Department of Mining Engineering

Degrees Offered

- Master's of science in mining engineering
- Master's of science in engineering with a major in mining engineering
- Doctor of philosophy with a major in mining engineering

Program Objectives

The objective of the master’s of science in mining engineering (M.S.Min.E.) program is to equip students to investigate and develop solutions to advanced mining engineering problems. This program provides students the technical knowledge and research experience needed to address the most challenging contemporary issues within a specialized area of study.

Moreover, the objective of the Ph.D. program in mining engineering is to educate students to the highest level of technical and research performance within the minerals profession. Graduates of this program not only possess the requisite technical skills, but they also have the capability to actively contribute to the scholarly body of knowledge through independent research. These graduates pursue impactful careers in industry, government agencies, and academia.

Areas of Research

The expertise of the current faculty members broadly spans many traditional mining sub-disciplines. Active research areas include mine systems, rock mechanics and ground control, mine health and safety, mineral/coal processing, mine pollution control, and mine ventilation.

FACULTY

CHAIR
- Christopher J. Bise - Ph.D. (Pennsylvania State University)
  Robert E. Murray Chairman

PROFESSOR
- Keith Heasley - Ph.D. (Colorado School of Mines)
  Charles T. Holland Professor, Numerical Modeling, Rock Mechanics

ASSOCIATE PROFESSOR
- Vladislav Kecojevic - Ph.D. (University of Belgrade)
  Surface Mining, Aggregates Production, Mine Materials Handling Systems
- Yi Luo - Ph.D. (West Virginia University)
  Surface Subsidence, Ventilation
- Felicia F. Peng - Ph.D. (West Virginia University)
  Coal Preparation, Coal Utilization, Process Control, Plant Design

ASSISTANT PROFESSOR
- Brijes Mishra - Ph.D. (West Virginia University)
  Theoretical and Experimental Rock Mechanics, Time Dependent Deformation of Rock and Salt, Mathematical Modeling in Rock Mechanics
- Aaron Noble - Ph.D. (Virginia Tech)
  Mineral Processing, Froth Flotation, Physical Separations

Admission Requirements

The Masters of science in the mining engineering program admits students who have met the following requirements:

- A grade point average (GPA) of 3.0/4.0 or above from an ABET-accredited B.S.Min.E. program or its equivalent. Additionally, all Ph.D. applicants must have earned an M.S. degree in mining engineering with a GPA of 3.0 or higher. Transfer students must have at least a GPA of 3.0/4.0 for the graduate programs at similar institutions.
- International applicants must submit a GRE score and demonstrate proficiency in communicating English. For applicants whose native language is not English, this requirement may be fulfilled by a TOEFL-pBT test score of 550 or better, or an iBT score of 79, or an IELTS score of 6.5.
• At least three letters of recommendation, one of which must be from the applicant’s previous thesis advisor or an academic equivalent. All letters of recommendation should evaluate the student’s potential for performing independent, masters or doctoral-level research.

The same review process is used for M.S. and Ph.D. applications. In both cases, the completed application packets are circulated to the graduate faculty. Initial evaluations consider whether:

1. The applicant should or should not be accepted; and
2. The reviewing faculty member is or is not willing to provide support.

If multiple positive responses are produced, the assignment of the potential graduate student is resolved at a meeting of the faculty according to specific needs and interests.

Masters of Science in Mining Engineering

Students desiring to take courses for graduate credit at the master’s level in the Statler College of Engineering and Mineral Resources must first apply for admission and state a major field.

Applicants with a baccalaureate degree from institutions other than WVU in Mining Engineering will be admitted on the same basis as graduates of WVU. Lacking these qualifications, the applicant must first fulfill the requirements of the Department of Mining Engineering.

Doctor of Philosophy

The doctor of philosophy degree is administered through the college’s interdisciplinary program; mining engineering may be the major. A candidate for the degree of doctor of philosophy must comply with the rules and regulations outlined in the general requirements of the Statler College of Engineering and Mineral Resources. The research work for the doctoral dissertation must show a high degree of originality on the part of the student and must constitute an original contribution to the art and science of mining engineering.

The principal objective of the doctor of philosophy program in mining engineering is the education and training of graduates so that they are capable of providing original scholarly contributions at the highest levels in the mineral engineering profession. The three areas of specialization are as follows:

• Mine systems
• Rock mechanics and ground control
• Mineral/coal processing

The Ph.D. program in mining engineering consists of a minimum of eighteen hours of coursework and twenty-four hours of independent research beyond a master’s degree in mining engineering. The successful completion of a written qualifying examination, dissertation-proposal defense, and an approved dissertation are also required.

COURSES

MINE 505. Integrated Mining Systems. 3 Hours.
PR: Graduate standing or consent. Problem-based and integrative learning to solve problems on underground and surface mining systems based on engineering principles.

MINE 593A-Z. Special Topics. 1-6 Hours.
A study of contemporary topics selected from recent developments in the field.

MINE 595. Independent Study. 1-6 Hours.
Faculty supervised study of topics not available through regular course offerings.

MINE 611. Adv Ground Control Coal Mine. 3 Hours.
PR: MINE 411 or consent. Ground and strata control for underground and surface coal mining, including slope stability and subsidence.

MINE 612. Surface Subsidence Engineering. 3 Hours.
PR: MINE 411. Elements of surface subsidence engineering due to underground mining: theories of surface subsidence, characteristics and prediction of surface movements, and effects of surface movements.

MINE 613. Ground Control Failures. 3 Hours.
PR: MINE 611 or consent. Case studies of ground control failures on coal pillar, roof bolting, roof fall, cutter, floor heave, multiple-seam mining, and longwall mining.

MINE 616. Advanced Rock Mechanics. 3 Hours.
PR: MINE 414 or consent. Testing techniques and interpretation, strength and fracture, classification, anisotropy, friction, jointed rock, fluid pressure, fragmentation, and excavation.

MINE 624. Num Analysis in Mineral Engr. 3 Hours.
PR: Graduate standing or consent. Application of mathematical and numerical methods in metallurgy and mineral processing problems.
MINE 625. Advanced Mineral Processing. 3 Hours.
PR: MINE 327 or consent. Theory and technology of separation. Triboelectrostatic and magnetic dry ore and coal separation. Engineering and scientific aspects of column flotation of fines in coal and mineral industries.

MINE 627. Advanced Coal Preparation. 3 Hours.

MINE 628. Comput FLuid Flow Mineral Engr. 3 Hours.
PR: Graduate standing or consent. Applications of appropriate theories for solving fluid transportation problems in mineral engineering. Newtonian and non-Newtonian slurries and applications to mineral engineering are emphasized.

MINE 629. Mine Waste Management/Closure. 3 Hours.
PR: Consent. Planning and design to control, detoxify, and contain mine openings for mine and mill closure in mineral industry. Regulatory frameworks.

MINE 631. Mine Ventlatn Netwrk Analysis. 3 Hours.
PR: MINE 331 and MINE 381 or consent. Theory and computational techniques for mine ventilation network problems with emphasis on computer-aided analysis of complex mine ventilation systems.

MINE 632. Advanced Mine Ventilation. 3 Hours.
PR: MINE 331. Advanced topics in mine atmospheric control including control of methane, dust, humidity, and heat. Also covers leakage characteristics, fan selection, analysis of ventilation networks, and planning of mine ventilation system.

MINE 633. Coal Mine Methane Control. 3 Hours.
PR: Graduate standing or consent. Control of explosive gas emissions in coal mines. Procedures for measurement, mitigation, capture, and utilization of mine-generated gases. Techniques for gas emission forecasting.

MINE 661. Num Analysis for Mine Design. 3 Hours.
PR: Graduate standing or consent. An introduction to the formulation and application of boundary-element, finite-difference, and discrete element methods for geomechanical design of mines and geologic structures.

MINE 662. Disp Disc Modeling in Mining. 3 Hours.
PR: MINE 661 or consent. An in-depth look into the formulation and application of the displacement discontinuity method for modeling stresses and displacements in single and multiple-seam coal mines.

MINE 663. Geomech Modeling with FLAC. 3 Hours.
PR: MINE 611 or consent. An in-depth study of the application of the finite-difference program, FLAC, for modeling static and dynamic scenarios in mining, geologic and soil structures.

MINE 682. Advanced Mine Power Systems. 3 Hours.
PR: Graduate standing or consent. Advanced study of mine electrical power systems from theory to practice covering the vital aspects that go into planning and designing a mine power system.

MINE 685. Grad Sem:Coal Mining. 3-6 Hours.

MINE 686. Grad Seminar Coal Mine. 3-6 Hours.

MINE 687. Materials Engineering. 3 Hours.
A study of materials engineering fundamentals emphasizing semiconductor, polymer, metal, and ceramic/cementitious material systems. Mechanical and physical properties, theoretical aspects, testing, design criteria, manufacturing, and economics of material systems. Laboratory testing and evaluation. (Equivalent to CE 687, CHE 687, EE 687, IMSE 687, and MAE 687.)

MINE 691A-Z. Advanced Topics. 1-6 Hours.
PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

MINE 693A-Z. Special Topics. 1-6 Hours.
A study of contemporary topics selected from recent developments in the field.

MINE 695. Independent Study. 1-15 Hours.
Faculty supervised study of topics not available through regular course offerings.

MINE 697. Research. 1-15 Hours.
PR: Consent. Research activities leading to a thesis, problem report, research paper, or equivalent scholarly project, or a dissertation. (Grading may be S/U.)

MINE 711. Theories of Surface Subsidence. 3 Hours.
PR: MINE 612. Theories of surface subsidence due to underground coal mining including empirical, profile function, theoretical and physical modeling methods, and time factors. (3 hr. lec.).

MINE 712. Theory of Pillar Design. 3 Hours.
PR: MINE 411 and MINE 611. Examination of various theories of pillar design for room and pillar mining and longwall mining including chain pillars, barrier pillars, and bleeder pillars.
MINE 713. Theory of Roof Bolting. 3 Hours.
PR: MINE 611 or consent. Review and discuss various theories of roof bolting. Review select papers representative of recent developments of design of roof bolts and selection of materials.

MINE 716. Theory of Rock Failure. 3 Hours.
PR: MINE 414 or consent. Friction, elasticity, strength of rock, mechanism of brittle failure, factors affecting failure process, theories of failure, fracture propagation in rock, fracture toughness of rock and coal, fluid pressure, size, stress gradient, and time-dependent effects.

MINE 718. Rock Mechanics Mine Design. 3 Hours.
PR: MINE 411 and MINE 414 or consent. Design process in mining engineering; design approaches for excavations in rock; input parameters for design; empirical, observational, and analytical methods of design; integrated designs. (1 hr. lec., 2 hr. lab.).

MINE 731. Mine Ventilation Network Optimization. 3 Hours.
PR: MINE 631 or consent. Application of mathematical optimization techniques to mine ventilation network problems, including linear and nonlinear optimization for controlled-flow and generalized networks.

MINE 769. Expert Systems in Mining. 3 Hours.
PR: Graduate standing. An overview of expert systems applications in mining, a detailed study of two mining applications, study of shells and their components, and study of a specific shell used to develop a project.

MINE 790. Teaching Practicum. 1-3 Hours.
PR: Consent. Supervised practice in college teaching of mining engineering. Note: This course is intended to insure that graduate assistants are adequately prepared and supervised when they are given college teaching responsibility. It will also present a mechanism for students not on assistantships to gain teaching experience. (Grading may be S/U.).

MINE 791A-Z. Advanced Topics. 1-6 Hours.
PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

MINE 792A-Z. Directed Study. 1-6 Hours.
Directed study, reading, and/or research.

MINE 793A-Z. Special Topics. 1-6 Hours.
A study of contemporary topics selected from recent developments in the field.

MINE 794A-Z. Seminar. 1-6 Hours.
Special seminars arranged for advanced graduate students.

MINE 795. Independent Study. 1-9 Hours.
Faculty supervised study of topics not available through regular course offerings.

MINE 796. Graduate Seminar. 1 Hour.
PR: Consent. Each graduate student will present at least one seminar to the assembled faculty and graduate student body of his or her program.

MINE 797. Research. 1-15 Hours.
PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).

MINE 798. Dissertation. 1-6 Hours.
PR: Consent. This is an optional course for programs that wish to provide formal supervision during the writing of student reports (698), or dissertations (798). Grading is normal.

MINE 799. Graduate Colloquium. 1-6 Hours.
PR: Consent. For graduate students not seeking coursework credit but who wish to meet residency requirements, use the University’s facilities, and participate in its academic and cultural programs. Note: Graduate students who are not actively involved in coursework or research are entitled, through enrollment in their department’s 699/799 Graduate Colloquium to consult with graduate faculty, participate in both formal and informal academic activities sponsored by their program, and retain all of the rights and privileges of duly enrolled students. Grading is S/U; colloquium credit may not be counted against credit requirements for masters programs. Registration for one credit of 699/799 graduate colloquium satisfies the University requirement of registration in the semester in which graduation occurs.