Mining Engineering

College of Engineering

The programs leading to the degrees of Master of Science in Mining Engineering, Master of Mining Engineering (* suspension pending) and Doctor of Philosophy are offered through the Department of Mining Engineering. The objectives of these programs are to provide an advanced level of applied science for use in the mining industry and to offer specified topics for research specialization.

The Master of Science in Mining Engineering is a research-oriented degree appropriate for a career in problem solving, research, or technology development.

For the Master of Science in Mining Engineering, 24 credit hours of course work plus an acceptable thesis (Plan A) or 30 credits of course work and a report on one or more research topics (Plan B) are required to fulfill program requirements. Plan B Master of Science degrees will be reserved normally for students who have already demonstrated their ability to conduct and report on independent research.

The Doctor of Philosophy is the terminal degree in the subject and is normally required for a career in teaching and research.

Admission Requirements
Enrollment in the Master of Science degree program is open to qualified applicants with an undergraduate degree in mining engineering or other engineering and science fields. A minimum cumulative grade point average of 2.8/4.0 from an accredited undergraduate program is required. Persons with undergraduate degrees in fields other than mining engineering are required to satisfy deficiencies in undergraduate mining engineering courses.

Applicants for admission must have a combined score on the verbal and quantitative portions of the Graduate Record Examination (GRE) in excess of 300. Scores on the analytical portion are also considered. Foreign applicants whose native language is other than English must take the Test of English as a Foreign Language (TOEFL) and achieve a score of at least 80 (internet based test) or 230 (computer based test) or (550 paper based test) is required before they can be admitted. Alternatively candidates should take the International English Language Testing System (IELTS) test and achieve a score of at least 6.5.

In addition to satisfying general Graduate School and College of Engineering admissions requirements, applicants for admission to the Master of Science and Ph.D. degree programs in Mining Engineering must have been awarded the Bachelor of Science degree prior to admission to the graduate degree status. Normally, it is expected that applicants will have graduated from an engineering program accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET). For applicants from non-U.S. universities, from related but non-engineering disciplines, and from institutions that do not have accredited engineering programs, an assessment will be made of the comparability of educational background to that prescribed and appropriate remedial course work established as a provision for admission.

The Ph.D. degree has no formal course requirements. Students need to complete a minimum of 36 credits of graduate level courses while preparing for the written and oral qualifying examinations. Students who hold a Master of Science degree are typically given credit for up to 18 credit hours of the 36 hour requirement.

Current research areas include the following: rock mechanics and ground control, operations research, mine ventilation, underground construction, surface mining and reclamation, explosive and blasting, mine environmental engineering, mine power systems, mineral and coal processing, extractive metallurgy, data management and mineral economics. In addition to the graduate courses in mining engineering, graduate courses in civil engineering and other disciplines may be used to satisfy degree requirements providing they are appropriate to the student's program of study.

Additional information about the graduate program in mining engineering can be obtained by writing the Director of Graduate Studies, Department of Mining Engineering.

Course Descriptions

MNG 511 MINE POWER SYSTEM DESIGN. (3)
A study of mine power distribution systems, major power system components, and techniques of power system analysis. Topics include per-unit analysis; symmetrical component analysis; grounding, including ground-bed design, ground-resistor sizing, and ground wire monitoring; cable and transformer sizing; and load-flow analysis. Course may not be used to satisfy degree requirements in electrical engineering if credit is earned in EE 538. Prereq: EE 305 or equivalent and engineering standing.

MNG 520 INDUSTRIAL AUTOMATION AND CONTROL. (3)
Automation techniques for controlling equipment and processes, including applications of sensors, transducers, motor starters, variable- frequency motor drives, linear actuators, and proportional hydraulic valves. Ladder logic programming of programmable automation controllers (PACs) and programming human-machine interface (HMI) touch-screen panels. Prereq: Engineering standing or permission of the instructor. (Same as MFS 520.)

MNG 531 ADVANCED BLAST DESIGN AND TECHNOLOGY. (3)
Advanced theory and application of explosives in excavation; detailed underground blast design; specialized blasting including blast casting, construction and pre-splitting. Bulk systems for blasting, electronic detonators, and introduction to demolition blasting. Introduction to blasting research. Examination of field applications. Prereq: MNG 331, engineering standing.

MNG 535 ENVIRONMENTAL CONTROL SYSTEM DESIGN AND RECLAMATION. (3)
Introduction to the principles of sustainable mine planning with a focus on environmental control system design, reclamation and restoration design, and environmental monitoring systems. Topics will include culvert and diversion design, hydrologic inputs, catchment delineation and routing, sedimentologic inputs, erosion control and best management practice selection, sediment pond design, design of silt fences, grass filters, and sediment ditches, weep berm and vegetated filter strip design, reforestation, grassland/wildlife establishment, stream restoration, wetlands/vernal ponds, environmental monitoring system design, and community integration. Prereq: MNG 291, MNG 463, and engineering standing or consent of instructor. (Same as BAE 535.)

MNG 541 COMPUTER DESIGN OF MINE VENTILATION SYSTEMS. (3)
Computer methods applied to the design and analysis of mine ventilation networks; flow distribution, location and size of regulators and fans; evaluation of existing ventilation systems and application of correction methods to improve effectiveness of ventilation system. Prereq: MNG 341 with a C or higher.

MNG 551 ROCK MECHANICS. (4)
Determination of the physical properties of rocks, rock mass classification, stress around mine openings, strain and displacement of the rock mass, rock reinforcement and support, stress interaction and subsidence, strata control. Lecture, three hours; laboratory, three hours per week. Prereq: EM 302, MNG 303, GLY 220, and engineering standing.

MNG 552 GROUND CONTROL SOFTWARE AND ANALYSIS. (3)
Evaluation and design of ground control plans for various mining conditions through the use of several computer programs with an emphasis placed on sedimentary tabular deposits. Variables including pillar stress, pillar

strength, convergence, and others are investigated. Prereq: MNG 551 – Rock Mechanics or consent of instructor.

MNG 555 ADVANCED GEOMECHANICS I. (3)
3D state of stress and strain, stress redistribution around mine openings, tunnels, wellbores, intact rock and rock mass properties, rock mass failure criteria, role of discontinuities and failure along discontinuities, rock reinforcement and support. Prereq: MNG 551 and engineering standing.

MNG 561 MINE CONSTRUCTION ENGINEERING I. (3)
Development of underground capital openings (shafts, chambers, tunnels, and drifts) in mines. Design and construction under normal conditions. Organization and management of construction operations. Prereq: MNG 551.

MNG 575 COAL PREPARATION DESIGN. (3)
Design a coal preparation plant by integrating unit operations preceded by certain back-up laboratory experiments. Cost sensitivity analysis of competing design schemes will be determined on a selected coal. Lecture: two hours; laboratory: three hours per week. Prereq: MNG 301 or equivalent, engineering standing.