Senate Transmittal
March 5, 2003

Changes in the Bachelor of Science in Mining Engineering undergraduate program were reviewed and approved by the Undergraduate Council on March 4, 2003.

COLLEGE OF ENGINEERING
Department of Mining Engineering
Bachelor of Science in Mining Engineering
Rationale:
MNG 101 will be changed from a 2-credit course to a I-credit course. The course will serve mainly as an introduction to the profession.

MNG 264 will be changed from a 2-credit underground operations course to a 3-credit mining methods course. Content removed from this course includes blasting and reserve estimation, which will be covered in greater detail in two new courses (MNG 331 and MNG 291). Content added to this course includes surface mining methods. The course will also emphasize mining terminology and health and safety issues.

A new course, MNG 291, 2 credits, Mineral Reserve Modeling, would be added at the Sophomore level. The purposes of this course are (i.) for students to learn how to develop CAD drawings, focusing on the specific needs of the mining profession; (ii.) to introduce them to a design software package that they will be using in subsequent coursework and their mine design project; and (iii.) to provide a single focused course on mineral reserve estimation techniques. In our current curriculum, reserve estimation is presented in a fragmented way over three different courses. Moreover, computer implementation of reserve estimation techniques is, inappropriately, a part of the capstone design course. (This course should focus on application of earlier curriculum content in a design context, not teach new content.) MNG 291 would remedy this situation. ME 105, 2 credits, Basic Engineering Graphics, would be dropped in lieu of this class. (Additionally, the Mechanical Engineering Department has proposed to drop ME 105 from its curriculum, which would make ME 105 unavailable in the future.) MNG 291 would, as noted above, teach these skills using the powerful CAD engines in mine design software packages and focusing on CAD applications most germane to the mining profession. The course would be a laboratory course and would use a mine design software package that would be used in subsequent courses, including the capstone design class. It is currently projected that this package would be Autocad/Survcadd, but might change as technology and industrial preferences change.

MNG 211 (cross-listed with CE 211), 4 credits, Surveying, would be eliminated and replaced with MNG 211, 2 credits, Mine Surveying. The Civil Engineering Department currently teaches the course, and its scope exceeds the needs of the current mining engineering profession. The new course would be taught by the Mining Engineering Department and would focus on mine surveying needs. This would make available credit hours for other important topics. The course would no longer be cross-listed with CE 211. (The Department of Civil Engineering has been contacted and is willing to submit the necessary minor course change form.)

A new course, MNG 331, 2 credits, Explosives and Blasting, would be added to the curriculum. This course would focus specifically on mechanical fragmentation of rock and explosives engineering. Currently, this material is presented in Underground Mining Operations and Surface Mining Operations classes. A special course addressing this topic would enable greater depth of coverage.

The elimination of the mining operations classes, discussed above, creates room in the curriculum for this course.

MNG 335,3 credits, Introduction to Mine Systems Analysis, would be added to the curriculum. The purpose of this course is to address topics in probability and statistics related to mining engineering topics in systems analysis and spatial statistics. STA 381,3 credits, Introduction to Engineering Statistics, would be dropped. The new course would focus specifically on the probability and statistics needs of mining engineers and time
study.

MNG 374 would be dropped from the curriculum. MNG 431, 3 credits, Mine Systems Analysis, will be modified and become MNG 431, 4 credits, Mine Systems Engineering and Valuation. The course would address production systems fundamentals, resource-constrained scheduling (including PERT/CPM and mine
production scheduling), methods analysis, production systems modeling and simulation (including standard materials handling capacity calculations used by industry such as Caterpillar's truck fleet sizing procedures), and engineering economics. Systems engineering content currently in MNG 363 (Surface Mining Operations) and MNG 332 (Mine Plant Machinery) would be moved to this course. The course will include a laboratory session, emphasizing computer applications, in addition to 3 lecture hours. The coverage of engineering economics will be reduced from what was covered in MNG 374, but will still be adequate for preparation for the Fundamentals of Engineering Exam and execution of a mine valuation study in the Capstone design course.

MNG 363,3 credits, Surface Mining Operations will be modified and become MNG 463,3 credits, Surface Mine Design and Environmental Issues. The modified course would focus on design aspects of surface mining (slope stability and pit layout) as well as environmental and reclamation topics in surface mining. (Surface mining methods will be covered earlier in the curriculum in the revised MNG 264.)

EE 306,3 credits, Electrical Circuits and Machinery, will be replaced by EE 305,3 credits, Electrical Circuits and Electronics. This is a result of the Electrical and Computer Engineering Department's elimination of EE 306 and EE 307 and revision of EE 305.

CE 341, 3 credits, Fluid Mechanics, will be replaced by ME 330, 3 credits, Fluid Mechanics. This is a result of the Civil Engineering Department's proposal to revise CE 341 from a 3-credit Fluid Mechanics course to a 4-credit Fundamental Principles of Thermodynamics and Fluid Flow course. (The Department of Mechanical Engineering has been contacted. Correspondence is attached to this form.)

One 3-credit hour technical elective will be converted from a free technical elective to a directed technical elective in the mineral processing area. Students will be permitted to choose between MNG 575 -Coal Preparation Design and MNG 580 -Mineral Processing Plant Design. Both courses will emphasize beneficiation plant design with the former directed to students whose primary interest is coal and the latter to students with mineral processing interests. The mineral processing design course would emphasize crushing and grinding and would be particularly suitable to students with interest in the crushed stone industry. By requiring this directed elective, all of our graduates would have a strong foundation in mineral/coal processing with 7 credit hours of instruction.

The cross-disciplinary requirement will be removed from the curriculum because the cross-disciplinary requirement has been dropped from the University Studies Program. The new University Studies Program requires students to complete six hours of electives. The revised curriculum meets this requirement by preserving the supportive elective and requiring two additional 3-credit technical electives, for a total of nine credits. This satisfies the Elective Requirement which states "...students must complete six hours of electives, three of which must be outside the student's major". In order to insure that this requirement is met, the Supportive Elective has been reworded to "the supportive elective is to be chosen from any University course *outside the student's major* excluding more elementary versions of required courses such as precalculus mathematics".

New Courses

MNG 291 Mineral Reserve Modeling (2)
Basic CAD drawing skills including drawing tools, basic dimensioning, coordinate systems, and crosshatching; concepts and approaches for estimation of spatial distribution of rock and mineral properties from sample data. The course emphasizes hands-on experience with mine design software for reserve estimation.
Prereq: MNG 264

MNG 331 Explosives and Blasting (2)
Drilling and drill performance, types and properties of commercial explosives, initiation and priming, explosives selection, blast design, explosives applications, environmental effects, and safety and regulatory compliance.
Prereq: MNG 101, MNG 264, CHE 105, PHY 231

MNG 335 Introduction to Mine Systems Analysis (3)
Descriptive statistics; random variables & probability distributions; point estimation; hypothesis testing; linear regression; time and motion study; introduction to geostatistics.
Prereq: MA 114, MNG 264

MNG 580 Mineral Processing Plant Design (3)
Design of mineral processing plants including the associated unit operations; flowsheet development, unit selection, sizing and number, water/mass flow balancing.
Prereq: MNG 301 - Minerals Processing; MNG 302 - Minerals Processing Laboratory; Engineering standing.

Course Changes

MNG 101 Introduction to Mining Engineering (2)
(Change in credit hours from 2 to 1)

MNG 211 / CE 211 Surveying
(Change in title, credits, prerequisites and description)
CHANGE TO
MNG 211 Mine Surveying (2)
Surveying as applied to mining engineering, including the use and care of surveying instruments, measurement of horizontal and vertical distances, angles and direction, collection of ground and underground mine workings. Structure, building and road surveying will be eliminated as well as lectures on Kentucky State Plane Coordinate System and route surveying.
Prereq: MNG 101 and MA 114

MNG 264 Underground Mining Operations (2)
(Change in title, credits, and description)
CHANGE TO
MNG 264 Mining Methods (3)
A study of the principal underground and surface mining methods practiced in coal and hard rock mines; method classification; support and equipment requirements; general mine planning; sequence of development, cycle of operations, and method application and variation.
Prereq: MNG 101

MNG 363 Surface Mining Operations (3)
(Change in course number, title, description, and prerequisites)
CHANGE TO
MNG 463 Surface Mine Design and Environmental Issues (3)
Pit layout and design of excess spoil disposal areas including stability of the slopes. Design of sediment control systems to satisfy surface mine regulations. Use of design standards for various reclamation alternatives.
Prereq: MNG 264, Engineering Standing

MNG 431 Mine Systems Engineering (3)
(Change in Title, credits, description and prerequisites)
CHANGE TO
MNG 431 Mines Systems Engineering and Valuation (4)
Characterization and analysis of mine production systems, including economic considerations. Topics include basic production systems concepts, work sampling, standard time models, scheduling, PERT/CPM, engineering economics, mine valuation.
Prereq: MNG 332, MNG 335, engineering standing