process engineering of size reduction, Ball Milling, New York, AIME, 1984.

Course Objectives

Mechanical behaviour of particles during comminution processes depend on both crushing and grinding units as well as structural and textural composition of the ores. Mineral liberation is the cornerstone of every mineral processing plant. Breakage factors and optimal liberation size of multiphase minerals should be well defined in order to benefit mineral population. In this lecture; basic concept of comminution, sizing and classification criterias and design of optimal flowsheet options are examined. Additionally, methods of mineral liberation and process efficiency and analysis for physical separation are covered.

Topics Covered on a Weekly Basis	
1. Introduction to comminution, definition and purposes of comminution, spesific energy calculation for size reduction	(1 week)
2. Classification of comminution units, selection criterias	(1 week)
3. Design of size reduction flowsheets	(1 week)
4. New developments on size reduction, New aged comminution units	(1 week)
5. Mechanical behaviour of multiphase mineral structures under the size reduction	(1 week)
6. Definition of sizing, classification of sizers, size distribution functions, calculation of size distribution	(1 week)
7. Introduction to size liberation, Definitions and physical, structural and mechanical properties of minerals	(1 week)
8. Laboratory study-I (Particle liberation ratio and shape factor)	(1 week)
9. Measurement methods of particle liberation	(1 week)
10. Grain counting methods, Float/sink analysis in heavy liquid, Image analysis methods.	(1 week)
11. Laboratory study-II (Heavy liquid analysis)	(1 week)
12.Methods for particle composition distribution or liberation from measurements on section (Petruk, Jones and Horton, Lin, Hill, Barbery)	(1 week)
13. Mid-term group seminar presentations and discussion	(1 week)
14. Liberation in physical separation processes: Process efficiency and analysis	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 50 %; (20 % class attendance, 20% Lab attendance and project, 20% mid-term seminar and 60% mid-term exam) and final examination 50 %. Computer Usage: MS OFFICE programs like WORD and EXCEL in order to do their mid-term studies, seminar and laboratory works

Contribution of Course to Meeting the Professional Component

80% Mineral Processing Engineering Design (MT), 20 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	8
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	3
(c) an ability to design a system, component, or process to meet desired needs	3
(d) an ability to function on multi-disciplinary teams	3
(e) an ability to identify, formulate, and solve engineering problems	6
(f) an understanding of professional and ethical responsibility	4
(g) an ability to communicate effectively	6
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	13
(i) a recognition of the need for, and an ability to engage in life-long learning	3
(j) a knowledge of contemporary issues	12
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	9
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	3

Prepared By

Asst.Prof. Dr. A.Ekrem Yüce; Dr.Vecihi Gürkan 07/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

PT 602 , Statistic, 2+0 hour/week, 2 Credit, Required , Turkish

Course Description

Importance of the statistic in engineering. Fundamentals of probability theory – Random variable and random incident. Probability concept. Distrubution of random variable, parameters of distribution of random variable, parameters of distribution. Statistical moments, mean, variance, freaquency analysis, prediction of parameters. Important probability distribution functions. Sampling distributions. Control of Statistical hypothesis. Simple linear regression analysis. Correlation of coefficient. Linear and non linear multivariable regression anaylsis.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Lecture Notes, (main textbook)
Statistics, Murray R. Spiegel Schaum's Outline Series Mc-Gray Hill International Book Company New York, 1972
Introduction to Statistic *(in Turkish)* , Dr. Serdar Kiliçkaplan, Adim Yayincilik, Ankara, 1989
Introduction to Statistic *(in Turkish)*,Prof. Dr. Salih Karaali, I.Ü. Fen Fakültesi Basimevi , Istanbul, 1995
Statistic (in Turkish),, Prof. Dr. Necla Çömlekçi, Bilim Teknik Yayinevi, Istanbul, 1984
Introduction to Statistic *(in Turkish)*, Prof. Dr. Semsettin Bagirkan, Bilim Teknik Yayinevi, Istanbul, 1987
Statistic with Computer Applications *(in Turkish)*, Prof. Dr. Necmi Gürsakal, Marmara Kitabevi Yayinlari
Statistical Analysis *(in Turkish)* , Prof. Dr. Semsettin Bagirkan, Bilim Teknik Yayinlari Istanbul, 1983

Course Objectives

Statistic enable us to deal with uncertainty and in respect to the accomplishment of organisational goals, the most important task modern engineering is both to control the variation and to take appropriate decision for the survival organisations. Furthermore, the understanding of quality makes today's engineers to apply the statistical principles into their field of engineering whether they are operating in industrial or service sector.

Topics Covered on a Weekly Basis

1. Introduction to statistic and applications in engineering	(1 week)
2. Organising the datas, frequency table, distributions	(1 week)
3. Arithmetic, geometric, harmonic means, example questions	(1 week)
4. Relations between mode and median, example questions	(1 week)
5. Distributions measures, range, variance	(1 week)
6. Standart deviations and examples	(1 week)
7. Asymetric measures regarding to means, moments in statistic and example from engineering	(1 week)
8. Mid-term exam	(1 week)
9. Probability and probability distributions binomial distributions, examples	(1 week)
10. Poisson distribution, normal distribution, Probability Distributions, (Poisson, Triangle, Uniform, Sampling Distribution)	(1 week)
11. Introduction to Estimation, (Confidence of Interval)	(1 week)
12 Test of Hypothesis , (Inference concerning two populations)	(1 week)
13. Regression & Correlation, Correlation Coefficient	(1 week)
14. Time Series, Analysis of Variance	(1 week)

Class / Laboratory / Computer / Field Schedule

40% Mid term exam) and Final examination (60%)

Contribution of Course to Meeting the Professional Component

80% Basic Engineering (TM), 20 % Mining Engineering (MT)

Relationship of Course Program Objectives

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	10
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	1
(c) an ability to design a system, component, or process to meet desired needs	0
(d) an ability to function on multi-disciplinary teams	0
(e) an ability to identify, formulate, and solve engineering problems	11
(f) an understanding of professional and ethical responsibility	0
(g) an ability to communicate effectively	1
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	0
(i) a recognition of the need for, and an ability to engage in life-long learning	10
(j) a knowledge of contemporary issues	4
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	8
(l) an abilit y to carry out an engineering design to meet the environmental and quality requirements of the society.	0

Prepared By

Prof. Dr. Orhan KURAL 04/06/2002

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 242, Surface Mining, 3+0 hour/week, 3 Credit, Required , Turkish

Course Description

Importance of surface mining. Advantages and disadvantages. Prospecting and valuation. Basic definitions. Slopes. Slope sripping. Drainage and planning. Different types of development. Selections of panel beginning. Striping and production, production methods, surface mining methods. Technological operations, excavation in hard and weak rock. Equipment selection. Excavator, dragline and other equipments. Haulage systems. Surface mining planning. Quarries, special conditions.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Saltoglu,S., Open Pit Mining, ITU Library, No. 1472, 1992, (in Turkish), (main text book)

Horace, K. Cruch Excavation Handbook, Mc Graw-Hill Book Company.

ISBN 0-07-010840-4, Printed in the United States of America, 1981.

Semyonov, S.M. Opencast Mining Unit Operation, Mir Publichers Moscow, Pervy Rizhsy Pereulok 2. USSR. 129820, 1985.

Konya, C. J., Surface Blast Design, ISBN 0-13-877994-5, Printed in USA, Prentice Hall, Englewood Cliffs, New Jersey 07632.

Tamrock Surface Drilling Blasting. 0291-5308-GB-1500, Info at drill tech. Com. PO Box, 338, 1988.

Wright, E.A., Open Pit Mine Design Models, 087849-083-3, Trans Tech Publications. PO Box 1254 D, 38670, Clausthall Zellerfeld, Germany, 1994.

Hustrulid,W., Kuchta,M., Fundamentals of Open Pit Mine Planning and Design, A.A. Balkema Publications PO Box 1675.3000 Br Rotherdam, Holland, 1995.

Course Objectives

Raw material is becoming very important nowadays with the increasing population of the world. The low grade mineral deposites result in big mining productions. Big mining productions cause big overburden removal operations in order to exploit the mining deposits.The importance of Open pit mining is well recognized by all the mining engineers in the world. It is the aim of this lecture to teach students the open pit mining techniques in details.

Topics Covered on a Weekly Basis	
1.Introduction to Open pit Mining, Advantages and disadvantages, Exploration techniques and evaluations, main concepts in open pit mining	(1 week)
2.Slopes, Slope stability, Benches, Slope overburden removal, General slope angle,	(1 week)
3.Economical overburden removal rate, Determination of Open/Underground mining boundaries, surface and underground waters, Drainage methods.	(1 week)
4.Precautions against water flood. Development works and determination of starting point	(1 week)
5.Open-pit mining operations, Types of open-pit mining, Excavation, hauling, dumping, Reclamation	(1 week)
6.Open pit mining in hard rock, blasting operations, Blasting materials, Drilling Equipments, Excavation in soft and weathered rock , Excavators, Draglines, Shovels, Loaders	(1 week)
7.Continous miners, shovel excavators, rail transportation, conveyors, Dumping operations	(1 week)
8.Reclamations, Face advance in open pit mining, Production methods	
9.Equipment Combination Systems	(1 week)
10.Special open pit mining methods (Block mining, plaser mining etc.), Flow chart of	(2 weeks)
open pit mining planning and design. Open pit mine investment analysis	(2 weeks)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 40 % (10% homework, 30% mid-term exam) and final examination (60%) / Computer Usage : MS OFFICE programs like WORD and EXCEL in order to do their mid-term studies/ Field Schedule : None .

Contribution of Course to Meeting the Professional Component

80% Mining Engineering Design (MT), 20 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	5
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	-
(c) an ability to design a system, component, or process to meet desired needs	11
(d) an ability to function on multi-disciplinary teams	-
(e) an ability to identify, formulate, and solve engineering problems	2
(f) an understanding of professional and ethical responsibility	-
(g) an ability to communicate effectively	-
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	-
(i) a recognition of the need for, and an ability to engage in life-long learning	-
(j) a knowledge of contemporary issues	1
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	-
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	-

Prepared By

Prof. Dr. Senai Saltoglu 04/06/2002

ISTANBUL TECHNICAL UNIVERSITY
CIVIL ENGINEERING FACULTY
GEODESY AND PHOTOGRAMMETRY ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 312, Surveying, 2+2 hour/week, 3 Credit, Required , Turkish

Course Description

Introduction. Measurement Units and Scale. Sources of Measurement Errors, Distance Measurement. Survey Instruments. Simple Angle Measurements and Traversing. Basic Homeworks, Bearing. Open and Closed Traverse, Coordinate Computation. Height Measurements, Geometric Levelling. Vertical Angles, Trigonometric Levelling. Profiles and Cross Sections, Surface Levelling. Tacheometry. Characteristics of Contour, Map Drawing. Area and Volume Computation. Application

Prerequisite(s)

None

Textbook(s) or Other Required Material

Özgen,M.G.; Surveying for Engineers and Architects, ITU Pub., 1993

Crawford,W.; Construction Surveying and Layout, Second Edition, USA, 1995

Dracup,J., Kelley,C.; Surveying Instrumentation and Coordinate Computation, 3.Edition, 1979

Wirshing,J.R.,Wirshing,R.H.; Introductory Surveying, Schaum's Outline Series, 1985

Stephan,V., Estopinal,P.E.; A Guide to Understanding Land Surveys, USA, 1993

Clancy,J.; Site Surveying and Levelling, Great Britain, 1991

Course Objectives

To improve the skills about producing topographic maps, map use, cartometric evaluation on maps, land survey, topographic measurements and applications.

Topics Covered on a Weekly Basis

1. Introduction, Measurement Units and Scale	(1 week)
2. Sources of Measurement Errors, Distance Measurement	(1 week)
3. Survey Instruments	(1 week)
4. Simple Angle Measurements and Traversing	(1 week)
5. Basic Homeworks, Bearing	(1 week)
6. Open and Closed Traverse, Coordinate Computation	(1 week)
7. Height Measurements, Geometric Levelling	(1 week)
8. Vertical Angles, Trigonometric Levelling	(1 week)
9. Mid-term exam	(1 week)
10. Profiles and Cross Sections, Surface Levelling	(1 week)
11. Tacheometry	(1 week)
12. Characteristics of Contour, Map Drawing	(1 week)
13. Area and Volume Computation	(1 week)
14. Application	(1 week)

Class / Laboratory / Computer / Field Schedule

Mid-term studies 40% (70% Field Exercise + 30% mid-term exam) and final examination 60 % / Field Schedule : 1 week after the end of the semester .

Contribution of Course to Meeting the Professional Component

100 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000

Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table.

0 week : No relation — 5 – 8 week : Related

1 – 4 week : Partly related — 9 – 14 week : Highly related

(a) an ability to apply knowledge of mathematics, science, and engineering	11
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	8
(c) an ability to design a system, component, or process to meet desired needs	0
(d) an ability to function on multi-disciplinary teams	5
(e) an ability to identify, formulate, and solve engineering problems	4
(f) an understanding of professional and ethical responsibility	0
(g) an ability to communicate effectively	0
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	4
(i) a recognition of the need for, and an ability to engage in life-long learning	0
(j) a knowledge of contemporary issues	0
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	4
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	9
(m) an ability to use computers and computer facilities in preparing data for interpretation.	3

Prepared By

Assoc.Prof.Dr. Yunus Kalkan, Assoc. Prof. Dr. Cengizhan Ipbuker, Dr. Ufuk Ozerman

18/06/2002

NAME OF DEPARTMENT					
Course Name	**Code**	**Regular Semester**	**Credit**	**Lecture**	**1**
				Recitation	**2**
Technical Drawing	**RES 101**	1	**2**	**Laboratory (Hour/Week)**	**-**

Course Language	Turkish
Course Type	Compulsary
Course Description	In engineering, importance of technical drawing and standard concept with technical drawing tools and materials. Lines and their meanings, technical writing. Principle of dimensioning and tolerancing. Projection, views of objects and sectional views. Basis of machine elements drawing and assembly drawing
Course Objectives	The aims of course are giving ability of preparing technical drawing, established with international standards, being a technical language among the mechanical engineers and connecting design and manufacture, and reading existing drawings.
Outcomes	The student will demonstrate their ability to 1. create freehand sketching 2. draw multi-view and sectional view for machine parts 3. apply surface finish symbols 4. draw standard machine elements 5. create machine assembly drawing 6. use conventional dimensioning technique
Textbook	H. Oztepe, Teknik Resim Cilt 1-2 ,Egitim Yayinlari,1995
Other References	1.A.W. Boundy, L L. Hass, Technical Drawing, McGraw-Hill Book Company , Sydney, 1991 2.Betoline, Wiebe, Miller, Mohler, Technical Graphics Communication, McGrawHill-Irwin Graphics Series, 1997. 3. C. Jensen, J. Helsel, Fundamentals of Engineering Graphics, McGraw Hill Book, 1992. 4. W.J. Lazadder, J.M. Duff, Fundamentals of Engineering Graphics, Prentice Hall Pub., 1997.
Prequisite (s)	Non

TOPICS COVERED

Week	Topics
1	Introduction to technical drawing
2	Principle of dimensioning and plate parts
3	Projection and basis of drawing views
4	Auxiliary views
5	Descriptive geometry and drawing symmetrical parts
6	Obtaining sectional views
7	Special sectioning conventions

8	Surface finish and surface texture symbols
9	Pictorial drawing principles
10	Materials symbols in machine design
11	Principles of machine elements drawing
12	General knowledge about assembly drawing
13	Mechanical assembly drawings
14	Limits and fits

Course Evaluation Method		**Quantity**	**Percentage**
	Midterm Exams	2	20
	Quizzes		
	Homeworks	2	20
	Projects		
	Term Paper		
	Laboratory Work		
	Other	10	20
	Final Exam	1	40
Contribution of course to meeting the professional component	**Mathematics and Basic Science**	-	
	Engineering Science	60	
	Engineering Desing	40	
	Social Sciences	-	
Prepared by: Assoc.Prof.Dr. Ismail Gerdemeli		**Date:** 01.06.2002	

ISTANBUL TECHNICAL UNIVERSITY
FACULTY OF MINES - MINING ENGINEERING DEPARTMENT

Course No. , Name, Credits, Type and Language

MAD 231, Underground Mining, 3+1hour/week, 3,5 Credit, Required , Turkish

Course Description

Introduction. Prospecting and evaluation. Exploration, reserve definitions and calculation methods. Grade, sampling. The value of ore deposit. Planning of underground structures. Planning of audits, drifts and inclines. Shafts, shaft location. Interval between levels, level planning, sublevels, Time scheduling. Structures in ore deposits. Excavation and face directions. Classifications of underground production methods. Longwall, shortwall, pillar chamber block methods. Method selection, stowing. Production methods in Turkey.

Prerequisite(s)

None

Textbook(s) or Other Required Material

Saltoglu, S., Excavation and Development in Mines, ITU Publication, 1987, (in Turkish), (4^{th} Edition), (main textbook)

Saltoglu,S., Underground Mining Methods in Mines,. ITU Publication, 1987, (in Turkish), (3^{th} Edition), (main textbook)

Hartman, H.L., SME Mininig Engineering Handbook, 2^{nd} Edition, Vol. 1-2, Port City Press Inc., 1992

Robert, S., Coal Mining Technology Theory and Practice Society of Mining Engineers, New York , 1983

Course Objectives

Underground Mining is a method for production of highly deep ore deposits. This method has importance due to decreasing of shallow ore deposits and environmental problems. Therefore it is necessary to give basic knowledge to the mining engineering students about underground mining methods.

Topics Covered on a Weekly Basis	
1. Prospection in ore deposit. Reserve and reserve determination	(1 week)
2. Tenor of mine deposit. Sample determination systems, amount of samples. Factors effecting the value of mineral deposits.	(1 week)
3. Projects and planning of underground deposits. Main developments (shafts, place of shafts, value of shafts and calculations).	(1 week)
4. Development from the shafts. Level development, shaft bottom developments, level cross-cut planning	(1 week)
5. Main development between levels, auxiliary shaft, inclines etc. Developments in sedimantary deposits, development metallic deposits.	(1 week)
6. Underground production methods. Face excavation and face advances systems. Classification of production methods. Longface production methods.	(1 week)
7. Longwalls rising direction, caving longwalls.	(1 week)
8 Diagonal longwalls, production system in diagonal longwalls. Diagonal longwall applications in steep and thick seams.	(1 week)
9. Production systems in narrow faces. Roof longwalls, stowing longwalls, longwalls with support.	(1 week)
10. Mid-term exam	(1 week)
11. Floor longwall, production methods with pillars	(1 week)
12. Room systems, open longwalls with free faces. Room and pillar methods, room systems, longwall above levels, funnel longwalls etc.	(1 week)
13 The factors effecting the selection of underground production methods.	(1 week)
14. Stowing systems. Underground methods applied in Turkey.	(1 week)

Class / Laboratory / Computer / Field Schedule
Mid-term studies 40 % (10% homework, 30% mid-term exam) and final examination 60 %.

Contribution of Course to Meeting the Professional Component
80% Mining Engineering Design (MT), 20 % Basic Engineering (TM)

Relationship of Course Program to ABET Criterion 3 of 2000	
Program outcome relations to the topics covered are assessed on weekly basis and the following gradings are used in the table. 0 week : No relation — 5 – 8 week : Related 1 – 4 week : Partly related — 9 – 14 week : Highly related	
(a) an ability to apply knowledge of mathematics, science, and engineering	4
(b) an ability to design and conduct experiments, as well as to analyze and interpret data	1
(c) an ability to design a system, component, or process to meet desired needs	10
(d) an ability to function on multi-disciplinary teams	-
(e) an ability to identify, formulate, and solve engineering problems	7
(f) an understanding of professional and ethical responsibility	1
(g) an ability to communicate effectively	-
(h) the broad education necessary to understand the impact of engineering solutions in a global and societal context	4
(i) a recognition of the need for, and an ability to engage in life-long learning	-
(j) a knowledge of contemporary issues	5
(k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.	7
(l) an ability to carry out an engineering design to meet the environmental and quality requirements of the society.	8

Prepared By
Prof. Dr. Senai Saltoglu, Prof.Dr. Gündüz Ökten 04/06/2002