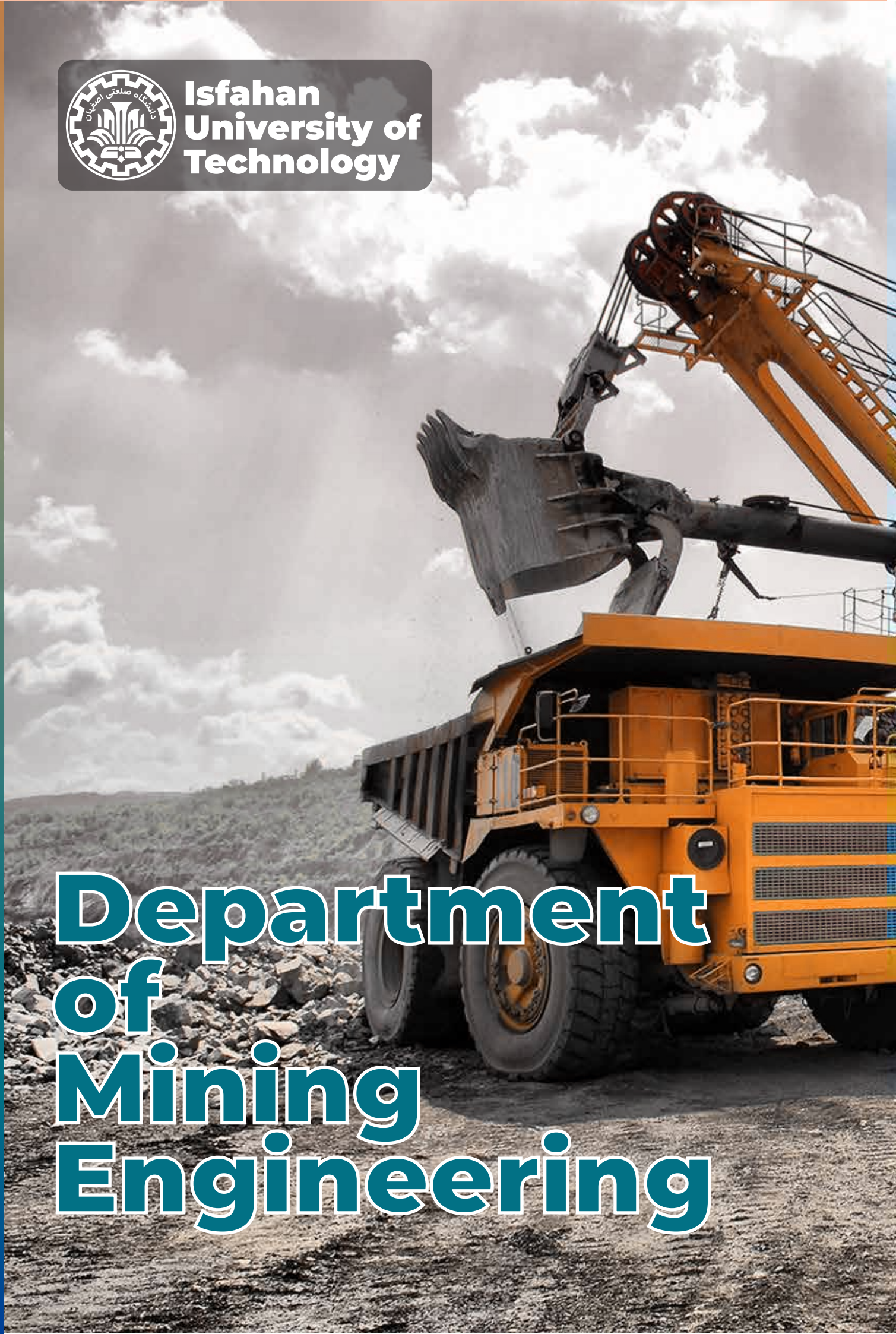
Isfahan University of Technology



Department of Mining Engineering

In The Name of God

Contents

Overview

Established in 1977, Department of Mining Engineering was started as one of the first university disciplines. As one of the most experienced units in mining engineering education, this department has made efforts to train responsible, creative and skillful practitioners in various fields of exploration, exploitation, rock mechanics, mineral processing and petroleum exploration in order to create changes in the mineral industry and meet the needs of industry.

The department has twenty-two full-time faculty members and ten staff dedicated to the research and education of more than 280 undergraduate and 190 master and Ph.D. students. Some of our research institutes and laboratories are among the top research centers of the country in Nano- and Bio-technology, mining equipment maintenance, surface mine, and underground structure design and geothermal supporting strong collaborations with national organizations, and academic and industrial partners.

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Department of Mining Engineering

Degree Programs

Bachelor Program

140 credits

Master Program

26 credits of coursework + 6 credits of thesis

Doctoral Program

18 credits of coursework + 24 credits of dissertation

Disciplines of the Department of Mining Engineering	
B.Sc.	*Mining Engineering*
M.Sc.	*Mining Exploitation Engineering*
	Mining Exploration Engineering
	Mineral Processing Engineering
	Rock Mechanics Engineering
	Petroleum Exploration Engineering
Ph.D.	*Mining Exploitation Engineering*
	Mining Exploration Engineering
	Mineral Processing Engineering
	Rock Mechanics EngineeringEngineering

To accomplish a successful B.Sc. in Mining Engineering, undergraduate students must take 22 credits in general courses, 27 credits in basic courses, 82 credits in compulsory courses, and 9 credits in elective courses (total 140 credits).
Graduate students must take 12 credits in compulsory courses, 12 credits from elective courses, two credits from a seminar, and 6 credits from a thesis, overall 32 credits to receive M.Sc. degree. The Ph.D. program consists of 18 credits of coursework and 24 credits of dissertation. Students must pass the written and oral comprehensive exams after completion of coursework.

Reasons to study at this department

- Strategic Partnership: We have thriving partnerships with outstanding research centers and organizations of the country including “Mining Industries such as Tabas Coal Mines, Sangan Iron Ore Complex, BAMA Company”, “Department of Natural Resources”, “The Northernmost University of Technology in Scandinavia” and “Clausthal University” supporting institutional research and teaching exchanges by mobility grants
- Visibility: Where feasible, this department coordinates its international presence with other Iranian higher education institutions and with the Ministry of Science, Research and Technology (MSRT)
  Global engagement: As an excellent research and education institution, this department is committed towards society and contributes to sustainable development
- Bilingual Communication: Administrative information and study-related procedures such as courses and research fields are published in Persian and English
- Mobility: All Ph.D. programs have a built-in mobility window, enabling students to take sabbatical leaves as part of their research work
- International Programs: This department has successful experiences in holding joint sabbatical program with “University of Clausthal” in Germany
- High-tech: application of Bio- and Nano-Technology in mineral processing plant design.

Students have freedom in course selection and planning and can benefit from strong digital technologies and equipped laboratories such as mineral processing laboratory available at this department.

Program Objectives

To achieve missions and educational objectives, the Mining Engineering Department ensures that graduates will attain the following program outcomes and abilities:

- Applied knowledge in mathematics, science, and engineering
- Experimental design and data interpretation
- Multi/Interdisciplinary teamwork
- Identification and solution of engineering problems
- Understanding professional responsibility
- Recognition and engagement in life-long learning
- Basic concepts in management, business, public policy, and leadership

Within a few years of graduation, our graduates will:

- Supervise the exploitation and exploration of the both underground and surface mining operations, and design a safe and profitable plane to extract surface and underground mines.
- Bring innovative decisions for making the mining operation sustainable in challenging environmental and difficult market conditions.
  Communicate and work in multidisciplinary teams and professional organizations.
- Possess fundamental technical and scientific knowledge as well as practical skills that allow them to make judgment-based decisions with confidence.
- Come up with new ideas and innovations that empower advancements in their profession.

Research Areas

- Optimization of Drilling Operation and Tools
- Mine-to-Mill optimization
- Mine Automation
- Mining Machinery Management and Optimization
- Ornamental Stones Extraction and Processing
- Ground Control and Geomechanical Risk Analysis in Coal Mines
- Underground Mining
- Mechanized Tunneling
- Mineral Processing in the field of Hydrometallurgy includes Leaching,
- Solution Concentration and Purification, Metal Recovery, Bio leaching.
- Mining Exploration includes Exploration Geophysics, Exploration Geochemistry, Remote Sensing and GIS, Evaluation Hydrocarbon Exploration.
- Rock Mechanics includes Dam, Tunnel, Slope, Underground Spaces, Petroleum Geo-mechanics, Open Pit Mine and Underground Mine Design.
- Petroleum Exploration includes Stratigraphy and Sedimentology, Petroleum Geology, Petrophysics, Basin Analysis and Exploration Geophysics.
- Mechanized Excavation
- Numerical Simulation and Instrumentation in Geomechanics.
  Pharmaceutical and Environmental Applications of Clays and Clay Minerals
- Processing and Modification of Minerals for Production of Nanomaterials and their Applications.
- Simulation, Modeling, and Control of Mineral Processing Processes (Commination, Flotation, Hydrometallurgy)

Industrial Projects

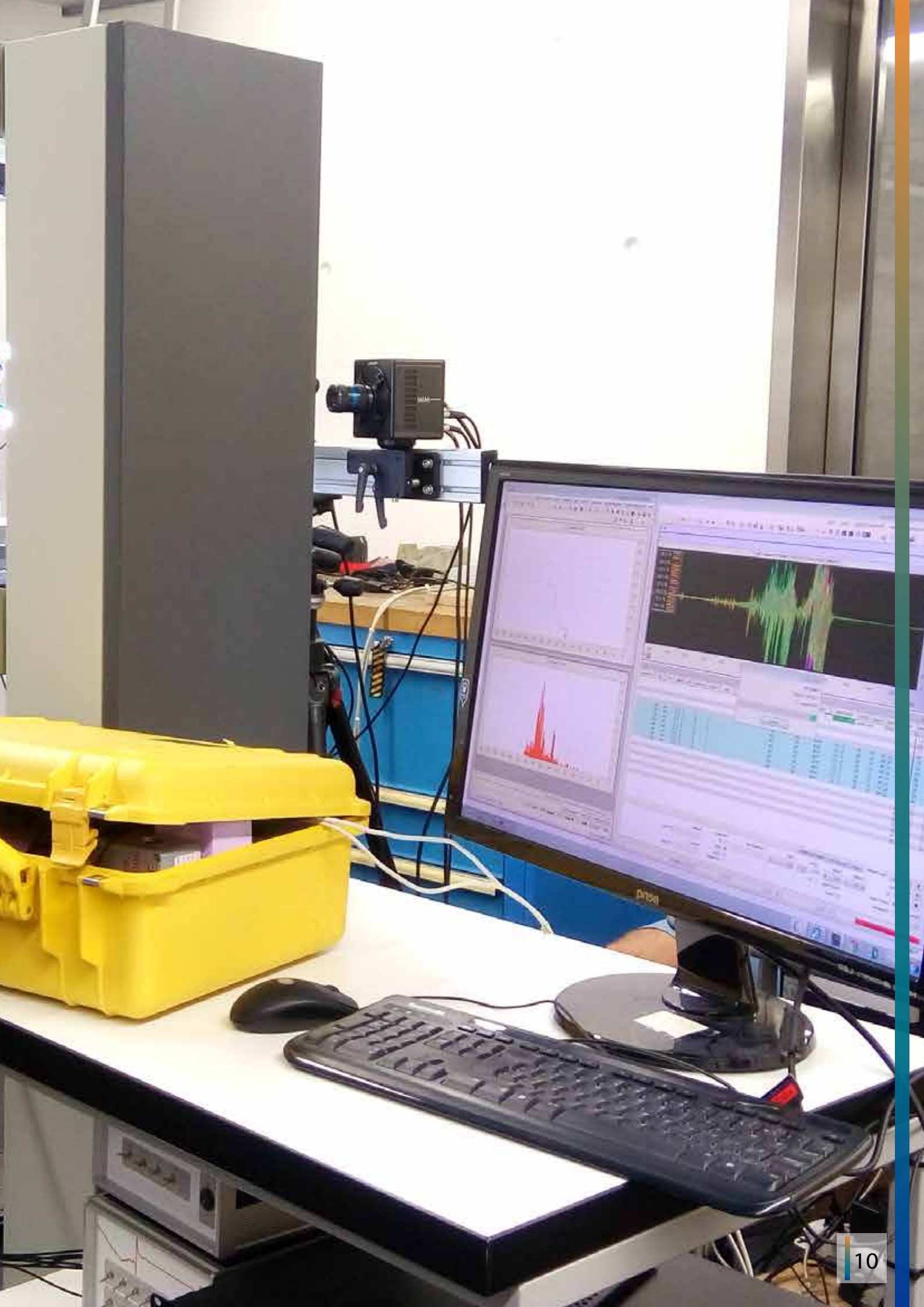
Employer	Number of Projects
BAMA Mining Complex	3
Sangan Iron Ore Complex	2
Esfahan's Mobarakeh Steel Company	8
National Iranian Copper Industries Company	1
Vice-Presidency for Science and Technology	1
Mining Industry	10
Department of Environment	2
Iran Aircraft Manufacturing Industrial Company (HESA)	1

Interdisciplinary Approaches

In collaboration with Departments of Civil Engineering, Mechanical Engineering, Natural Resources Engineering, Chemical and Materials Engineering our department provides a platform for students to learn teamwork and thus enhance their technical knowledge through inter-disciplinary projects pursued by our departments.

International Profile

Scientific cooperation with ETH Zorich, Clausthal University, Halle-Wittenberg University, Lulea University of Technology and Uppsala University.



A Profile of the Labs

Rock Mechanics Lab

The geomechanical characteristics of rock such as compressive, tensile and shear strength, permeability, physical characteristics, P and S wave velocity and rock drillability could be determined in this lab. The major focus of this lab is on the training of undergraduate students. The lab is also used for research studies by graduate students.

Research Equipment:

- *Slake Durability*
- *Pundit Lab Ultrasonic Instrument to Measure the P and S Wave Velocity*
- *Furnace and Freezer (-75 to 1400)*
- *Oven (200)*
- *Core Drilling and Preparation*
- *Uniaxial and Triaxial Compressive Test*
- *Direct Shear Test*
- *Permeability Test*
- *Brazilian Tensile Test*
- *Four Point Bending Test*
- *Drillability Test*
- *Diamond Wire Saw*

Mineral Processing Lab

The mineral processing lab executes tests on various types of minerals in batch and pilot circuit and it is used by undergraduate students in mineral processing course to understand the mineral separation techniques. Moreover, it is used by graduate students to perform research work.

Research Equipment:

- *Sample Preparation, Study and Testing of Mineral Recovery;*
- *Crushing and Grinding (Jaw, Cone and Impact Crushers, Ball and Rod Mills)*
- *Gravity Separation*
- *Magnetic Separation*
- *Flotation*
- *Leaching and Bioleaching*

Geophysics Lab

In line with the educational and research programs of the Department of Mining Engineering, the geophysics laboratory has been operating since 1999. This laboratory plays an essential role in understanding the basics and applications of geophysical exploration methods and provides services for undergraduate and postgraduate students.

At present, this laboratory supports geophysical projects in magnetometry, magnetic gradiometry, electromagnetic VLF, electrical resistivity measurement, self-potential, induced polarization, seismography, seismometry, and well-logging. This lab provides students and researchers with opportunities to improve their skills in geophysics using related software for modeling and data interpretation.

This laboratory can implement all practical geophysical projects at the level of industry and mining companies' needs. So far, this laboratory has accomplished more than a dozen geophysical exploration projects in various fields such as groundwater exploration, mineral exploration, and archeology. Furthermore, the geophysics laboratory announces its readiness to carry out geophysical exploration projects and invites applicants to send their application to this laboratory.

Research Equipment:

- *A Digital Total Station Theodolite*
- *GPS and Compass*
- *ENVI Magnetometric and VLF Electromagnetic Device*
- *Scintrex IP & RS Measuring Devices*
- *A Site for Geophysical Surveying with Buried Masses*
- *Mala GPR Device*
- *Geophysical Wireline Logging Sondes and Probes*
- *6 Channel Seismograph and Geophones*
- *BLS244 Blast Recorder*
- *Metronix ADU07e Magnetotelluric Measurement System*

Geochemistry Lab

This laboratory includes analytical instruments and general devices and hardware for geochemical studies. Atomic Adsorption and UV-visible instruments are the main tools in geochemistry laboratory.

Microscope, Mineralogy, Petrography Lab and Mineral Museum

There are 24 systems of the reflected-transmitted polarizing light microscopes for petrographic studies on ore and rock samples. Some of them are equipped with the devices of the camera, television and computer systems.

There are many of the hand specimens of minerals with different compositions such as silicates and non-silicates (carbonate, sulfide, sulfate, oxide, evaporate and halide minerals). Moreover, there are a lot of hand specimens of rocks in the 3 classifications sedimentary, igneous and metamorphic rocks in petrography lab.

Mining Machinery Laboratory

This laboratory was founded in 2018 as a unique research laboratory in Iran and the Middle East. All master and PhD thesis, along with industrial research projects in the field of mining machinery, are performed in this laboratory. the available testing equipment are as listed below:

- *Leeb Hardness Testing*
- *Smoke Density Analyzer*
- *Thermographic Camera*
- *Tire Wear Analysis Instruments*
- *Ultrasonic Thickness Tester*
- *Ball-bearing Health Tester*
- *Operator Body Vibration Platform*
- *Sound Level Analyzer*

Ornamental Stones Laboratory

This laboratory as one of the unique laboratories among the Iranian universities is hosting all research activities related to ornamental stone extraction and processing. Currently the following testing rigs are applied in this laboratory:

- *Real Scale Wire Saw Machine*
- *Polishability Testing Machine*
- *Cerchar Abrasiveness Tester*

The Professor Basir Rock and Mineral Museum

The Professor Basir Rock and Mineral Museum was established in 1997 in the Department of Mining Engineering by the efforts of Professor Dr. Sayed Hasan Basir. The main purpose of collecting rock and mineral samples was helping students and specialists to watch and study the different forms, colors and patterns of the main and some accessory constituents of the Earth's crust. Several good samples, mainly of minerals, have been collected from Iran and different parts of the world.

We would like to express our sincere thanks to the faculty members at the Department of Mechanical Engineering, and our colleagues at International Scientific Cooperation Center (ISCC) for sincere assistance in producing this prospectus.

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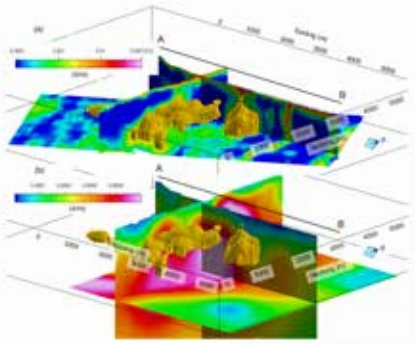

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