MNG 101 INTRODUCTION TO MINING ENGINEERING.  (2)
Orientation to the mining engineering profession; introduction to key mining engineering activities and functions; mining methods and equipment; health and safety subsystems.

MNG 211 SURVEYING.  (4)
A comprehensive course in the art and science of surveying as applied to civil and mining engineering, including the use and care of surveying instruments; measurement of horizontal and vertical distances, angles and directions; collection of ground and underground data for the design and layout of roads, buildings, various mineral workings and other structures; and some aspects of the precise determination of position and direction for survey control. Lecture, three hours; laboratory, three hours per week. Prereq: CE 106, CE 121 or MNG 101, MA 114. (Same as CE 211.)

MNG 264 UNDERGROUND MINING OPERATIONS.  (2)
A study of the principal underground mining methods practiced in coal and hard rock mines; method classification and selection; support and equipment requirements; general mine planning, sequence of development, cycle of operations, production estimates, and method application and variations. Prereq: MNG 101.

MNG 301 MINERALS PROCESSING.  (3)

MNG 302 MINERALS PROCESSING LABORATORY.  (1)
Application of the principles studied in MNG 301. Laboratory, two hours. Prereq or concur: MNG 301.

MNG 303 DEFORMABLE SOLIDS LABORATORY.  (1)
Experimental studies of the mechanical properties of materials and structural elements. Laboratory, four hours per week for three-fourths of the semester. Prereq or concur: EM 302.

MNG 332 MINE PLANT MACHINERY.  (3)
Theory and practice of mine haulage, hoisting, and drainage and pumping. Application of engineering principles to the analysis and selection of materials handling mediums for the minerals industry. Prereq: MNG 101, MNG 264, PHY 231; concur: EM 221.

MNG 341 MINE VENTILATION.  (3)
Hazards of dust and gaseous contamination of mine atmosphere, air dilution requirements, flow distribution in mine network, computer analysis of the ventilation network, natural ventilation and fans. Lecture, two hours; laboratory, three hours. Prereq: PHY 231, CE 341 and engineering standing.

MNG 363 SURFACE MINING OPERATIONS.  (3)

MNG 371 PROFESSIONAL DEVELOPMENT OF MINING ENGINEERS.  (3)
development of professional skills important to the practice of mining engineering. Topics include written and oral communication skills, understanding ethical responsibility and appropriate ethical conduct, real world problem formulation and solution skills, exercise of abilities important to lifelong learning, knowledge of contemporary issues important to mining engineering. Prereq: COM 199, Engineering standing.

MNG 374 MINE VALUATION AND INVESTMENT ANALYSIS.  (3)
Economic evaluation methods and applications to economic decision problems encountered in the mining industry, including the mine valuation problem. Prereq: MNG 264, MNG 301, STA 381, engineering standing.

MNG 395 INDEPENDENT WORK IN MINING ENGINEERING.  (1-6)
Individual work on some selected problem in the field of mining engineering. May be repeated for a maximum of six credits. Prereq: Consent of department chairperson and the instructor, engineering standing.
MNG 431 MINE SYSTEMS ENGINEERING.  (3)
Aspects of industrial and geological engineering for mine systems engineering design. Course consists of reserve engineering, presystems modeling and interfacing systems to reserves. Prereq: STA 381, MNG 332, engineering standing.

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 306 or equivalent, and engineering standing.

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 240, and engineering standing.

MNG 561 MINE CONSTRUCTION ENGINEERING I.  (3)

MNG 563 SIMULATION OF INDUSTRIAL PRODUCTION SYSTEMS.  (3)
Discrete event simulation and its application to performance analysis of industrial production systems. Topics include concepts for characterizing production systems, approaches to structuring simulation models, instruction in a simulation language, and techniques for comparing alternative system designs and control strategies. Applications to manufacturing, commercial and mining production systems are considered. Prereq: CS 221 or 270, STA 281 or 381, engineering standing. (Same as MFS 563.)

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.

MNG 581 GEOSTATISTICS.  (3)
The geostatistics approach for estimating the spatial distribution of rock and mineral properties. Topics include treatment of the spatial distribution of ore grade as regionalized variables, covariance stationary processes, variograms, volume/variance relations, ordinary kriging, block grade distributions, and nonlinear kriging approaches. Prereq: STA 381, engineering standing.

MNG 591 MINE DESIGN PROJECT I.  (1)
Students will undertake a design project consisting of reserve analysis on a given mine property. They will calculate minable reserves and analyze mining and quality properties of coal. Each student will write a report supported by maps and will present it orally before a group of peers and invited experts. Lecture, one hour; laboratory, one hour per week. Prereq: MNG 332, engineering standing.

MNG 592 MINE DESIGN PROJECT II.  (3)
Students will undertake a major design project such as the overall design of a mining system, including design of major components of the system and economic evaluation. Students will write reports documenting this design, which will also be presented orally before a group of peers and invited experts. Lecture, two hours; laboratory, two hours per week. Prereq: MNG 341, MNG 551, MNG 591 and engineering standing.

MNG 599 TOPIC IN MINING ENGINEERING.  (2-3)
A detailed investigation of a topic of current significance in mining engineering. May be repeated to a maximum of six credits, but only three credits can be earned under the same title. A particular topic may be offered at most twice under the MNG 599 number. Prereq: Engineering standing and consent of instructor.
MNG 611 MINE POWER SYSTEM PROTECTION. (3)
A study of components and methods for providing protection to mine electrical systems. Review topics include power distribution arrangements, per-unit system, and symmetrical components. Course topics include sources of transients and faults, protective equipment, phase overcurrent relaying, and ground fault protection. Lecture, two and one-half hours; lab, one and one-half hours per week. Prereq: MNG 511.

MNG 634 ADVANCED MINE ENGINEERING.

MNG 637 ROCK SLOPE STABILITY AND DESIGN. (3)
Design and stability analysis of rock slopes using analytical, empirical, and numerical approaches, engineering geological data, groundwater pressure, blasting, and remedial measures. Prereq: MNG 551.

MNG 641 ADVANCED MINE VENTILATION.

MNG 681 GEOSTATISTICS II. (3)
A second course in geostatistics for mine planning and geotechnical applications. Topics include co-regionalized variables and cokriging, non-parametric geostatistics (indicator, probability, and soft kriging), loss functions and optimum predictors for ore selection decisions, conditional simulation—techniques and applications. Prereq: MNG 581.

MNG 690 ADVANCED MINERAL BENEFICIATION ENGINEERING. (3)

MNG 691 SIMULATION OF MINERAL PROCESSING CIRCUITS. (3)
Flowsheet modeling and analysis for coal preparation and ore dressing plants. Topics include unit models for comminution, gravity separation, and froth flotation; relevant techniques for solving systems of nonlinear equations; convergence acceleration techniques; sequential modular, simultaneous modular, and equation-solving flowsheeting frameworks; flowgraph techniques for analysis of certain classes of mineral processing circuits. Prereq: MNG 575.

MNG 699 TOPICS IN MINING ENGINEERING (Subtitle required). (3)
A detailed investigation of a topic of current interest in mining engineering. May be repeated to a maximum of six credits, but only three credits may be earned under the same subtitle. A particular topic may be offered only twice under the MNG 699 number. Prereq: Consent of instructor.

MNG 748 MASTER'S THESIS RESEARCH. (0)
Half-time to full-time work on thesis. May be repeated to a maximum of six semesters. Prereq: All course work toward the degree must be completed.

MNG 749 DISSERTATION RESEARCH. (0)
Half-time to full-time work on dissertation. May be repeated to a maximum of six semesters. Prereq: Registration for two full-time semesters of 769 residence credit following the successful completion of the qualifying exams.

MNG 768 RESIDENCE CREDIT FOR THE MASTER'S DEGREE. (1-6)
May be repeated to a maximum of 12 hours.

MNG 769 RESIDENCE CREDIT FOR DOCTOR'S DEGREE. (0-12)
May be repeated indefinitely.

MNG 771 SEMINAR IN MINING ENGINEERING. (1)
Review of current research in specific areas of mining engineering. Required of all graduate students. Prereq: Graduate classification.

MNG 780 SPECIAL PROBLEMS IN MINING ENGINEERING. (1-6)
Individual work on some selected design problems in one area of mining engineering. May be repeated to a maximum of six credits. Prereq: Approval of the chairperson of the department.
MNG 790 SPECIAL RESEARCH PROBLEMS IN MINING ENGINEERING. (1-9)
Individual work on some selected problems in one of the various fields of mining engineering. Laboratory and field measurements, six hours. May be repeated to a maximum of nine credits. Prereq: Approval of the Director of Graduate Studies.