

# DEPARTMENT OF MINING ENGINEERING

## A. About the Department of Mining Engineering

The vision of I.T.U. Mining Engineering Department is

- to keep its educational standards same as with the internationally well-known Mining Engineering Departments.
- to educate students to play an active role in industry, satisfying present and future needs of a global society through the development and implementation of revolutionary technologies for the extraction of mineral resources, and construction of underground structures in a socially responsible, economically viable and environmentally sound manner.

The mission of I.T.U. Mining Engineering Department is

- to provide high quality undergraduate and graduate programs supported by up-to-date curriculum and scientific and industrial research.
- to produce technically competent and well educated mining engineers who have team skills and are able to work in mining and mining-related industries both within the country and abroad.
- to educate mining engineers who can follow and utilize the technological developments that may occur during their careers and recognize the needs of an environmentally sensitive society.

## Educational Objectives

The undergraduate program of study is structured in a way that graduates meet the following objectives:

1. Achieving an educational experience with interdisciplinary flavor by studying a blended program consisting of mathematics and basic sciences, engineering, social and humanity sciences and elective courses.
2. Strong fundamental scientific and technical knowledge and experience in order to apply science and engineering skills to the analysis and design of mining and mining-related engineering projects with consciousness of quality.
3. The ability to effectively communicate technical/professional information in written, oral, both in Turkish and also in English language.
4. Capability for teamwork and ability to solve problems and make decisions.
5. Equipped for continuing learning, analytical thinking skills, and creativity which will serve as the foundation for life-long learning;
6. An awareness and understanding of professional obligations to protect human welfare and the environment with professional and ethical responsibility.

## **Research Objectives**

To cooperate with rapidly developing mining and mining related industries and develop innovative solutions to the problems by conducting research in fundamental and applied sciences.

## **Program Outcomes**

1. The ability to use mathematics, physics, chemistry and social sciences in mining engineering.
2. Development of students ability to define, analyze and solve mining engineering problems.
3. Development of the student ability to analyze a system, a component of the system to meet the requirements of a design process.
4. The ability to provide reliable solution to engineering problems so as to be sensitive to national and international environmental impact.
5. The ability to design an experiment, to collect data and analyze the results.
6. Ability to use effectively the modern engineering tools and information technologies.
7. The skill of conducting single or multiple disciplinary team works.
8. The skill of working individually.
9. The skill of lifetime learning by following development in science and technology.
10. Effective written or oral communication in Turkish.
11. Effective written or oral communication in English.
12. Professional and ethical responsibility.
13. To be aware of contemporary issues.
14. Consciousness of quality.

### **A1. ECTS Coordinator of the Department of Mining Engineering**

**ECTS Coordinator:** Doç. Dr. Selamet Erçelebi

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## A2. Student and Academic Staff Profile and Major Research Areas

The number of undergraduate students registered to the program at each level in 2007 is given in Table A.1., respectively. The Department of Mining Engineering accepts the undergraduate students through one of the following ways; a) admission of the students through a central examination system organized by the “Students Selection and Placement Center (ÖSYM)”, b) admission of transfer students from the other universities, ([www.sis.itu.edu.tr/yonetmelik/yataygecis.html](http://www.sis.itu.edu.tr/yonetmelik/yataygecis.html)) c) admission of students from the other faculties of ITU for the double major program ( [www.sis.itu.edu.tr/yonetmelik/cap.html](http://www.sis.itu.edu.tr/yonetmelik/cap.html) ).

Table A.1. Undergraduate Student Profile of Mining Eng. Dept. (2007)

Levels	Number of Students
ITU College of Foreign Language	62
First Year	54
Second Year	61
Third Year	43
Fourth Year	46

### Academic Staff Profile

Teaching and research team of the Mining Engineering Department includes a large number of faculty members to fulfill all the vision and mission requirements stated in this report. Distribution of the faculty and staff based on the divisions and their academic positions is given Table A.2.

Table A.2. Faculty and Staff Profile of Mining Eng. Dept. (2005-Spring Semester)

<b>Chair</b> : Prof. Dr. Gündüz Ökten		
<b>Secretary</b> : Yeter Kaya		
<b>DIVISIONS</b>		
<b>Underground Mining</b>	<b>Surface Mining</b>	<b>Mine Mechanization and Technology</b>
<b>Professors</b>	<b>Professors</b>	<b>Professors</b>
Gündüz Ökten*	Senai Saltoğlu (R)	Nuh Bilgin*

Erkin Nasuf Orhan Kural		Şinasi Eskikaya (R) Hasan Ergin
<b>Associate Professors</b>	<b>Associate Professors</b>	<b>Associate Professors</b>
Cengiz Kuzu	Selamet G. Erçelebi*	İsmail Uğur Hanifi Çopur
<b>Assistant Professors</b>	<b>Assistant Professors</b>	<b>Assistant Professors</b>
--	--	Cemal Balcı
<b>Research Assistants</b>	<b>Research Assistants</b>	<b>Research Assistants</b>
Dr. Hakan Tunçdemir Abdullah Fişne Türker Hüdaverdi İ. Emre Önsel Erim Güçlü	Dr. Cengiz Kırmanlı Murat Özkan Ozan Bayram	Dr. Ömür (Acaroğlu) Ergün Deniz Tumaç İlke Düzyol
<b>Secretary</b> Aynur Er		
<b>Technician</b> Hurşit Polat		

\*Head of Divisions R: Retired Web Page: <http://www.madenmuh.itu.edu.tr>

### **Research Interests**

- Planning for Underground Mining, Metro and Tunnel Excavations (feasibility studies, production planning, costing for tender documents)
- Cuttability Assessment of Intact Rocks and Rock Masses (full-scale linear cutting experiments, small-scale (core) cutting experiments, index tests- uniaxial compressive strength, Brazilian tensile strength, static and dynamic elasticity modulus, Poisson's ratio, acoustic velocities, Cerchar abrasivity, Cerchar hardness, point load index, cone indenter hardness, Shore scleroscope index, Schmidt hammer rebound value, impact strength index-).
- Selection and Design of Mechanical Miners (tunnel boring machines-TBMs, roadheaders, shearer-loaders, microtunnel machines, continuous miners, surface miners, etc.), Determination of Torque-Thrust-Power Requirements.
- Performance Prediction and Optimization of Mechanical Miners (theoretical, experimental and empirical prediction and optimization of instantaneous cutting rate, production rate and bit consumption rate).
- Cutter Selection and Design, Cutterhead Design, Determination of Cutterhead Geometry, Cutter Allocation (Lacing) Design on Cutterheads of Mechanical Miners.
- Selection and Design of Large and Small Drill Rigs (full-scale horizontal drill rig experiments, full-scale linear cutting experiments).
- Performance Prediction and Optimization of Large and Small Drill Rigs (full-scale horizontal drill rig experiments, full-scale linear cutting experiments).
- Mechanization of Underground Mining and Tunneling Operations
- Dimensional Natural Stone Cutting Technology Design

- Transportation Planning and Design in Underground and Surface Mines (rails, conveyors, shaft hoisting, hydraulic transportation, etc)
- Planning and Design of Water Drainage in Underground and Surface Mines.
- Design of Hydraulics and Pneumatics for Mining Machines
- Planning and Design of Underground Mines and Large Openings (feasibility, modeling, mining method selection, support design, surface settlement prediction)
- Planning and Design of Open Pit Mines (feasibility, block modeling by geostatistical methods, mining method selection, final pit limits, etc)
- Slope Stability Analyses (rock slopes, soil slopes, embankments, etc)
- Marble, Travertine etc Natural Stone and Aggregate Quarry Planning and Design
- Geostatistical Evaluation Methods for Reserve Estimations, Modeling of Ore Deposits and other Engineering Design Purposes
- Environmental Rehabilitation of Abandoned Mining Sites, Disposal of Mining Wastes
- Planning and Design of Drilling and Blasting for Underground and Surface Operations, Blasting Vibration Measurements
- Physical and Mechanical Property Tests for Rocks (uniaxial compressive strength, triaxial compressive strength, Brazilian tensile strength, shear strength, Schmidt hammer rebound value, point load, static and dynamic elasticity modulus, Poisson's ratio, acoustic velocities, image analysis, etc) and Rock Mass Characterization
- Physical and Mechanical Property Tests for Natural Building Stones and Aggregates (LA degradation, particle shape, bending strength, porosity, specific gravity, abrasion, sieve analysis, image analysis, freezing and thaw strength, etc)
- Ventilation Design of Underground Openings, Mines, Metro Tunnels, etc
- Ventilation Network Analysis, Physical Properties of Mine Air and Dust and Gas Measurements in Mine Air
- Mine Valuation, Investment Analysis, Mining Law

### ***Educational Facilities***

Mining Engineering Department is one of the four departments in the Faculty of Mines. The total useful area of the Faculty of Mines is 21,000 m<sup>2</sup> and the department occupies 3,000 m<sup>2</sup> of area. The Mining Engineering Department has 23 offices, 5 laboratories, 1 meeting hall, 1 library and 1 computer room. The construction of the faculty building was finished in 1988.

In addition to the facilities of the department, the faculty has a contemporary conference hall open to the use of all departments. The conference hall is equipped with all type of up to date visual aids and Internet connection. In the Faculty building, there are two computer rooms provided with 35 and 52 computers, respectively. All computers have Internet connection. Both computer rooms are open to the use of the students and lecturers. The faculty library has recently been furnished for the comfort of all students where specific publications in the field of earth sciences resources can be found.

There are 16 classrooms in the faculty 12 of which have been refurnished and supplied with Internet connection. The capacity of the classrooms varies between 70 and 192 students. All classrooms are equipped with an overhead projector. The classrooms in the faculty are open to the use of all students.

All laboratories of the Mining Engineering Department have been supplied with up to date equipment. The laboratories of the department have continuously been renewed with contemporary tools. The department has close relationship with the industry and different

organisations. Therefore, projects taken from different organisations are the major financial resource for maintaining the excellent condition of the departmental laboratories. The equipment list and their condition are presented below. Virtually all units in the laboratories are in working conditions, however, because of infrequent use of some units they need periodic maintenance.

Laboratories of Mining Engineering Department (<http://www.madenmuh.itu.edu.tr/Icerik.aspx?sid=2339>):

- Sample Preparation and Rock Cutting Laboratory
- Mine Safety and Ventilation Laboratory
- Mine Mechanization and Technology Laboratory
- Rock Mechanics Laboratory
- Micro-Tunnel Boring and Drilling Laboratory
- Aggregate Testing Laboratory

### **A3. Programs and Their Periods**

Istanbul Technical University, Mining Engineering Department offers the degree of Bachelor of Science in “Mining Engineering” following a four year (eight academic semesters) undergraduate education program. Each academic semester has 14 weeks of classes, excluding final examinations.

### **A4. Student Evaluation Methods (Exams, Labs, Home works, Projects, Term papers, etc.)**

Undergraduate students are informed about the course assignments including number of projects, seminars, terms papers, labs, home works, field studies, exams and the percentages of them at the beginning of each semester. Attendance required is 70% for the courses and 80% for the laboratories/workshops and other applied studies. The students who can not fulfill the attendance requirement can not take the final exam of that course. List of the students who can not fulfill the requirements to enter the final exam is posted in the last week of the semester. The students who can not fulfill the requirements to the final exam are graded to be (VF) for that course. The contribution of the final exam to the average grading of a course must be greater than 40% and less than 60%. At the end of each semester, ABET survey committee of the department reports the success of the courses in terms of the program outcomes and the success of the instructors based on the results of “Student Course Evaluation Surveys” and send them to the instructors. The instructors use both these reports and average course grades of students attending the course to improve the quality of the course. At the end of each semester, the instructors make suggestions on the types, numbers and percentage of the student evaluation methods for the following years.

## A5. Grading System

A supervisor of faculty member is assigned to each student who registered to the department. The supervisor monitors his/her students' performance during all their educational period. Students can continue their courses with or without prerequisite, if not conflicted. A prerequisite for a course means to have had the right for entering to the exam(s) of the prerequisite course(s). However, it can be requested from the students, with the suggestion of the Department and approval of the University Senate, to pass the exams of the prerequisite course(s). The information about the prerequisites are presented in Course Forms and ITU Internet Web Pages.

The students, except for the first semester students (freshman) and students under close monitoring, must register a minimum of 15 credits and maximum of 25 credits in a semester. He/she can drop a course and register to another one, with the approval of his/her supervisor, in the first 15 days of every semester; in addition, he/she has the right to withdraw from a course in the first month of the semester. The student can withdraw from maximum of one course in any one semester and of seven courses in all the undergraduate education period.

The success of the students in the courses is an indicator of their improvement. The scores of the course activities such as homework, quizzes, mid-term exams, team works, presentations, etc, combined with the final exam scores are considered to be the indicators of their success. The success of a student in a course is defined via Relative Grading. In this type of evaluation, the success of a student is defined based on his/her mid-term studies combined with the final exam and considering the general success level of the whole class. Instructor of the course performs the relative grading by considering grade distribution and average grade in the class. The grading and success relation is presented in Table A.4. A student, if he/she wants, can re-take a course to raise his/her average grade. The last grading is valid for these courses.

**Table A.4. Relative Grading and Success Relation**

<b>Relative Grade</b>	<b>Success Level</b>
AA (4.0/4.0), BA (3.5/4.0), BB (3.0/4.0), CB (2.5/4.0) and CC (2.0/4.0)	Pass
DC (1.5/4.0) and DD (1.0/4.0)	Conditional Pass
F (0.0/4.0)	Fail
VF (0.0/4.0), unsuccessful to enter final exam	Fail

AA	4.0	excellent
BA	3.5	very good
BB	3.0	good
CB	2.5	average
CC	2.0	satisfactory
DC	1.5	poor
DD	1.0	minimum acceptable
F	2.0	failure
VF	0.0	not permitted to take courses with prerequisites

The grade point average (GPA) is a weighted average determined multiplying the grade received in each course by the number of its credit hours and then dividing the sum by the total number of course credit hours earned.

## B. Programs

### B.1. Graduation

Before graduation, the undergraduate student has to complete MAD 492 Graduation Project. The graduation project is accepted as a last semester course. However, it is possible to choose graduation project subject before the last semester. Graduation projects are evaluated and graded by a jury. Undergraduate students who have completed the compulsory and elective courses of the program (Table B.1), fulfilled the internships and succeeded in 30% of the total credit hours in English will be granted with the graduation diploma (B.Sc.) provided that their GPA is not less than 2.00.

Table B.1. Program of undergraduate education of the Department of Mining Engineering. Each course is defined with its code, name, type, language and assigned ECTS credits. Type of courses; TB: Basic Science Course; TM: Basic Engineering Science Course; ITB: Humanities and Social Science Course; MT: Engineering Design Course.

1. Semester									
Course Code	Course Name	ECTS	Credit Hours	Course Hours	App./Lab. Hours	TB	TM	MT	ITB
BIL 101E	Intr. to Comp. and Info. Sys.	3	2	1	2		2		
MAD 111	Intro. to Mining Eng.	3	1	1	0			1	
MAT 101	Mathematics I	8	5	4	2	5			
FIZ 101E	Physics I	4	3	3	0	3			
FIZ 101EL	Physics I Lab.	2	1	0	2	1			
RES 103	Technical Drawing (CAD)	5	3	2	2		3		



ING 101	<a href="#">English Course I</a>	3	3	3	0				3
	<b>TOTAL</b>	<b>28</b>	<b>18</b>	<b>14</b>	<b>8</b>	<b>9</b>	<b>5</b>	<b>1</b>	<b>3</b>

## 2. Semester

Course Code	Course Name	ECTS	Credit Hours	Course Hours	App./Lab. Hours	TB	TM	MT	ITB
KIM 101	General Chemisrty I	4	3	3	0	3			
KIM 101L	General Chemisrty I Lab.	2	1	0	2	1			
BİL 104 E	Intr. to Sci & Eng Comp.	5	3	2	2		3		
MAT 102	Mathematics II	8	5	4	2	5			
FIZ 102 E	Physics II	6	4	3	2	4			
ING102	English Course II	4	3	3					3
	<a href="#">2.yy Elective (ITB)</a>	3	3	3					3
	<b>TOTAL</b>	<b>32</b>	<b>22</b>	<b>18</b>	<b>8</b>	<b>13</b>	<b>3</b>		<b>6</b>

## 3. Semester

Course Code	Course Name	ECTS	Credit Hours	Course Hours	App./Lab. Hours	TB	TM	MT	ITB
MAD 232	Surface Mining	4	2.5	2	1			2,5	
MAT 261	Linear Alcebra	4	3	3	0	3			
MAD 211	Mineralogy	5	2.5	2	1		2,5		
MEK 205	Eng. Mechanics	4	3	3	0		3		
MAD 241	Blasting Technology and Applications	5	2	2	0			2	
MAT 271E	Probability and Statistics	3	3	3	0	3			
MAT 202	Numerical Methods	5	3	3	0	3			
	<b>TOTAL</b>	<b>30</b>	<b>19</b>	<b>18</b>	<b>2</b>	<b>9</b>	<b>5,5</b>	<b>2,5</b>	

## 4. Semester

Course Code	Course Name	ECTS	Credit Hours	Course Hours	App./Lab. Hours	TB	TM	MT	ITB
MAT 201	Differencial Equations	6	4	4	0	4			
ING 201	English III	3	3	3	0				3
JEO 112	General Geology	4	3	3	0		3		
MAD 252E	Mining and Environmental	4	2.5	2	1			2.5	
JEO 331	Petrography	4	2.5	2	1		2.5		
MAD 243	Underground Mining	5	2.5	2	1			2.5	
	<a href="#">4.yy Elective courses (TB)</a>	4	3	3	0	3			

	<b>TOTAL</b>	<b>30</b>	<b>20,5</b>	<b>19</b>	<b>3</b>	<b>7</b>	<b>5,5</b>	<b>5</b>	<b>3</b>
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### 5. Semester

Course Code	Course Name	ECTS	Credit Hours	Course Hours	App./Lab. Hours	TB	TM	MT	ITB
<a href="#">MAD 341</a>	Mineral Processing I	5	2.5	1	3			2.5	
<a href="#">MAD 311</a>	Geophysics	4	2	2	0		2		
<a href="#">MAD 361</a>	Mineral Deposits	4	2	2	0		2		
<a href="#">MAD 371</a>	Haulage Drainage in Mines	4	2.5	2	1			2.5	
<a href="#">MAD 351</a> <sup>E</sup>	Rock Mechanics	4	2.5	2	1		2.5		
TUR 101	Turkish I	2	2	2	0				2
	<a href="#">5.yy Elective courses (ITB)</a>	3	3	3	0				3
	<a href="#">5.yy Elective courses (MT)</a>	4	3	3	0			3	
	<b>TOTAL</b>	<b>30</b>	<b>19.5</b>	<b>17</b>	<b>5</b>		<b>6.5</b>	<b>8</b>	<b>5</b>

### 6. Semester

Course Code	Course Name	ECTS	Credit Hours	Course Hours	App./Lab. Hours	TB	TM	MT	ITB
<a href="#">MAD 352</a>	Mineral Processing II	5	3	2	2			3	
<a href="#">MAD 342</a> <sup>E</sup>	Hydraulic Power Systems in Mining	4	2	2	0			2	
<a href="#">MAD 322</a>	Design of Supports in Mines and Tunnels	4	2.5	2	1			2.5	
<a href="#">MAD 312</a>	Topography	5	3	2	2		3		
TUR 102	Turkish II	2	2	2	0				2
	<a href="#">6.yy Elective Course-tr (MT)</a>	4	3	3	0			3	
	<a href="#">6.yy Elective Course-E (MT)</a>	4	3	3	0			3	
	Practical Training(summer)	2							
	<b>TOTAL</b>	<b>30</b>	<b>18.5</b>	<b>16</b>	<b>5</b>		<b>3</b>	<b>13.5</b>	<b>2</b>

### 7. Semester

Course Code	Course Name	ECTS	Kredi	Course Hours	App./Lab. Hours	TB	TM	MT	ITB
ATA 101	Revolutions History I	2	2	2	0				2
<a href="#">MAD 431</a>	Coal Prep. and Technology	4	2	1	2			2	
<a href="#">MAD 411</a>	Mining Machinery	5	2.5	2	1			2.5	
<a href="#">MAD 421</a>	Mine Ventilation and Safety	5	2.5	2	1			2.5	
<a href="#">MAD 441</a> <sup>E</sup>	Mine System Analysis	4	2.5	2	1			2.5	
<a href="#">MAD 471</a>	Electrotechniques in Mines	3	1.5	1	1			1.5	
	<a href="#">7.yy Elective Course (ITB)</a>	3	3	3	0				3
	<a href="#">7.yy Elective Course (MT)</a>	4	3	3	0			3	

	<b>TOTAL</b>	<b>30</b>	<b>19</b>	<b>16</b>	<b>6</b>			<b>14</b>	<b>5</b>
<b>8. Semester</b>									
Course Code	Course Name	ECTS	Kredi	Course Hours	App./Lab. Hours	TB	TM	MT	ITB
ATA 102	Revolutions History II	2	2	2	0				2
MAD 492	Graduation Project	8	3	0	6			3	
<a href="#">EKO 201</a>	Economics	4	3	3	0				3
<a href="#">MAD 422</a>	Mine Planning and Design	4	2	1	2			2	
<a href="#">MAD 432E</a>	Mech.in Min.and Tun.Ex.	4	2.5	2	1			2.5	
ETK 101	Engineering Etics	2	1	1	0				1
	<a href="#">8.yy Elective Course (MT)</a>	4	3	3	0			3	
	Summer Training	2							
	<b>TOTAL</b>	<b>30</b>	<b>16.5</b>	<b>12</b>	<b>9</b>			<b>10.5</b>	<b>6</b>

**[ Total Study: 120 ECTS Credits ]**

## COURSES OF UNDERGRADUATE SUBPROGRAMS:

MINING PROGRAM						MINERAL PROCESSING PROGRAM					
<b>5. Semester</b>											
Course Code	Course Name	ECTS	Credits	Course hrs	Appl./Lab.	Course Code	Course Name	ECTS	Credits	Course hrs	Appl./Lab.
<a href="#">MAD 326</a>	Mining Laws(in Turkish)	4	3	3	0	<a href="#">MAD 315</a>	Metalurgy (in Turkish)	4	3	3	0
<b>6. Semester</b>											
<a href="#">MAD 318</a>	Industrial Minerals(in Turkish)	4	3	3	0	<a href="#">MAD 318</a>	Industrial Minerals (in Turkish)	4	3	3	0
<a href="#">MAD 313E</a>	Drilling Techniques	4	3	3	0	<a href="#">MAD 423E</a>	Flotation and Flocculation	4	3	3	0
<a href="#">MAD 328</a>	Shaft and Roadway Drivages in Mines(in Turkish)	4	3	3	0						
<b>7. Semester</b>											
<a href="#">MAD 413E</a>	Large Section Underground Opening	4	3	3	0	<a href="#">MAD 417E</a>	Recycling of Mineral Processing Plant Tailings	4	3	3	0
<a href="#">MAD 415E</a>	Cement Technology	4	3	3	0						
<b>8. Semester</b>											
<a href="#">MAD 410</a>	Economical Evaluation of Mining Investments(in Turkish)	4	3	3	0	<a href="#">MAD 416</a>	Post Concentration Processes(in Turkish)	4	3	3	0
<a href="#">MAD 418</a>	Marble Technology(in Turkish)	4	3	3	0	<a href="#">MAD 428</a>	Plant Design in Mineral Processing(in Turkish)	4	3	3	0
<a href="#">MAD 420</a>	Health and Safety in Mines (in Turkish)	4	3	3	0						