Department of Mining Engineering, M.S.Min.E., Ph.D.

Degrees Offered

- Masters of Science, Mining Engineering (M.S.Min.E.)
- Doctor of Philosophy, Mining Engineering (Ph.D.)

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 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 surface and underground mining, rock mechanics and ground control, mine health and safety, mineral/coal processing, mine pollution control, and mine ventilation.

FACULTY

CHAIR

- Vladislav Kecojevic - Ph.D. (University of Belgrade)
  Surface mining, Surface mine health and safety, Environmental impact of surface mining

ASSOCIATE PROFESSOR

- Yi Luo - Ph.D. (West Virginia University)
  Surface Subsidence, Ventilation, Miners’ Health
- Brijes Mishra - Ph.D. (West Virginia University)
  Rock mechanics, Numerical modeling

ASSISTANT PROFESSOR

- Hassan Amini - PhD (West Virginia University)
  Process circuit design and simulation, Process modeling and optimization, Environmental management strategies
- Qingqing Huang - Ph.D. (University of Kentucky)
  Mineral Processing, Coal Preparation, Explosion Mitigation, Extractive Metallurgy
- Tulu, I. Berk - Ph.D. (West Virginia University)
  Coal/stone/hard rock pillar stability, Coal bump/burst, Rock drilling and fragmentation

LECTURER

- Dan Alexander - Ph.D. (West Virginia University)
  Mineral economics evaluation

TEACHING ASSISTANT PROFESSOR

- John Craynon - Phd (Virginia Tech)
  Raw materials and modern society, Mining and the environment, Energy and environmental footprint

Masters Admissions

The M.S program in the Mining Engineering department may admit students who meet the following minimum 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. 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.
• International applicants must submit proof of English language proficiency.
• 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.

**Doctoral Admissions**

The Ph.D program in the Mining Engineering department may admit students who meet the following minimum 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.
• International applicants must submit proof of English language proficiency.
• 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.

Applicants for both M.S. and Ph.D. are considered by the entire faculty for both admissions and funding.

**MSMINE Major Code:** 3035

**PhD Major Code:** 3061

For specific information on the following program, please see the links to the right:

• Mining Engineering, M.S.Min.E.

For specific information on the following program, please see the links to the right:

• Mining Engineering, Ph.D.

**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 588. Advanced Mine Control Systems Engineering. 3 Hours.**
PR: MINE 682 with a minimum grade of B- or MINE 382. Specially focused on controls requirements in extraction industries, combining classic control theory with first and second order system response, assessing system stability, selection of appropriate and cost-effective field-level sensors and devices, and overall control system design using programmable logic controllers. Responsible charge managing design-build controls project team.

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

**MINE 595. Independent Study. 1-9 Hours.**
Faculty supervised study of topics not available through regular course offerings.

**MINE 611. Advanced Ground Control-Coal Mines. 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. Numerical Analysis in Mineral Engineering. 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 425 and MINE 326 and MINE 427 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. Computation Fluid Flow in Mineral Engineering. 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 Wastes Management/Closure. 3 Hours.
PR: Consent. Planning and design to control, detoxificate and contain mine openings for mine and mill closure in mineral industry. Regulatory frameworks.

MINE 631. Mine Ventilation Network 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. Numerical 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. Displacement Discontinuity 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. Geomechanical Modeling with Fast Lagrangian Analysis of Continuum. 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 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 691. Advanced Topics. 1-6 Hours.
PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

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

MINE 695. Independent Study. 1-9 Hours.
Faculty supervised study of topics not available through regular course offerings.

MINE 697. Research. 1-9 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 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 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 791. Advanced Topics. 1-6 Hours.
PR: Consent. Investigation of advanced topics not covered in regularly scheduled courses.

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

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

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

MINE 796. Graduate Seminar. 1-3 Hours.
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. 1-9 Hours.
PR: Consent. Research activities leading to thesis, problem report, research paper or equivalent scholarly project, or a dissertation. (Grading may be S/U.).