

Investigation of a problem either individually or as part of a research group under the direction of a member of the faculty. Not for graduate credit. Prerequisite: MICR 301 or equivalent and a 3.0 or better grade point average in Microbiology. Special approval needed from the instructor.

495-1 Senior Seminar. Readings, discussions, and presentations of current research topics on microbiology. Restricted to senior standing in Microbiology or Biological Sciences. Graded P/F only.

Microbiology Faculty

Achenbach, Laurie A., Professor and *Dean*, Ph.D., University of Illinois, 1988.

Bender, Kelly S., Associate Professor, Ph.D., Southern Illinois University Carbondale, 2003.

Clark, David P., Professor, *Emeritus*, Ph.D., University of Bristol England, 1976.

Fisher, Derek J., Assistant Professor, Ph.D., University of Pittsburgh, 2006.

Fix, Douglas F., Associate Professor and *Chair*, Ph.D., Indiana University, 1983.

Haddock, John D., Associate Professor, *Emeritus*, Ph.D., Virginia Polytechnic Institute and State University, 1990.

Konjufca, Vjollca, Assistant Professor, Ph.D., University of Arkansas Fayetteville, 2002.

Madigan, Michael T., Professor and Distinguished Scholar, *Emeritus*, Ph.D., University of Wisconsin, 1976.

Martinko, John M., Associate Professor and Distinguished Teacher, *Emeritus*, Ph.D., State University of New York at Buffalo, 1978.

Rader, Bethany, Assistant Professor, Ph.D., University of Oregon, 2006.

Mining and Mineral Resources Engineering

(Department, Major [Mining Engineering], Courses, Faculty)

Mining engineers engage in planning, design, development and management of surface and underground mining operations for extraction of the earth's mineral deposits. The Mining Engineering Program prepares graduates to meet the challenges of the mining industry with emphasis on the coal and aggregate industries.

The missions of the Department are: to provide quality engineers to meet current trained manpower needs for exploration and extraction of regional minerals resources in an environmentally acceptable manner; advance the mining engineering discipline by engaging in basic and applied research, with emphasis on solving regional problems; and to transfer and apply new technical knowledge to enhance the competitive position of the state and national minerals industry.

Program Educational Objectives

Our undergraduate degree in mining engineering prepares our students for careers in or related to the mining industry. Within three to five years of graduation, our students will:

1. Have the ability to practice mining engineering in global,

sustainable and societal contexts.

2. Have skills needed for effective communication, teamwork and creative thinking.
3. Have the ability to pursue advanced education and/or lifelong learning to support career development in a broad range of mining related fields.
4. Have the education and background to always act in a safe, professional and ethical manner.

Student Outcomes

Student outcomes describe what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire as they progress through the program. In order to meet our program educational objectives, we will prepare our students to know the following:

1. The ability to apply knowledge of mathematics, science, and engineering.
2. The ability to design and conduct experiments, as well as to analyze and interpret data.
3. The ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. The ability to function on multi-disciplinary teams.
5. The ability to identify, formulate and solve engineering problems.
6. An understanding of professional and ethical responsibility.
7. The ability to communicate effectively.
8. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
9. A recognition of the need for and an ability to engage in life-long learning.
10. Knowledge of contemporary issues.
11. The ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

Coursework in the program includes such areas as surface and underground mining systems, mine ventilation, ground control and rock mechanics, mineral and coal processing, material handling systems, engineering economics, mine environment, health and safety engineering, probability and statistics applications, and computer-aided mine design. Facilities include modern, well-equipped rock mechanics, mine ventilation, mineral processing, material handling, mine environment, and computer laboratories.

After completing the program, the graduate may work in an engineering or management position for mining industries, environmental companies, construction industries, oil companies, equipment manufacturers, research organizations, or government agencies. The coursework also provides strong preparation for further study at the graduate level. The undergraduate program in mining engineering is accredited by the Engineering Accreditation Commission of ABET, <http://>

www.abet.org.

Bachelor of Science Degree in Mining Engineering, College of Engineering

MINING ENGINEERING MAJOR

<i>University Core Curriculum Requirements</i>	39 ³
Foundation Skills	13
English 101, 102	6
Mathematics (substitute Mathematics in major).....	3
Communication Studies 101	3
University College 101	1 ⁴
Disciplinary Studies	23
Fine Arts	3 ²
Human Health (BIOL 202 or approved substitute)	2 ²
Humanities	6 ²
Science (substitute Physics and Chemistry)	6 ¹
Social Science	6 ²
Integrative Studies	3
Multicultural	3 ²
<i>Requirements for Major in Mining Engineering</i>	(9) + 87 ¹
Basic Science	(6) + 9
PHYS 205A, 255A	(3) ¹ + 1 ¹
CHEM 200, 201	(3) ¹ + 1 ¹
GEOL 220 or 222, 302	7
Mathematics	(3) + 14
MATH 150 ¹ , 250, 251, 305	(3) + 11
MNGE 417.....	3
Science/Math Elective	3 ⁵
Required Engineering Courses.....	17
ENGR 250, 261, 335, 350A, 370A	15
ME 102.....	2
Required MNGE Courses.....	38
MNGE 270, 310, 315, 317, 320, 420, 425, 430, 431, 440, 455, 460, 475.....	38
Approved Electives.....	6 ⁵
Total	126

¹Courses required for the major will apply towards University Core Curriculum.

²Engineering requirements for Core Curriculum are more restrictive than those of the University as a whole.

³Students transferring are required to: (a) have an associate degree in a baccalaureate-oriented program or (b) meet the Core Curriculum requirements for engineering students. See departmental advisor for an approved course.

⁴Students with catalog year prior to Summer 2012 are required to complete an interdisciplinary or equivalent course.

⁵Three hours of a science/math elective and six hours of major electives are required. See departmental advisor for approved courses.

Mining Engineering Suggested Curricular Guide

FIRST YEAR	FALL	SPRING
UCOL 101	1	-
ENGL 101, 102	3	3
PHYS 205A, 255A	-	4
GEOL 220/222, MNGE 315	3	3
MNGE 270, 310.....	3	3
MATH 150, 250	4	4
Total	14	17

SECOND YEAR	FALL	SPRING
Core Social Science, Core Humanities ..	3	3
CMST 101, ENGR 350A	3	3
MATH 251, 305	3	3
MNGE 320, Core Social Science	1	3
ME 102, MNGE 317	2	1
ENGR 250, 261	3	3
Total	15	16

THIRD YEAR	FALL	SPRING
Core Humanities, Core Human Health	3	2
CHEM 200, 201	-	4
ENGR 370A, MNGE 417	3	3
MNGE 425	4	-
MNGE 420	4	-
Basic Science/Math Elective	-	3
ENGR 335, GEOL 302	3	4
Total	17	16

FOURTH YEAR	FALL	SPRING
MNGE 430, 455	3	3
MNGE 431, Approved Elective in Major	4	3
MNGE 440, 460	3	3
Core Multicultural	3	-
MNGE 455, 475	3	3
Core Fine Arts, Approved Elective in Major	3	3
Total	16	15

Courses (MNGE)

Safety glasses, an electronic calculator, and textbooks are required of all mining engineering students.

270-3 Introduction to Mining Engineering. Importance of mining to a country's economy; stages of mining; prospecting and exploration, development and extraction; unit operations of mining; surface mining systems; underground mining methods; novel mining methods; mineral processing; marketing of minerals. Co-requisite: Math 109 or 111.

292-1 to 3 Special Topics in Mining Engineering. Course topics will be identified by instructor. Restricted to mining engineering transfer students.

310-3 Underground Mining. Underground mining access openings; underground mining equipment types and functions; advancing, sinking, and production blast rounds; underground mining methods, planning, and layout considerations. Prerequisite: MNGE 270 or consent of instructor. Co-requisite: Math 150 or consent of the instructor.

315-3 Surface Mining. Surface mining methods, equipment, and sequences; surface mining tools; surface mine blast design basics; truck-shovel fleet design, sizing, and selection. Prerequisite: MNGE 270 or consent off instructor. Co-requisite: Math 150.

317-1 Ore Minerals. Introduction to the rocks and minerals that are commonly mined including such considerations as typical grade and tonnage relations, an overview of how the

minerals and rocks are made into economic products, and the value and use of those products. Class includes basic mineral identification. Prerequisites: MNGE 270, GEOL 220 or GEOL 222 and knowledge of element symbols and formulas from chemistry or similar background with consent of instructor.

320-1 Mine Surveying Laboratory. Introduction to surveying; horizontal and vertical angles; using a level; land surveying; analysis of survey data for engineering design. Laboratory. Prerequisite: MATH 109 or MATH 111, or consent of instructor.

392-1 to 6 Mining Engineering Cooperative Education. Supervised work experience in industry, government or professional organizations. Students work with on-site supervisor and faculty adviser. Reports are required from the student and the employer. Hours do not count toward degree requirements. Mandatory Pass/Fail. Restricted to sophomore standing.

401-1 Mining Environmental Impacts and Permits. Socio-economic impacts of mining industry. Analyzing the markets for coal and its products. Mining operations and related environmental impacts. Mining permits. Prerequisite: MNGE 270 or consent of instructor.

405-1 Field Trip. Visit several mining operations and prepare a report. Not for graduate credit. Prerequisite: MNGE 270.

417-3 Statistics, Probability, and Modeling. Basic concepts of probability and statistics, analysis of engineering data, fitting data to distribution functions. Modeling of engineering systems and optimization. Project management techniques and system simulation. Prerequisite: MATH 150

420-4 Mineral and Coal Processing. Principles of processing minerals, aggregates and coal, including unit operations of comminution, classification, solid-solid separation, dewatering and tailings disposal. Laboratory investigations of the fundamental principles governing unit operations including size reduction, mineral liberation, classification, mineral recovery, and dewatering. Laboratory. Prerequisite: MNGE 270, CHEM 200, PHYS 205A; Concurrent enrollment in or completion of ENGR 370A or 370B, or consent of instructor.

421-3 Mineral Processing Plant Design. Engineering design of unit operations used for minerals, aggregates and coal processing including crushing, grinding, industrial screening, classification, gravity separation, flotation and dewatering. Overall plant performance optimization and flow sheet design. Prerequisite: MNGE 417 or concurrent enrollment and MNGE 420. Special approval needed from the instructor.

425-4 Mine Ventilation Systems Analysis and Design. Thermodynamic principles in mine ventilation. Study of the theories and practice of natural and forced mine ventilation. Fan and mine characteristics. Ventilation network analysis. Mine ventilation design and problem analysis. Laboratory. Prerequisite: MNGE 320 and ENGR 370A, or 370B, or consent of instructor.

430-3 Economics of Mineral Resources. Investment decision making criteria; economic viability of mining projects, financing mining projects; sensitivity and risk analysis. Prerequisite MNGE 270; or consent of instructor.

431-4 Rock Mechanics: Principles and Design. Analysis of stress and strain, elementary elasticity, stress distribution around openings, engineering properties of rocks, artificial

support and reinforcement, slope stability. Laboratory. Prerequisite: ENGR 350A or 350B. Special approval needed from the instructor for graduate students and non-majors.

435-3 Application of Operations Research to Mining. Mine systems analysis, operations research and statistics in decision making, production engineering, optimization, linear programming, simulation. Prerequisite: MNGE 270, knowledge of linear algebra, or consent of instructor.

440-3 Material Handling Systems. Analysis and design of material handling systems such as belt conveying, hoisting and pumping. Mine power systems design. AC and DC motor applications. Material handling systems economics. Prerequisite: MNGE 310 and 315, or consent of instructor.

450-3 Industrial Minerals. Mining, Processing and Utilization aspects of key industrial minerals with special emphasis on the aggregates industry. Prerequisite: MNGE 270, 420 or consent of instructor.

455-3 Mine Environment, Health and Safety Engineering. Analysis of mine environmental impacts and their mitigation, safety problems and rules and regulations, hazards and accidents. Sealing and recovery of mines. Design of mine emergency plans, safety methods, and health hazard control plans. Acid mine drainage, minerals waste disposal environmental remediation. Prerequisite: MNGE 310, 315, consent of instructor. Mining industrial experience will be accepted in lieu of prerequisites.

460-3 Senior Design. Projects in planning and design of surface and underground mining systems. Evaluate and design mining subsystems; integrate subsystems and procedures into a preliminary mine design; and optimize operations from exploration to closure. Two lectures and two two-hour laboratories per week. Prerequisite: MNGE 420, 425, 431, 440, or consent of instructor.

475-3 Analysis and Design of Mine Excavations. Rock classification; design of shafts, slopes, tunnels, and underground chambers; support requirements; design of slopes; design of mining systems from ground control point of view; design of impoundments. Prerequisite: MNGE 310, 315, and 431. Special approval needed from the instructor for graduate students and non-majors.

492-1 to 5 Special Problems in Mining Engineering. Topics and problems selected either by the instructor or the student with the approval of the instructor. Five hours maximum course credit. Not for graduate credit. Restricted to senior standing. Special approval needed from the instructor.

Mining Engineering Faculty

Chugh, Yoginder P., Professor, *Emeritus*, Ph.D., Pennsylvania State University, 1971.

Harpalani, Satya, Professor, Ph.D., University of California, Berkeley, 1985.

Mohanty, Manoj, Professor, Ph.D., Southern Illinois University, 1997.

Paul, Bradley C., Associate Professor, *Emeritus*, Ph.D., University of Utah-Salt Lake, 1989.

Sinha, Atmesh K., Professor, *Emeritus*, Ph.D., University of Sheffield, 1963.

Spearing, Anthony, Associate Professor, *Emeritus*, Ph.D.,

University of Silesia, Poland, 1993.

Mortuary Science and Funeral Service (Major, Courses)

The mission of the Mortuary Science and Funeral Service program is to challenge students to achieve academic and professional excellence; prepare students to acquire entry level positions in the funeral service profession; provide quality instruction and stay current with trends of the profession; cultivate and maintain excellent relations with local, state, and national organizations; enhance University and community relations; and work toward the continued improvement of the Mortuary Science and Funeral Service program as an ongoing process.

This program is the only mortuary science and funeral service program offered in a public university in the state of Illinois. The initial program was developed in response to a request from the Illinois Funeral Directors Association. The Mortuary Science and Funeral Service program at SIU Carbondale is accredited by the American Board of Funeral Service Education (ABFSE), 3414 Ashland Ave., Suite G, St Joseph, MO 64506, (816) 233-3747. Web:<www.abfse.org> Graduates meet licensing requirements established by the Illinois Department of Financial and Professional Regulation. This program in mortuary science and funeral service is recognized by other state licensing boards.

The program is designed to accept students directly from high school or to accommodate students transferring from other accredited post-secondary institutions. Enrollment in the program is limited due to variety of circumstances, including rules of accreditation, limitations of facilities/internship sites, and faculty-student ratio.

Prospective students attending another college or university prior to transferring to SIU should concentrate on completing courses articulated or approved as substitutes for SIU's University Core Curriculum requirements. Prior to taking courses that appear to equate to the professional sequence, the applicant should consult with an advisor within the Mortuary Science and Funeral Service program.

The Mortuary Science and Funeral Service program has a Linkage Agreement with Southeastern Illinois College, Rend Lake College and Shawnee College. If you have questions about this agreement, contact the community college advisor or SIU School of Allied Health at (618) 453-7287.

In addition to the professional course work, the student will be responsible for the University Core Curriculum as well as a number of courses, which will lead to an understanding of the psychological, sociological and theological implications of life and death. Each student will serve a semester-long internship at an approved off-campus facility. The expenses related to the internship courses are the responsibility of the student. The Internship Coordinator and/or Program Director will assign the internship location. Prior to participation in the internship, students may be required to undergo an "Internship Site Required" criminal background check and drug screening. Faculty members in the professional courses are licensed funeral directors and embalmers with experience in the profession. The

program's Advisory Committee is composed of mortuary science and funeral service professionals.

The student is required to complete the Hepatitis B vaccine series before participating in the laboratory classes. The vaccine may be acquired at the SIU Student Health Center, a local health department, or through a private physician. The cost of this vaccine is the responsibility of the student and documentation showing completion of the vaccine series must be presented to the advisor prior to registration. In addition to the Hepatitis B vaccine requirement, a laboratory uniform, personal protective equipment and instruments must be purchased.

In accordance with accreditation standards, each student will be required to take the National Board Examination prior to graduation. The expense for the exam is the responsibility of the student. The annual passage rate of first-time takers on the National Board Examination (NBE) for the most recent three-year period for this institution and all ABFSE accredited funeral service education programs is posted on the ABFSE web site: <<http://www.abfse.org>>. Since laws governing the profession are enacted at the state level, licensing and qualification requirements vary among states. Prospective students should contact the licensing body of the state in which they wish to attempt licensure. Career opportunities are excellent and to date all graduates who desire placement within the profession have been offered entry-level employment.

The Mortuary Science and Funeral Service program can be completed at Southern Illinois University Carbondale or in combination with other institutions of higher education.

The specific goals and objectives for the mortuary science and funeral service program may be found at www.sah.siu.edu/undergraduate/mortuary-science-funeral-service/index.php.

Bachelor of Science Degree in Mortuary Science, College of Applied Sciences and Arts

<i>University Core Requirements</i>	41
ENGL 101 and 102, MATH 101 or 108, CMST 101, ZOOL 115/118, CHEM 106, PSYC 102, SOC 108, MUS 103, Humanities	
Elective PHIL 104, Human Health and Multicultural Elective.	
<i>Requirements for Major</i>	74
MSFS 101, 108, 240, 245, 256, 257, 270, 302, 325A,B, 340, 351, 352, 355, 360, 401, 410, 411, 412, AH 241, ISAT 120 or ACCT 210, FIN 270.	
<i>Approved Career Electives</i>	5
<i>Total</i>	120

Mortuary Science and Funeral Service Suggested Curricular Guide

FIRST YEAR	FALL	SPRING
ZOOL/PLB 115, MATH 101.....	3	3
PSYC 102, ISAT 120	3	3
ENGL 101, CHEM 106	3	3
UCOL 101, MSFS 108	3	3
MSFS 101, Fine Arts	3	3
<i>Total</i>	15	15
SECOND YEAR	FALL	SPRING