



Diploma in Mineral Economics



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Director: Dr. José Saavedra Rosas

Presentation

The Department of Mining Engineering offers the **Diploma in Mineral Economics**. The program is oriented to **engineers, geologists, and others related engineering professionals** who will fulfill senior management roles in companies and institutions in the natural resources sector.



This program provides students with a broad-based fundamental knowledge of mineral economics, financial aspects of the mining industry, and the interaction of business, cultural, and technological issues related to the exploitation of natural resources. It is also designed to **strengthen students' communication, problem-solving, critical thinking, and teamwork skills**.

The Diploma contains 10 modules plus a case study that has to be developed by the student with the supervision of the academic staff. After this process, the student will obtain the **Diploma in Minerals Economics** issued by the University of Chile.

After the end of the Diploma, graduates will be eligible for the **Master of Science in Mineral Economics**, at **Curtin University, in Perth, Australia**. It will be necessary to complete a 5 courses sessions and approve all English requirements.

Location: Department of Mining Engineering, Faculty of Physical and Mathematical Sciences - Universidad de Chile, Av. Tupper 2069, Santiago.

Time: Monday to Friday from 9:00 to 13:00 and from 14:00 to 18:00.

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Note 1: *The Department of Mining Engineering has the right to suspend the Diploma if the number of students is not enough to ensure minimum administrative conditions and the quality of the program.*

Note 2: *If one of the lecturers or professors needs to be replaced, the program has the commitment to find a new one with similar background.*

Why is our program attractive?

1. It is carried out by two of the most prestigious and traditional mining institutions, at their respective geographical zones: **The Department of Mining Engineering (Universidad de Chile, Santiago, Chile) and The Department of Mining Engineering (Curtin University, Perth Australia).**
2. Students attend classes for short periods of time.
3. Our students return to their jobs with new knowledge and skills, which can be directly applied to their professional activities.
4. Professors and lecturers are world-class scholars, thus enhancing the highest quality learning.
5. Despite intensive sessions take place in short periods of time, the project study case maintains the concentration and continuity of the student throughout the year
6. The courses allow to relate and fill the gap between the technical and commercial aspects of the mining industry. Participants from various professional activities can expand their knowledge working on an international environment as a team.

Course description

The Diploma considers 10 modules of one-week length (240) divided in 3 semesters (fall, spring, and summer) covering different areas of **Mineral Economics**, a project developed by the student (140 hours), and personal work (220 hours) between modules. Here you can find a brief description or contents of the courses of the Diploma. Courses consider among their activities exercises with the supervision of assistants.

Students are required to have adequate English language skills so that they can study the complementary material.

Fall Session

1. Mining and Economic Development

Microeconomic: Role of Market - supply and demand, production, costs and utilities, Competitive Markets, price discrimination. **Trade in a Global World:** Comparative Advantages – trade models. Instruments of trade policy. The work factor in Global Economy. **Foreign Direct Investment (FDI) in a Global World:** Empirical FDI Evidence, FDI topics and investment. Costs and benefits of FDI. **Special globalization topics:** Free Trade, Commercial Agreements and Protectionism, Multilateral Institutions - GATT-WTO- IMF-World Bank, China & India, Latin America. **Globalization:** Benefits and costs of Globalization.

2. Natural Resource Economics

Introduction to Mineral Economics. Demand, supply and market: a review. Minerals and Economic development –foundations (Economic growth and development, Periods of history and minerals, minerals and economic development -the traditional view, mineral consumption - recent trends. **Mineral resources – Course or blessing?** Resources booms and Dutch disease. Empirical evidence: Chile, Australia, and Africa. **Non-renewable Natural Resources:** Natural resources. Mineral markets and price cycles. Demand and supply responses. **Renewable Natural Resources. Market failure:** Property rights and externalities, information and uncertainty. The Economics of Pollution. Externalities. Valuation of Natural Resources. **Mineral Taxation and Royalties:** Concept of Economic Rent / Royalties. Design Principles. **Mineral Policy**

3. Financing the Mining Activity

The Chilean financing system. Preliminary financial concepts. Financial states analysis. Profitability, financial ratios and short-term indicators. **Fixed and Variable Income Instruments.** Assessment. Bond valuation. Duration. Share valuation. Gordon-Shapiro model. Inc valuation. **Risk and Uncertainty.** Probabilistic analysis and Monte Carlo simulation. Introduction to real options: decision trees. Risk of an individual asset and a portfolio. Capital Asset Pricing Model, CAPM. **Capital Asset Pricing Model continuation.** WACC. Application: Financing structures analysis (Modigliani and Miller) and EVA. **A panoramic view of derivatives.** The binomial model and the Black-Scholes formula. The net present value limitation rule and the use of option theory to evaluate an investment project.

Spring Session

4. Risk Analysis and Decisions in Mining

Introduction and Statistical Review. Financial Risk: Uncertainty and Risk. Stochastics for prices. Volatility Models. Risk Evaluation Methodologies. **Simulation and Operational Risk:** Introduction, discrete event simulation concepts, random variables model. Introduction to Ptolemy II. **Geological Risk:** Sampling. Geostatistical Concepts and Kriging. Conditional simulation.

5. Innovation and Entrepreneurship in Mining

6. Socio-economic Impacts in Mining

Macro-Economic Impacts: Trade Balance and Exchange / Exchange Rates and Inflation / Reserve Accumulation / Dutch Disease Effect/ Currency expenses. **Financial Impact of Mining:** Ricardian rent concept / Royalty / Criteria of sustainability fund / National taxes / Tax evasion mechanisms / Optimal tax. **Impacts in Local Economy:** Consumer chains. Infra-structure effect. Technological effects. Gross domestic product by sector. Depletion and Natural Resources pollution. Higher cost of labor work. Higher cost of production factors. Antofagasta disease effect. Sustainable GDP. H index. **Social Impacts on employment, poverty, and social inequality:** Employment and Unemployment / Poverty lines / Gini coefficient. The division of communities. **Mining Socio-Environmental Impacts:** Water and pollution /The effect on native people's culture/ Negative effects of production growth. **Political Impact:** Mining and Socio - environmental conflicts/ Political and media financing /Relationship with citizens' organizations.

7. Global Competitiveness in Mining

Introduction to Mineral Resources Economics. Market and Industry Analysis. Competition in times of cholera: How to compete in difficult times? A personal vision about the extractive industry and the opportunities generated by crises. **Competition key factors:** Professional human resource for mining. Water and energy: conflicts and uses. Logistics and services: new fronts of a complex business. **Comparative and Competitive Advantages Concepts. Towards a business strategy:** Strategic Analysis and business strategy. **Recent trends in the competitiveness of mining companies.** Creation of value for shareholders. The role of stock markets and their effects on the strategy of mining companies, Competition in the commodities markets: comparative advantages to competitive advantages. The end of the "super - cycle " of mining: problems and challenges of the current situation for the competitive strategies of the mining industry. **Reducing costs and increasing productivity:** Impacts of outsourcing services. Social and Environmental Sustainability in mining. Project Management.

Summer Session

8. Legal and Regulatory Environment

Mining and Environment: Sustainable development. Definition of environment. Environmental aspects/impacts. Impact characterization. Environmental impacts of mining and metallurgical processes. Mining and metallurgical wastes. Atmospheric emissions. Water emissions. **Regulatory Framework and Environmental Institutions:** Environmental law and environmental responsibility. New environmental regulations and institutions. Environmental management instruments. Policies and international agreements. Mine closure legislation. System of environmental impact assessment. **Water and Mining – Sustainability challenges:** Demand end efficient use of water, water supply alternatives. Legislation. Seawater, a new alternative. Environmental policies. ISO 14,000 certification. Mining and energy. Responsible handling of mining waste. Closure and rehabilitation of mine sites. Corporate social responsibility. **Legal and regulatory framework for mining. Taxation.**

9. Minerals Market Analysis

Introduction: Short-Run Model of a Commodity Market. Economic Profits, Economics Rents, and the Extractive Sector. Porter's Five Sources of Competition. Supply and demand. **Market volatility and instability:** Immediate-run volatility, short-run instability, and long-run episodes. **Market structures:** Competition, Monopoly and monopsony. Dominant firms. Oligopoly and oligopsony. **Location and product quality:** How transportation costs limit the geographic extent of some markets?. How differences in product quality are reflected in price in some markets? **Sustainability and sustainable development, and other special topics**

10. Cost Estimation and Capital Investment

Economic Environment. Introduction to Ordinary Least Squares. Business Plan and project evaluation. Costs from an economic perspective (capital costs and operational costs). Introduction to Linear Programming. Projects Portfolio Control and Management. Project Financing. Project Planning and Control.

Each program's module will be evaluated through tests/readings/presentations/reports and/or a final exam. The minimum passing grade is 4,0 on a scale from 1,0 to 7,0.

Professors and Lecturers

- Prof. Patricio Meller, Ph.D.
- Prof. Dan Packey, Ph.D
- Prof. Eduardo Contreras, Ph.D.
- Prof. José Saavedra-Rosas, Ph.D.
- Ing. Jorge Lara, MBA
- Prof. Jan Cademartori, Ph.D.
- Ing. Jorge Bande, MEc
- Ing. Marcelo Vargas, MSc.
- Dr. Jacques Wiertz, Ph.D.
- Cristián Quinzio, MA
- Prof. Rod Eggert, Ph.D.

Application and Admission Requirements

There are a restricted number of positions and are offered in strict order of registration. Candidates fulfilling the following requirements, may apply to the Diploma:

- Hold a bachelor degree in a discipline related to the program. They may also apply those who hold a professional degree which level, content and duration of studies correspond to an equivalent to the degree of Bachelor of the University of Chile.
- Curriculum Vitae
- At least 2 years' experience working in mining
- Application Form
- Sponsor letter (company's financing) and payment order
- Good level of written and spoken English.
- Cover letter in English

Each application will be resolved by the Academic Director of the Program, who will decide the acceptance or decline of the admission, based on the information presented.

Interested people registering the Diploma must apply to the program by sending the documents describe above to: diploma@minas.uchile.cl

Fees

The program has a total cost of US\$ 15.000.

- Enrollment : US\$ 500
 - Fall Session : US\$ 4.500
 - Spring Session : US\$ 5.000
 - Summer Session : US\$ 5.000
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- All candidates must pay an enrollment fee of US\$ 500 -CLP \$ 350,000. This amount will be discounted from the total cost.
 - Students that are sponsored by their companies must send a letter of support and a payment order.

Certification

After requirements are fulfilled, the student will receive a **Diploma in Mine Planning**, issued by the Faculty of Physical and Mathematical Sciences of the University of Chile.