923. Topics in Operations Management
Fall, Spring, 3(3-0). Open only to Ph.D. students in Business. Current research in the field. Topics vary. QP: MGT 801, MGT 803. R: MGT 801, MGT 803.

388. Food Marketing Management
Fall, Spring, 3(3-0) Interdepartmental with Food Systems Economics and Management. P: MGT 304, MGT 345. R: Open only to juniors and seniors in College of Business and in programs for which ML 335 is a catalog-listed requirement. Major decision-making in food industry organizations (processors, wholesalers, retailers). Marketing and sales in retail outlets. Consumer and customer needs. Distribution and merchandising systems in domestic and international contexts. QP: MGT 304, MGT 345, MGT 355.

345. Logistics Management
Spring, 3(3-0) Interdepartmental with Management. P: MGT 304, R: Open only to juniors and seniors in College of Business. Activities and decisions necessary to plan, implement, and control private and public physical distribution and transportation channel systems. Physical, human, informational, and organizational system components. QP: MGT 304, MGT 301, MGT 345.

351. Retail Management
Fall, Spring, Summer, 3(3-0). P: ML 300. R: Open only to juniors and seniors in the College of Business or in programs for which MTA 301 is a catalog-listed requirement. Analysis of and strategic integration of buyer behavior, segmentation, positioning, demand analysis, information, pricing, promotion, channels, product policies, and ethics in consumer, reseller, industrial, and service markets. QP: ML 201 or ML 251H, ACC 201 or ACC 230 or ACC 251H, R: Open only to seniors in the College of Business or in programs for which MTA 301 is a catalog-listed requirement.

310. International and Comparative Dimensions of Business
Fall, Summer, 3(3-0). P: ML 202 or ML 251H, MGT 300 or concurrently, ML 300 or concurrently. R: Open only to juniors and seniors in the College of Business. Special emphasis on cross-cultural study of business decisions, enterprises, markets, and institutions. QP: MTA 300, MTA 301, MTA 345.

439. Food Business Analysis and Strategic Planning
Fall, Spring, 3(3-0) Interdepartmental with Food Systems Economics and Management. P: ML 325 or FSM 385. STT 201 or STT 200 or STT 315. R: Open only to juniors and seniors in College of Business and in programs for which MTA 439 is a catalog-listed requirement. Principles and techniques of business analysis and strategic planning applied to food firms. Food trend forecasts, market potential, competition, and number of customers in business and strategic planning. QP: MTA 300, MTA 301, STT 428 or STT 429 QP: MTA 415.

446. Physical Distribution Operations

460. Marketing Strategy
Fall, Spring, Summer, 3(3-0). P: ML 302, ML 319, and one other ML course. R: Open only to seniors in the College of Business. Identification and analysis of managerial marketing issues. Integration of marketing concepts and theories through case analysis. Ethical and international applications. QP: MTA 300, MTA 319 QP: MTA 460.

470. Materials and Logistics Policy
Fall, Spring, 3(3-0) Interdepartmental with Management. P: MGT 304, MGT 345. R: Open only to juniors and seniors in College of Business and in programs for which MTA 470 is a catalog-listed requirement. Case studies of materials and logistics management. Identification and definition of problems, evaluation of integrated alternatives, and development of recommendations. QP: MTA 300, MTA 345 QP: MTA 470.

490. Independent Study
Fall, Spring, Summer, 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to majors in Marketing and Transportation Administration and in Materials and Logistics Management. Approval of department. Supervised program of independent library or field research designed to supplement classroom study. QP: MTA 490.

490H. Honors Independent Study
Fall, Spring, 3(3-0) Open only to juniors and seniors in the College of Business. R: Open only to majors in Marketing and Transportation Administration. QP: MTA 490H.

491. Topics in Marketing
Fall, Spring, 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course. R: Open only to juniors and seniors in the College of Business. QP: MTA 491.

805. Marketing Management
Fall, Spring, 3(3-0) R: Open only to graduate students in Business or students in programs for which ML 805 is a catalog-listed requirement. QP: MTA 805.

908. Decision Support Systems for Marketing
Fall, Spring, 3(3-0) R: Open only to graduate students in Business. QP: MTA 908.

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907. Customer-Driven Strategies
Fall, Spring. 3(3-0)
P: ML 806. R: Open only to graduate students in Business.
Marketing strategies based on the analysis of consumer and organizational buyers. Strategy development designed to meet or exceed customers' expectations.
QM: MTA 805

908. Market-Driven Strategies
Fall, Spring. 3(3-0)
P: ML 806. R: Open only to graduate students in Business.
Marketing strategies based on the analysis of competitors. Alternative approaches to competitive strategies.
QM: MTA 805 QA: MTA 851

909. Logistics and Transportation Strategy
Fall, Spring. 3(3-0) Interdepartmental with Management.
P: MGT 800. R: Open only to graduate students in College of Business.
Planning, control, and measurement for logistics and transportation systems. Customer service, transportation, inventory, order processing, warehousing and materials handling.
QM: MGT 800 QA: MTA 809

910. Product Innovation and Management
Fall. 3(3-0)
P: ML 805 or approval of department. R: Open only to graduate students in the College of Business and College of Engineering.
Analytic, decision-making, and planning tools. Topics include new product policy and development, organizational issues, and product modification and deletion.
QM: MTA 805

911. Marketing Communication
Spring. 3(3-0)
P: ML 805. R: Open only to graduate students in Business.
Marketing communication programs for consumer, industrial, and service firms. Communication mix objectives, positioning, budgeting, media, trade promotion, and brand name strategies. Regulation and ethical issues.
QM: MTA 805

912. Logistics Research and Analysis
Fall. 3(3-0) Interdepartmental with Management.
P: ML 809. R: Open only to graduate students in College of Business.
Research methodology in the design and analysis of transportation and distribution systems. System design, customer service, and policy studies.
QM: MTA 809

913. Marketing Research Methods
Spring. 3(3-0)
P: ML 806. R: Open only to graduate students in Business.
Collection, analysis, and interpretation of primary data from problem definition to report writing.
QM: MTA 805 QA: MTA 892

914. Transportation Policy and Plans
Spring. 3(3-0) Interdepartmental with Management.
P: ML 808. R: Open only to graduate students in College of Business.
Policy models and managerial perspectives on future national and corporate transportation policies. Interaction of government, carrier management, and user logistics and distribution strategies.
QM: MTA 818

915. Strategic Planning
Fall. 2(2-0) R: Open only to students in the Advanced Management Program.
QM: MTA 815

916. Marketing Management
Spring. 3(3-0)
P: ML 818. R: Open only to students in the Advanced Management Program.
Analysis, coordination, and execution of marketing programs. Segmentation, marketing mix, market response modeling, and ethics.
QM: MTA 805

917. Market Channel Management
Spring. 3(3-0)
P: ML 805. R: Open only to graduate students in Business.
Design, selection, and performance measurement of channel structures in domestic and international settings.
QM: MTA 805 QA: MTA 824

918. Food Marketing Management
Fall, 3(3-0) Interdepartmental with Agricultural Economics.
P: ML 805 or approval of department. R: Open only to graduate students in Business or approval of department.
Marketing management decisions in food firms. Consumer orientation, computer technologies, food system cost reduction, global opportunities, environmental and social issues.
QM: MTA 805 QA: MTA 831

919. Materials and Logistics Policy
Fall, Spring. 3(3-0) Interdepartmental with Management.
P: ML 805 or MGT 829. R: Open only to graduate students in College of Business.
Case study of strategy, policy, and planning. Customer satisfaction, quality, organization, information use, and strategic alliance issues.
QM: MTA 809, MGT 803 QA: MTA 841

920. Business Communication I
Fall, Spring. 2(1-2)
R: Open only to MBA students.
Analysis of planning and execution of business communications. Development of oral and written communication skills.

921. Business Communication II
Fall, Spring. 3(3-0)
P: ML 801. R: Open only to MBA students. Integrating and applying written and oral business communication skills with other courses in the MBA program.

922. International Business
Fall, Spring. 3(3-0) QA: MTA 921
R: Open only to graduate students in Business. Management of the firm in the multinational environment. Assessment of international modes of operations. Markets, financial strategies, services, and resources. Competitive strategy.
QM: MTA 850

923. International Marketing
Spring. 3(3-0)
P: ML 805, ML 860. R: Open only to graduate students in Business.
Marketing decisions, strategies, performance and operations of the international firm. Attention to multinational enterprises, exporters, service marketers, and contractors.
QM: MTA 890, MTA 805 QA: MTA 882

924. Emerging Topics in Business
Spring. 3(3-0)
R: Open only to second-year MBA students.
Perspectives on new and emerging issues of business administration. Topics vary.
QM: MTA 805

925. Seminar in Marketing and Logistics
Fall, Spring. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course.
P: ML 805. R: Open only to graduate students in College of Business.
Issues in marketing and logistics in an environment of rapid change. Topics vary.
QM: MTA 805

926. Independent Study
Fall, Spring, Summer. 1 to 3 credits. A student may earn a maximum of 6 credits in all enrollments for this course.
P: ML 805. R: Open only to graduate students in Business. Approval of department. Faculty-supervised independent study.
QM: MTA 805 QA: MTA 890

927. Theory Development and Research Design in Marketing
Fall. 3(3-0)
Research methods and scientific methods for the study of marketing. Formulation of hypotheses, concepts of measurement, and quantitative methods.
QM: MTA 905

928. Quantitative Methods in Marketing
Spring. 3(3-0) QA: MTA 906
P: ML 805 or approval of department.
Collection and methods in the scientific investigation of marketing phenomena. Focus on the use of multivariate analytic tools.
QM: MTA 905 QA: MTA 906

929. Causal Modeling in Marketing
Fall. 3(3-0)
P: ML 805. R: Open only to Ph.D. students in the College of Business.
Statistical methods in marketing, emphasis on causal modeling.
QM: MTA 906 QA: MTA 907

930. Marketing Decision Models
Fall. 3(3-0)
P: ML 806.
Applications of marketing decision models in new product development, pricing, distribution, advertising, and sales promotion.
QM: MTA 906 QA: MTA 908

931. History of Marketing Thought
Fall. 3(3-0)
P: ML 805. R: Open only to Ph.D. students in Business.
Evolution of marketing institutions, techniques, theories, and practices. Influence of changing environmental and technological factors.
QM: MTA 805 QA: MTA 920

932. Theories of Competition in Marketing
Fall. 3(3-0)
P: ML 820. R: Open only to Ph.D. students in Business.
Relationships among competition, marketing, and corporate and economic growth. Competition phenomena studied through a variety of disciplines, including marketing, economics, political science, sociology and technology.
QM: MTA 920 QA: MTA 921

933. Seminar in Social Sciences in Marketing
Spring. 3(3-0)
P: ML 906 or concurrently. R: Open only to Ph.D. students in Business.
Social science perspectives on marketing.
QM: MTA 906 QA: MTA 922

934. Seminar in Spatial and Temporal Marketing
Spring. 3(3-0) QA: MTA 923
P: MLA 800, MLA 850. R: Open only to Ph.D. students in College of Business.
Theory concerning marketing strategies and programs in logistics, channels, and pricing. Field research needed.
QM: MTA 920 QA: MTA 923

935. Special Topics Seminar
Fall, Spring. 3(3-0) A student may earn a maximum of 6 credits in all enrollments for this course.
P: Open only to Ph.D. students in College of Business.
Intensive reading and research on a marketing topic of mutual interest to a faculty member and a Ph.D. student.
QM: MTA 921 QA: MTA 924
931. Transportation and Distribution Research Methods
Fall of even-numbered years. 3(0-3)
P: ML 805. R: Open only to Ph.D. students in the College of Business.
Techniques and methodology of system design, economics, and policy formulation.
QP: MTA 930 QA: MTA 931

932. Transportation and Distribution Development Policy
Fall of even-numbered years. 3(0-3)
P: ML 805, ML 862. R: Open only to Ph.D. students in College of Business.
The interaction of government, carrier, and user logistics and distribution strategies, particularly at the macro-corporate and national policy levels.
QP: MTA 931 QA: MTA 932

940. International Business Theory
Fall of even-numbered years. 3(0-3)
P: ML 860. R: Open only to Ph.D. students in Marketing and Transportation Administration.
Theories explaining international business phenomena. Varying perspectives on international business activities, concepts, and frameworks.
QP: MTA 960 or MTA 962

941. International Business Research Issues
Spring of even-numbered years. 3(0-3)
P: ML 940. R: Open only to College of Engineering majors.
Scientific methods of research on international business. Topics include cultural bias and organizing multi-country studies.
QP: MTA 962 QA: MTA 963

995. Directed Research Paper
Fall, Spring, Summer. 1-11 credits.
P: ML 921. R: Open only to Ph.D. students in Marketing and Transportation Administration.
Guided research paper under the direction of a senior faculty member.
QP: MTA 921

999. Doctoral Dissertation Research
Fall, Spring, Summer. 1 to 24 credits.
A student may earn a maximum of 99 credits in all enrollments for this course.
R: Approval of department.
QP: MTA 999

MATERIALS SCIENCE AND MECHANICS
MSM

Department of Materials Science and Mechanics
College of Engineering

160. Engineering Communications
Fall, Spring. 3(3-0)
P: MTH 116 or concurrently.
Computer-aided design and drafting, Prendard sketching. Two and three dimensional visualization. Preparation of spreadsheets and technical reports.
QP: MMM 160

205. Statics
Fall, Spring. 3(3-0)
P: MTH 131.
Vector description of forces and moments. Two and three dimensional equilibrium of particles and rigid bodies. Analysis of trusses, frames and machines.
QP: MTH 216 QA: MMM 205

211. Mechanics of Deformable Solids
Fall, Spring. 3(3-3)
P: MSM 205, MTH 310 or concurrently.
QP: MMM 206, MTH 310, MTH 311 QA: MMM 211, MTH 215

250. Materials Science and Engineering
Fall, Spring. 3(3-3)
P: CEM 141, MTH 133.
Structure of metals, ceramics and polymers. Phase diagrams, thermostabilization procedures, physical and mechanical properties, diffusion, microstructure studies and environmental effects.
QP: CEM 141, MTH 113 QA: MMM 250, MTH 250

306. Dynamics
Fall. Spring. 3(3-0)
P: MSM 205, MTH 250. R: Open only to College of Engineering students.
QP: MMM 205, MTH 310 QA: MMM 306

350. Thermochemistry of Materials
Fall. Spring. 3(3-0)
P: CEM 152, MTH 234.
Open only to Materials Science and Engineering majors. Not open to students with credit in CHE 141, CHE 211, CHE 250.
State variables, laws of thermodynamics, phase and chemical equilibrium. Gas and condensed phase relations, solutions, interfaces, point defects, electrochemistry.
QP: CEM 152, MTH 215 QA: MMM 350

352. Diffusion in Solids
Spring. 3(3-0)
P: MSM 250, MTH 351. R: Open only to Materials Science and Engineering majors.
QP: MMM 350 QA: MMM 452

355. Mechanical Behavior of Materials
Fall. 3(3-0)
P: MSM 211, MTH 250. C: MSM 375 R: Open only to Materials Science and Engineering, Mechanical Engineering majors. Stress and strain, crystal elasticity, anelasticity and viscoelasticity. Mechanical properties in tension and torsion. Crystallographic aspects of plasticity.
QP: MMM 211, MTH 250 QA: MMM 350, MTH 351

356. Deformation Mechanisms
Spring. 3(3-0)
P: MSM 355. R: Open only to Materials Science and Engineering majors.
QP: MMM 350, MMM 351 QA: MMM 351, MTH 456

365. Physical Metallurgy I
Fall. 3(3-0)
P: MSM 250, MMM 351 or concurrently. C: MSM 375 R: Open only to Materials Science and Engineering majors.
Complex binary and ternary phase diagrams. Solidification, recrystallization and grain growth. Phase transformations.
QP: MMM 250, MMM 350, MTH 360 QA: MMM 360, MTH 361

366. Physical Metallurgy II
Spring. 3(3-0)
P: MSM 365. C: MSM 376 R: Open only to Materials Science and Engineering majors.
QP: MMM 360, MMM 390 QA: MMM 453, MTH 361

375. Materials Science Laboratory I
Fall. 1(0-3)
QP: MMM 350, MMM 390 QA: MMM 362

376. Materials Science Laboratory II
Spring. 1(0-3)
QP: MMM 350, MMM 390 QA: MMM 362

380. Polymeric Materials
Spring. 3(3-0)
P: CEM 152, C: MSM 442.
QP: CEM 152

Fall. 3(3-0)
P: MSM 211. R: Open only to College of Engineering majors.
QP: MMM 211 QA: MTH 401

402. Computational Mechanics
Spring. 3(3-0)
P: MSM 306, ME 471. R: Open only to College of Engineering majors.
QP: MMM 401 QA: MMM 402

403. Intermediate Dynamics
Fall of even-numbered years. 3(3-0)
P: MSM 306. R: Open only to College of Engineering majors.
QP: MMM 306 QA: MMM 403

405. Experimental Mechanics
Fall of odd-numbered years. 3(2-3)
P: MSM 211, MSM 306. R: Open only to College of Engineering majors.
Measurement of stress, strain, vibration, and motion using strain gauges, accelerometers, photelasticity, holography, Motre patterns, laser speckle and electronic imaging. Transducer design.
QP: MSM 211, MMM 306 QA: MMM 405

444. Introduction to Composite Materials
Spring. 3(3-0)
P: MSM 211. R: Open only to Materials Science and Engineering majors or approval of department.
QP: MSM 211 QA: MTH 444

451. X-Ray Crystallography
Fall. 3(2-3)
P: MSM 250. R: Open only to Materials Science and Engineering majors and graduate students.
QP: MMM 250 QA: MMM 430