

# J. David Lowell Master of Engineering in Mineral Resources

The J. David Lowell Master of Engineering in Mineral Resources is intended for mineral resource professionals advancing to management positions and for those from other disciplines who are entering the mineral resources industry and need professional career preparation specific to the industry. The program is modeled after distance-based executive MBA programs. The curriculum will consist of courses that teach fundamental engineering principals in mining, cutting edge research and technology advances in the industry, mine finance and management, legal topics of importance to engineering managers, and personnel management.

The program requires an undergraduate degree in an engineering discipline or a related science, health, or business discipline. Prerequisites in calculus, physics, chemistry, engineering science, and geology must be satisfied prior to applying to the program.

The program consists of distance-based courses that run the duration of a semester and intensive short courses that run from 2-3 days to 2 weeks. Courses are available in live interactive formats or on-demand formats. Courses from other departments may not be available via distance delivery. The program strongly recommends each cohort to come to campus for a short period of time at the beginning of the program for 5 days of orientation and short courses and at the end of the program for 3 days of short courses, final presentations, and debriefing. The on-campus time provides a time for networking with fellow students, faculty, and industry professionals.

Students are required to select at least 9CH of coursework from a predefined emphasis area. In addition, they are required to take 3CH of engineering focused mathematics related to their program of study and 3CH of coursework in business or management. Short courses may be used as part of the required emphasis units or electives. A minimum of 15 units of graded coursework must be in mining engineering. Students pursuing the M.Eng. degree via this curricular track can take up to 9CH of report and work-related independent study units spread over 2-3 semesters if they are employed in the industry. Students who are not employed in the industry should take 27-30CH of graded course work and no more than 3CH of independent study. Students will have an advisory committee that must approve the plan of study, independent studies, and final report. A maximum of 6CH can be transferred from another university (courses from Arizona State University and Northern Arizona University can be included in the program without transferring credits). Courses from one of the three certificate programs in mining engineering from the University of Arizona will transfer into the Master of Engineering in Mineral Resources degree.

Required courses:	9 CH
Electives:	3-12 CH
Engineering Math:	3 CH
Business Fundamentals:	3-9 CH
Final Report or Independent Studies:	0-9 CH

**Total: 30 CH**

**Students must select one emphasis area and take at least 9CH from that area and 3-12CH from one or more different areas:**

- **Mine Information and Production Technology (9CH)** MNE 507 Equipment Operations Technology (web), MNE 509 Management Operations Technology (web); MNE 696b Modern Mining Operations Systems; MNE 587 Applied Neural Network Computing (web); MNE 519 Mine Planning Software (short course); MNE 534 Surface Mine Design (web); MNE 538 Underground Mine Design (web); SIE 554A The Systems Engineering Process (web); SIE 531 Simulation Modeling and Analysis (web); SIE 548 Operations Research Modeling (web);
- **Mine Health and Safety (9CH)** MNE 526 Health and Safety in Mining (web), MNE 521 Disease and Illness in Mining (web); MNE 506a Fundamentals of Mine Ventilation; CPH 553 Toxicology and Chemical Exposures (web); CPH 522 Safety Fundamentals (web); CPH 576a Biostatistics (web) (may be used to satisfy math requirement); CPH 577 Social and Behavioral Aspects of Public Health (web); CPH 574 Health Administration and Policy (web); CPH 575 Environmental and Occupational Health (web); CPH 573a Basic Principles of Epidemiology (web)
- **Geomechanics (9CH)** MNE 527 Geomechanics (web); MNE 547 Underground Construction Geomechanics (web); MNE 580 The Mechanics of Failure in Rock and Other Brittle Materials (web); MNE 515 Rock Excavation (web); CE 540 Soils Foundation Engineering; CE 541 Earth Structures (web)
- **Mineral Processing (9CH)** MNE 511 Mineral Processing (web); MNE 541 Surface Chemistry of Flotation (web), MNE 513 Surface Characterization Techniques
- **Sustainable Resource Development (9CH)** MNE 522 Engineering Sustainable Development (web); MNE 541 Environmental Management and Mine Reclamation (web); ABE 526 Soil and Water Conservation Engineering; AREC 576 Natural Resource Law and Economics; GEOS 596A Sect 1 (field course) Ore deposit mapping; GEOS 596a Sect 2 (field course) Porphyry, IOCG, and Alkalic Copper Deposits.
- **Mine Management (Business fundamentals 3-9CH)** MNE 530 Mine Examination and Valuation; MNE 697A Global Capital Markets (short course); MNE 697B (short course) Modern Corporate Organizations in the Minerals Industry; MNE 697C (short course) Basic Concepts in Mineral Economics; MNE 697D Introduction to Engineering Contract Law (short course); MNE 697E (short course) International Minerals Trade; MNE 697F (short course) Leadership for Engineers and Scientists; MNE 697G (short course) Mine Finance and Acquisitions;

**Electives (3-12CH)** Students must complete 3-12CH of elective coursework. These courses are subject to the approval of the advisory committee, and may include courses listed above that exceed the individual requirements. Some courses from other departments such as Geosciences may not be available through distance delivery. Short courses may be used as elective credit.

**Engineering Math (3CH)** Students must complete 3CH of a mathematically focused course that is appropriate to the chosen engineering electives. Examples of math intensive classes include MNE 527, 587, 547, 580; CPH 576a

**Business Fundamentals (3-9CH)** Students must complete a minimum of 3CH of coursework in fundamental business topics, law, and personnel management,

possible topics include: contract law, personnel management, mineral economics, mine finance, corporate organizational structure, financial institutions, innovation. Short courses may be used to satisfy this requirement.

**Final Report and Independent Studies (O-9CH)** Students who are employed in the minerals industry or closely related field may take up to 6 units of report credit spread over no less than 2 semesters and up to 3 units of a work-related independent study. The report and independent study must be appropriate to the student's plan of study, and is subject to the approval, in advance, of the student's advisory committee. The independent study can be "Entrepreneurship in the Mineral Resources Industry" which launches the second year of the program and culminates in a business plan or study of a new technology or process.