

Master of Science in Manufacturing Systems

Coordinator: H. Fred Walker

Professors: Andrews, Gupta, Walker; *Associate Professors:* Grover, Jensen, Marshall

Note: Admission to this program has been temporarily suspended.

Program Description

The master of science in manufacturing systems (M.M.S.) is an interdisciplinary program designed to prepare working professionals for advancement and leadership positions in a variety of manufacturing industries. The M.M.S. program is open to students who may or may not have a manufacturing-related undergraduate degree who want or need a graduate-level understanding of manufacturing operations. A Certificate of Graduate Study in Manufacturing Systems is also offered for non-degree seeking students interested in similar content knowledge without a research component.

While in the M.M.S. program, students will develop the knowledge, skills, and abilities necessary to plan for and successfully implement advanced manufacturing technology for competitive advantage in a global marketplace. Applied problem solving and quantitative methods will serve as the primary context of coursework for students in the M.M.S. program. Accordingly, the M.M.S. program will seek to develop in students the critical thinking and analytic abilities needed by leaders in this profession.

The M.M.S. program is intended primarily for adult learners participating on a part-time basis. The program is offered on two- and three-year completion cycles, depending on how many courses students complete from semester-to-semester and whether students attend courses during the summer. Most coursework for the M.M.S. program will be offered in the late afternoon and early evening.

Admission

Admission to the M.M.S. program and the Certificate of Graduate Study will be competitive based on the availability of 20 seats each year. Students applying for full admission for an available seat must meet the following requirements (a conditional admission *may* be granted to students who do not satisfy the undergraduate grade point average requirement provided they score above the 50th percentile on the quantitative section of the Graduate Record Examination (GRE) or the Graduate Management Admissions Test (GMAT), and provided a seat in the program is available):

1. Hold a baccalaureate degree from an accredited institution with a grade point average of at least 3.0 on a 4.0 scale (B average).
2. Provide official test scores from either the GRE or GMAT.
3. Provide an essay describing why the degree is important for your professional development.
4. Provide a description of your professional experience in manufacturing.
5. Provide three letters of recommendation.

The Admission Committee will evaluate an applicant's undergraduate performance, standardized test scores, recommendations, essay, and experience when making an admission decision.

Conditional Admission Students without strong undergraduate academic performance, standardized test scores, or industrial experience may be considered for conditional admission. Students admitted on a conditional basis will be required to complete specific courses in a sequence defined by the graduate advisor with a grade of 3.0/B or better. This specified set of courses will normally consist of four courses, graduate, undergraduate, or both. Failure to complete these courses, in the order and with the grades specified, will result in dismissal from the program.

Application Materials

In addition to the materials described in the Admissions chapter, students applying for the M.M.S. program must submit:

1. A completed application for graduate study, including application fee.
2. Official transcripts of all graduate and undergraduate coursework.
3. Official scores from the GRE or GMAT.
4. An essay describing why the M.M.S. program is important for your professional development.

5. A description of your professional experience.
6. Three letters of recommendation.
7. Test of English as a Foreign Language (TOEFL) score of at least 550 on the paper-based TOEFL or 213 on the computer-based TOEFL for students whose native language is not English.

Application materials may be obtained from the USM Office of Graduate Admissions and returned to the same office.

Application Deadline

Applicants are reviewed on a rolling basis until all slots are filled, with priority given to applications that are completed by April 15.

Program Policies

In addition to the general policies described in the Academic Policies chapter, specific policies of the M.M.S. program are as follows:

Deferred Admission

Students admitted for full- or part-time study must register for and complete at least one course in the fall semester in which they are admitted. Students who are admitted and do not complete one course in the first semester will be withdrawn from the program and must reapply as described above.

Transfer Credit

Students who have completed graduate-level courses specifically related to manufacturing at a regionally accredited institution of higher education other than USM may request in writing that no more than two of the courses (the equivalent of six semester hours) be considered for credit in the M.M.S. The graduate advisor, in coordination with the Office of Transfer Affairs, will make all decisions related to transfer credit.

Time Limit

Once admitted to the M.M.S. program all requirements for graduation must be completed within six years. Any work not completed within six years of beginning the program must be repeated.

Non-Degree Release

Students admitted as Certificate of Graduate Study candidates must sign a release stating they will not pursue the M.M.S. degree from USM on the basis of accumulated credit, unless they gain admission through the formal admission process described above.

Certificate of Graduate Study

Candidates for the Certificate of Graduate Study must comply with the same admission and performance requirements as degree seeking students.

Grade Point Average

Students must maintain a GPA of 3.0 or better.

Grade Policy

A student whose grade point average (GPA) falls below 3.0 will be placed on academic probation. In this case, a student will be allowed 12 semester hours to raise their GPA to, or above, the 3.0 minimum by taking only graduate-level courses. Students unsuccessful in raising their GPA during a probationary period may be dismissed from the program. A 3.0 GPA is required for graduation from the M.M.S. program.

The First Course

The first course taken by students participating in a degree or certificate seeking status must be MBA 504 Probability and Statistics for Business Decision Making. Successful completion of MBA 504 with a 3.0/B or better is a requirement before taking any other courses beyond the first semester.

Elective Courses

A list of courses that may be used to satisfy the electives requirement has been provided below. Additional elective courses will be developed as part of the M.M.S.

program and will be available as needed/requested. Students in the M.M.S. program may also complete elective courses offered by academic departments not participating directly in the M.M.S. program so long as the course(s) are specifically related to manufacturing and are approved by the graduate coordinator. Any course taken as an elective for the M.M.S. degree or Certificate of Graduate Study requires prior approval from the graduate coordinator.

Publication Requirement

Candidates for the master of science, manufacturing systems degree must prepare and submit a manuscript to a refereed journal related to manufacturing. Manuscripts are to be based on the applied manufacturing research completed as part of a thesis.

Program Requirements

The M.M.S. program at USM is composed of 36 credits allocated as follows: 24 credits M.M.S. core, 6 credits electives, and 6 credits thesis.

M.M.S. Core M.M.S. core courses include the following (24 credits):

MMS	510	Applied Research Methods
MMS	515	Engineering Economy
MMS	520	Quality Systems
MMS	525	Manufacturing Strategies
MMS	530	DOE Applications in Manufacturing
MBA	504	Probability and Statistics for Business Decision Making
MBA	508	Management Science
MBA	642	Leadership

M.M.S. Electives M.M.S. elective courses include, but are not limited to, the following (6 credits):

MMS	553	Automated Systems for Materials Processing
MMS	555	Advanced Control Applications for Automated Systems
MMS	557	Advanced Applications of Computer Integrated Manufacturing
MMS	570	Project Management
MMS	580	Special Topics in Manufacturing Systems
MBA	675	Production/Operations Management

M.M.S. Thesis The M.M.S. thesis is an applied research component that must be based on an experiment design application in a manufacturing environment – a significant component of this research will be an analysis of the economic impacts of the research (6 credits).

MMS	590	Thesis
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Certificate of Graduate Study, Manufacturing Systems

The Certificate of Graduate Study, Manufacturing Systems, at USM includes 21 credits allocated as follows: 18 credits M.M.S. core and 3 credits of electives.

M.M.S. Core M.M.S. core courses include the following (18 credits):

MMS	515	Engineering Economy
MMS	520	Quality Systems
MMS	525	Manufacturing Strategies
MBA	504	Probability and Statistics for Business Decision Making
MBA	508	Management Science
MBA	642	Leadership

M.M.S. Electives M.M.S. elective courses include, but are not limited to, the following (3 credits):

MMS	553	Automated Systems for Materials Processing
MMS	555	Advanced Control Applications for Automated Systems
MMS	557	Advanced Applications of Computer Integrated Manufacturing
MMS	570	Project Management
MMS	580	Special Topics in Manufacturing Systems
MBA	675	Production/Operations Management

MMS 510 Applied Research Methods

This course will prepare students to engage in a systematic method of inquiry when investigating problems commonly encountered in operational manufacturing environments. Topics include: formulating/defining problems, gathering data as related to similar problems encountered in the larger context of a manufacturing industry, gathering data as related to a specific problem of interest within a specific company, methods for organizing and displaying data, formulating research questions, integrating quantitative methods with the research process, data analysis, and decision making. Additional topics include: cost justification of applied research, presentation techniques, and manuscript preparation. Cr 3.

MMS 515 Engineering Economy

This course will expose students to a variety of topics related to financial resources as used in manufacturing operations. Topics include the time value of money, sources and costs of capital, project/alternative selection, and capital budgeting. Additional advanced engineering economy topics including project/asset valuation using real options, competition, project selection under risk and uncertainty, multi-attribute decision making, and sensitivity analysis. Prerequisite: MBA 604. Cr 3.

MMS 520 Quality Systems

This course will cover the functional requirements of quality systems as applied to manufacturing operations. Quality systems components commonly associated with assurance, control, and improvement functions will be a primary focus of the course. Applications of applied research methodology using quantitative methods to solve problems related to quality will be emphasized. Prerequisite: MBA 604. Cr 3.

MMS 525 Manufacturing Strategies

This course will explore issues impacting the competitive posture of a variety of manufacturing industries. Topics include: operating and organizational structures, use of financial resources for competitive advantage, risk assessment, technology management, global operations, and emerging trends in operating policy. Cr 3.

MMS 530 DOE Applications in Manufacturing

This course will expose students to experimental design applications most commonly encountered in manufacturing. Topics include practical experimentation strategy, one-way designs, full and fractional factorial designs, selected screening and characterization designs, and use of JMP 5.1 software. Particular attention will be directed toward model

selection and refinement, appropriate hand and computer-based calculation, analysis and interpretation of results, and using quantitative input in decision-making processes. Cr 3.

MMS 590 Thesis

The thesis is a study focused on solving a problem in an operational manufacturing environment. Theses for the M.M.S. degree must be quantitative in nature and be based on the application of an experiment design. Prerequisite: successful completion of all M.M.S. coursework and approval from the graduate advisor. Cr 6.

MBA 504 Probability and Statistics for Business Decision Making

An introduction to the concepts and use of probability and statistics as tools for business decision making. Prerequisite: computer proficiency, ABU 190, or ITT 181. *Students matriculated into the M.M.S. program have already met the prerequisites.* Cr 3.

MBA 508 Management Science

This course examines the role, perspective, and commonly used tools of quantitative analysis in operational decision making. Emphasis is placed on developing students' abilities to recognize the need for quantification; formulate operations management problems quantitatively; select and test computer-based decision-support system models; collect meaningful data; and interpret the implications of analysis results. Prerequisites: MBA 604; computer proficiency, ABU 190, or ITT 181. Cr 3.

MBA 642 Leadership

The course integrates five perspectives of leadership: individual differences and diversity; transactional leadership; power and politics; transformational leadership; and the physical, psychological, and spiritual dimensions of leader well-being. Prerequisite: BUS 340. Cr 3.

MBA 675 Production/Operations Management

An examination of the role of operations within manufacturing and service organizations. Emphasis is placed on recognizing operational opportunities and tradeoffs, and employing computer simulation and other quantitative tools and decision support systems to assist strategic and operational decision making. Topics include: quality management, capacity management, process design, facility location, layout, production planning, and manufacturing philosophies such as group technology, the theory-of-constraints, and just-in-time. Prerequisite: MBA 608. Cr 3.

M.M.S. Program Scheduling

	<i>2 Year Plan</i>	<i>3 Year Plan</i>
Fall	MBA 504 MMS 510	MBA 504 MMS 510
Spring	MBA 542 MMS 515	MBA 542 MMS 515
Summer Session 1	Elective Elective	
Summer Session 2	<i>No Class Offerings</i>	<i>No Class Offerings</i>
Fall	MMS 520 MBA 508	MMS 520 MBA 508
Spring	MMS 530 MMS 525	MMS 530 MMS 525
Summer Session 1	Thesis	
Summer Session 2	<i>No Class Offerings</i>	<i>No Class Offerings</i>
Fall		Elective Elective
Spring		Thesis