

Course Code	Title	Term	Instructor	Estimated Enrollment	Estimated # of TA ships and hours	Required Background/Skills	Application Status	Description
MINE225	<i>Applied Rock Mechanics</i>	W	TBA	22	1 TA (60 hrs)	Previous experience and/or background in rock a mechanics course, with lab exposure.	Open	This course deals with the principles of solid mechanics as applied to geologic materials in order to examine the effects of stress, strain and other factors on the geomechanical responses of such materials to these influences. Topics covered include rheological behaviour of rocks, stress measurement and prediction, and measurement procedures for determination of rock strength and other characteristic parameters. Failure theories are discussed and used to describe fracture development and design considerations for underground and surface mine structures. Analytical techniques based on empirical knowledge and supported by available theory and engineering practice are presented, including, for example: slope stability, underground structure and rock foundation design; the influences of ground water, rockbursts and backfill support on structural stability of excavations; and discussion of potential hazards associated with each. The operation and design of instrumentation used for rock mechanics studies are also discussed. (0/0/0/54/0)
MINE267/MINE268	<i>Applied Chemistry for Mining</i>	W	Chris Pickes	30/11	2 TA for MINE268 (60 hrs) each, lab only	Preference will be given to applicants with an undergraduate degree in Mining Engineering and with a background in mineral processing/chemical engineering	Open	This course provides an overview of the chemistry of inorganic and organic compounds used in the practice of mining and mineral processing including hydro- and pyro-extractive methods. Chemistry and chemical interactions for selected reagent formulations used in blasting, flotation/flocculation, leaching/precipitation, solvent extraction/electrowinning and pollution control technologies are outlined with relevant stoichiometry. Mineral stability and its relevance to metal extraction is discussed. Unary, binary and ternary phase diagrams are explored. The properties of solutions of interest are reviewed. (0/12/0/30/0)
MINE324	<i>Hydraulics for Mining Applications</i>	W	Euler De Souza	15	1 TA (30 hrs)	Previous experience and/or background in hydraulics.	Open	The fluid mechanics basic to fluid hydraulic systems used in the mineral industry are introduced. Topics covered include properties of fluids, fluid statics and its application to mining. Hydrodynamic studies include the energy balance and Bernoulli's equation, energy losses in incompressible flow, the momentum equation and its application, and flow and pressure measuring devices. Flow in closed conduits, including series and parallel pipeline systems and pipe networks, is studied in detail and open channel flow is introduced. Applications include industrial pumps, sump design, hydraulic structures, underground mine dewatering systems, open pit mine drainage systems, and mine backfill and mine tailings transportation. (0/12/0/30/0)
MINE326	<i>Operations Research</i>	W	Takis Katsabanis	22	1 TA (45 hrs)	Previous experience and/or background in optimization and simulation.	Open	The course deals with the application of operations research methods in engineering with emphasis on mining applications. Topics covered are linear programming, optimization methods, transportation and network models, discrete optimization, non linear optimization, decision tree methods, simulation and elements of geostatistics as applied to mining. Lab sessions also deal with forecasting techniques, regression analysis, dispatch problems, planning and scheduling. (20/0/0/14/20)
MINE344	<i>Underground Mining</i>	W	Euler DeSouza	15	1 TA (30 hrs)	Previous experience and/or background in mining methods.	Open	A study of underground mining technology with special reference to economic optimization in both design and production. Conventional and up to date mining methods are reviewed. Developments and trends in mining methods are closely analyzed. Mine design is studied in relation to ore reserves, tonnage and grade distribution, equipment with emphasis on the growing importance of maintenance on underground machinery and capacities of various production units. Development and production costs associated with mining are an inherent aspect of this course. The problems and possibilities of existing and evolving mining techniques are reviewed. (0/0/0/16/20)

MINE 445	Open Pit Mine Design	W	Ortiz	18	1 TA (30 hrs)	Required background and skills include: Surpac, Whittle and Project Management. TAs MUST be able to provide lab support in Surpac and Whittle.	Open	The material of MINE 341 and other foundation courses is applied to the design of an open pit mine. Special attention is given to the selection of equipment and the use of computers in strategic and detailed mine planning and scheduling. The course uses mine planning software to enable small groups of students (2-4) to complete mine designs starting with topography maps, drill information, and mineral inventory block models. Several real deposit databases are used including gold, copper, copper/molybdenum, copper/zinc. The deposits are evaluated, feasibility assessed, and production decisions discussed. (0/0/20/0/46)
MINE448	<i>Underground Design</i>	W	TBA	18	1 TA (30 hrs)	Previous experience and/or background in course topics and experience with mine design software.	Open	This course provides an opportunity to apply a knowledge of basics to the design of an underground mine. Initial design information may range from diamond-drill assay data to a partially or completely designed mine. The problem of design or renovation entails ground stability, ventilation, systems analysis, equipment selection, maintenance, etc, with safety and economics as the basic criteria for design. (0/0/18/0/48)
MINE472	Mining Systems, Automation and Robotics	W	TBA	50	1 TA (60 hrs)	Previous experience and/or background in course topics. Preferably has experience in control, robotics and mechatronics-related topics and may have taken a graduate course in this field.	Open	In order to address issues related to safety, productivity, and remote operations, the world's mineral resources industry has been gradually shifting towards the increased use of automated systems and robotically enhanced machines. It is important, therefore, that graduate engineers understand how these new technologies work so as to improve and make best use of them. This online course introduces senior students to the fundamental tools and techniques of automation and robotics as applied to modern mining practice. Enrolment is open to students from a range of engineering disciplines. This course provides an introduction to the basics of systems control, examples of how methods of automatic control can be applied to mining equipment and associated industrial vehicles, as well as to the fundamentals of sensing and navigation as applied to the design of robotic mobile equipment. (0/0/0/24/18)