

PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE
COLLEGE OF ENGINEERING
DEPARTMENT OF MINING ENGINEERING
ABET COURSE SYLLABI

IMM2503 DRILLING AND BLASTING

Credits and contact hours:	10 UC credits / 10 hours (3 h. Lectures; 1.5h. site visit and 5.5h. Independent learning experiences)
Instructor's name:	Ronald Guzmán
Course coordinator's name	Ronald Guzmán
Textbook:	Manual de Perforación y Voladura de Rocas, Lopez, J. C., 1995.
Course Catalog Description:	This course aims to familiarize students in modern rock drilling techniques and in basics blasting design and control, with focus on the planning and control of the mining operation.
Prerequisite Courses:	IMM2043 Underground mining
Co-requisite Courses:	None
Status in the Curriculum:	Required
Course Learning Outcomes:	<ol style="list-style-type: none">1. Know and understand basic concepts and characteristics of drilling equipment and its evaluation.2. Know and understand concepts and characteristics of different explosives type.3. Design blasting meshes for open pit and underground mining.4. Implement and evaluate vibration analysis and blasting damage criteria for mining and civil works.
Relation of Course to ABET Criteria:	<ol style="list-style-type: none">a. Knowledge of mathematics, science and engineeringb. Design and conduct experiments: analyze and interpret datac. Design a system, component, or processd. Multidisciplinary teamse. Identify, formulate, and solve engineering problemsf. Professional and ethical responsibilityg. Effective communicationh. Broad education necessary for global, economic, environmental and societal contexti. Recognition of the need for, and an ability to engage in life-long learningj. Knowledge of contemporary issuesk. Techniques, skills, and modern tools for engineering practice.

Topics covered:

1. Drilling objectives – Introduction to rock drilling methods; Method application fields.
2. Drilling methods and special mounting systems – Exploration drill holes; Roads and trenches; Shafts and ramps.
3. Drilling planning – Critical factors; design criteria.
4. Drilling costs estimation – Capital and operational costs.
5. Blasting objectives - Explosive engineering; Explosive energy sources.
6. Rock fragmentation mechanisms – Energy use in rock fragmentation; Theories analysis.
7. Explosives substances and delay devices – Environmental characteristics; performance characteristics; Commercial explosives; Initiators and delays devices.
8. Blasting design – Open pit mining; Underground mining.
9. Controlled blasting in mining and civil works – Description of controlled blasting alternatives; Results in Chilean mines.
10. Rules concerning vibration and blasting damage – Near and far field concept analysis; Damage criteria description in mining and civil works; Vibration and damage criteria analysis application.
11. Blasting planning – Planning critical factors.
12. Blasting costs estimation – Capital and operational costs.
13. Technologies and innovation (drilling and blasting).