Master of Arts in
Science & Mathematics Education

Contact Person: H. Lawrence Jones, Ed.D., Director

The Master of Arts in Science and Mathematics Education (MASMED) is designed for science and mathematics teachers. Participants will learn through hands-on experience how to integrate mathematics and science content (as called for in the National Science Education Standards) with a technology-intensive, problem-based approach to teaching and learning.

Students enter the program as a cohort group; each cohort is limited to 24 students and only one cohort will be admitted annually. The program is completed in three summers, two fall, and two spring semesters. Fall and spring semester classes are conducted by distance learning, while summer classes are on-campus. During the initial summer, students will complete two hands-on classes at the state-of-the-art Center for Educational Technologies. At the end of seven consecutive terms, students will graduate having completed 32 graduate credits.

Upon completion of the program, the MASMED graduate will instruct secondary school students using:

1. Integrated math and science content
2. Experiential, problem-based learning activities
3. Technology infusion strategies
4. Research-based classroom interventions
5. Constructivist learning strategies

Admission Requirements

The program is open to graduates of any accredited college or university who possess a bachelor’s degree or its equivalent and who have demonstrated high promise of success in graduate studies.

Applicants will be evaluated by the MASMED Admissions Committee according to the following criteria:

1. Currently teaching science or mathematics
2. Internet accessibility with e-mail and distance learning capabilities
3. 2.75 or better cumulative undergraduate average
4. A score of at least 550 on the TOEFL exam for students whose native language is not English
5. Submission of either an appropriate score on the Graduate Record Examination (GRE) or Miller Analogies Test (MAT) or a transcript showing receipt of a master’s degree
6. Completion of an essay outlining how this degree will be used to improve acquisition of mathematics and science skills and knowledge in the applicant’s classroom.

Upon evaluation by the MASMED Admissions Committee, the applicant will be notified as to the status of the application and whether or not a personal interview is needed. Students may be admitted in one of the following categories:

1. Full Admittance – Students who meet all the qualifications listed above
2. Provisional Admittance – Students whose qualifications fall short of the requirements for full admittance, but whose qualifications and experience indicate their potential for achievement. These students may be admitted to the program on the recommendation of the Admissions Committee and the director of the program.

An applicant not currently teaching in the area of science or mathematics will be required to have endorsement by a local school where assignments and projects can be conducted and evaluated in actual classroom situations. Access to the technology needed for distance classes is also required.

Curriculum Sequence

Summer 1
- MSM 505 Integrated Mathematics, Science and Technology
- MSM 508 Introduction to Action Research
- MSM 511 Educational Research Design

Fall 1
- MSM 514 Educational Psychology
- MSM 518 Action Research II
- MSM 512 Instructional Design and Theory

Spring 1
- MSM 522 Astronomical: Integrating Physics and Mathematics in Space
- MSM 528 Action Research III

Summer 2
- MSM 505 Integrated Mathematics, Science and Technology
- MSM 508 Introduction to Action Research
- MSM 511 Educational Research Design
- MSM 603 Energy in the 21st Century
- MSM 608 Action Research IV
- MSM 611 Measuring and Analyzing Learning Outcomes

Fall 2
- MSM 615 Earth Systems Science: A Qualitative and Quantitative Look
- MSM 618 Action Research V

Spring 2
- MSM 624 Teaching in America in the 21st Century: Contemporary Issues
- MSM 628 Action Research VI

Summer 3
- MSM 633 Applying Earth Ecology to Space Habitation (SPACEHAB)
- MSM 638 Action Research VII
- MSM 612 Professional Writing
Course Descriptions

MSM 500 Workshop (1-3 crs)
Integration of math and science into curricula using best practices, constructivist theory and techniques. Designed to meet specific needs of teaching professionals.

MSM 505 Integrated Mathematics, Science and Technology (3 crs)
Exploring the relationships among mathematics, science and technology in the context of real world, problem-solving activities, with a focus on environmental monitoring. Introducing problem-based learning concepts and hands-on distance mission involving simulated natural disasters and an International Space Station satellite video conference. Computers, calculator-based laboratory probes, chemical test kits and digital cameras will be used to gather and analyze data. Participants will integrate activities to design a home site investigation. Optional Scuba Science Course with scuba certification.

MSM 514 Educational Psychology (3 crs)
The study of psychological principles applied to the field of education. Topics include: characteristics of effective teaching, nature of intelligence, student-centered/constructivist theories, learning environments, using rubrics, motivation and the assessment of learning. Participants will create lesson plans for juried/peer review.

MSM 522 Astronomical: Integrating Physics and Mathematics in Space (3 crs)
Examining the contents, structure and dynamics of the universe using extensive mathematical tools and technology. Astronomy Village, the Voyager software and website resources combine to create an integrated mathematics and science learning environment. Mathematics applications use information from the cosmos. Topics include: celestial dynamics, optics and telescopes, galaxies and quasars and UFOs and extraterrestrials.

MSM 530 Mission to Accomplished Teaching Phase I - National Board Certification
The five Core Propositions of the National Board for Certification for Teachers of: 1) commitment to students and their learning, 2) knowing the subject and how to teach it, 3) management and monitoring of student learning, 4) thinking systematically about teaching practice and experience and 5) membership in learning communities will be explored through a guided design for behavioral manifestations of those propositions.

MSM 531 Mission to Accomplished Teaching Phase II - National Board Certification
A continuation of MSM 530.

MSM 508, 518, 528, 608, 618, 628 & 638 Action Research I-VII (1 credit each)
Action research entails a set of steps from an idea to a refined teaching module, integrating program content with current practice. Throughout the seven semesters, participants will be engaged in the development, refinement, assessment and analysis of a curriculum design tailored for their own classroom. Four mini-courses are designed to support teachers as they conduct action research. The mini-courses are:

- MSM 511 Educational Research Design (1 credit)
- MSM 512 Instructional Design and Theory (1 credit)
- MSM 611 Measuring and Analyzing Learning Outcomes (1 credit)
- MSM 612 Professional Writing (1 credit)

MSM 615 Earth Systems: A Qualitative and Quantitative Look (3 crs)
Featuring a collaborative, inquiry-based, online environment, this course focuses on the impacts and interactions between earth events and each of the spheres—biosphere, lithosphere, atmosphere and hydrosphere. Topics include deforestation, ozone, global warming and coral reefs. Participants will draw on the chemistry discipline and mathematical modeling to design PBL lessons that will help their students to think in terms of earth systems science.

MSM 624 Teaching in America in the 21st Century: Contemporary Issues (3 crs)
Investigate contemporary issues in education that impact teaching effectiveness and career success. The online format will be enhanced by the use of Guided Design, an interactive problem-solving approach. Representative topics include school violence, core curriculum, successful intelligences and motivating the unmotivated.

MSM 633 Applying Earth Ecology to Space Habitation (3 crs)
Applying ecological principles to solve the problem of human habitation of space. A focus on biological fundamentals of ecology, experimentation using scientific instrumentation to take measurements, and the use of computer simulations and spreadsheets for graph interpretation and data analysis. Participants will use multimedia, laboratory and other technology tools as they present an integrated three-year lunar base simulation analysis.

MSM 608, 618, 628 & 638 Action Research I-VII (1 credit each)
Action research entails a set of steps from an idea to a refined teaching module, integrating program content with current practice. Throughout the seven semesters, participants will be engaged in the development, refinement, assessment and analysis of a curriculum design tailored for their own classroom. Four mini-courses are designed to support teachers as they conduct action research. The mini-courses are:

- MSM 511 Educational Research Design (1 credit)
- MSM 512 Instructional Design and Theory (1 credit)
- MSM 611 Measuring and Analyzing Learning Outcomes (1 credit)
- MSM 612 Professional Writing (1 credit)