

MKTG 401 ADVERTISING AGENCY MANAGEMENT I (3-0-3) (F). Functions as a full-service advertising agency to develop a complete promotion and advertising campaign. Students develop a marketing and advertising plan complete with advertising and media objectives and strategies, comprehensive ad designs, and sales promotion plans. PREREQ: Junior standing, PERM/INST, and formal application through the department.

MKTG 402 ADVERTISING AGENCY MANAGEMENT II (3-0-3) (S). Functions as a full-service advertising agency in the latter stages of developing a complete promotion and advertising campaign for a real client. Includes a marketing and advertising plan with advertising and media objectives, strategies, comprehensive ad designs, and sales promotion plans for their client. PREREQ: MKTG 401, PERM/INST, and formal application through the department.

MKTG 407 MARKETING COMMUNICATIONS (3-0-3) (F/S). Comprehensive approach to creating and implementing marketing communications activities, including advertising, sales promotions, event sponsor-ships, direct marketing, public relations, and business/store image. Complete a course project involving development of a marketing communications plan. Relevant social, cultural, and ethical issues are emphasized. PREREQ: MKTG 307.

MKTG 418 CUSTOMER SATISFACTION MEASUREMENT (3-0-3) (F/S). This course introduces students to the concept and process of measuring customer satisfaction. The specific issues connected with designing and implementing customer satisfaction programs will be presented. Included will be an analysis of how customer satisfaction data can be integrated into the operations of the organization. Such topics as internal and external benchmarking, survey techniques, and survey data analysis will be discussed. PREREQ: MKTG 301.

MKTG 420 MARKETING MANAGEMENT (3-0-3) (F,S). Marketing principles and theories integrated with analytical and behavioral decision processes. Emphasis on problem and opportunity recognition, marketing strategies, and planning and administering marketing programs. Consumer, industrial, institutional, and international markets are considered. PREREQ: MKTG 301 and satisfactory completion of the College of Business and Economics computer competency exam.

MKTG 421 SALES ADMINISTRATION (3-0-3) (F/S). Management of sales organizations with emphasis on selection, motivation, and supervision of salespeople. Ethics, social responsibilities, and coordination with other functional areas also considered. PREREQ: MKTG 301, MKTG 321.

MKTG 422 NEW PRODUCT DEVELOPMENT (3-0-3) (F). Basic strategies and processes used in the introduction of new products (goods and services). Includes concept generation and evaluation for production and market value. Other topics include perceptual mapping, positioning, integrated design, quality functional deployment, and test marketing. Guest speakers will discuss current applications. PREREQ: MKTG 301.

MKTG 423 MARKETING HI-TECH PRODUCTS (3-0-3) (F/S). Strategies and practices involved in the fast-paced, turbulent environment of marketing technologically oriented goods and services. Explores if, where, how, and why these strategies differ from marketing of non-technical goods/services. Examines different schools of thought along with their respective advantages and limitations. PREREQ: MKTG 301

MKTG 425 MARKETING PLANNING APPLICATIONS (3-0-3) (F/S). Real world study of marketing problems. Emphasis on live marketing problem definition, situational analysis, identification and evaluation of alternative solutions, decision criteria, presentation of a "best" solution, and programmatic design to accomplish desired objectives. PREREQ: Marketing major, senior standing, and MKTG 301.

MKTG 430 INTERNATIONAL MARKETING (3-0-3) (F/S) (Diversity). An analysis of the creation, planning, and implementation of marketing strategies that cross national and cultural borders. PREREQ: MKTG 301.

MKTG 440 INDUSTRIAL MARKETING (3-0-3) (F/S). An analysis of activities related to the marketing of products and services to organizations including government agencies, profit and nonprofit institutions, and commercial enterprises. PREREQ: MKTG 301.

MKTG 460 INTERNET MARKETING STRATEGY (3-0-3) (S). How end consumers and business customers buy products on the Internet, how to enhance customer relationships through use of the Internet, and how the Internet fits within traditional marketing tactics such as advertising and pricing. PREREQ: MKTG 301.

MKTG 493 INTERNSHIP (number of credits varies). Internship credits are earned in supervised field work specifically related to a student's major. No more than 3 credits of internship may be used to meet the upper-division marketing elective requirement. PREREQ: MKTG 301 and PERM/INST.

MKTG 498 SEMINAR IN CONTEMPORARY TOPICS IN MARKETING. Provides an opportunity for the study of topics of current interest in marketing. The topics will be selected based upon the interests of students and expertise of faculty. PREREQ: MKTG 301.

Department of Materials Science and Engineering

College of Engineering

Engineering & Technology Bldg. Room 240
http://coen.boisestate.edu/mse/

208 426-5788
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Chair and Associate Professor: Amy J. Moll. *Professors:* Butt, Hampikian.
Associate Professors: Campbell, Knowlton, Müllner. *Assistant Professor:* Frary.

Degrees Offered

- B.S. and Minor in Materials Science and Engineering (B.S.M.S.E.)
- M.Engr. in Materials Science and Engineering (See the *BSU Graduate Catalog*)
- M.S. in Materials Science and Engineering (See the *BSU Graduate Catalog*)

Department Statement

A fundamental understanding of how properties, structure, processing and performance of materials are interrelated is an essential aspect of an engineering education. Understanding how these materials properties can be altered, or how the properties change in different applications and environments, is a critical focus for all engineering disciplines. The Materials Science and Engineering program focuses on the fundamental aspects for the technical classes of materials including metals, ceramics, polymers, electronic materials, biomaterials, nanomaterials, and composites. Laboratory emphasis is placed on the measurement and characterization of these materials systems, providing hands-on experience with various process operations typical in the materials fabrication industry.

The study of materials properties has held fascination with scientists for many years. However, it is in the application of materials to product design and manufacturing where economic growth is realized. In today's technology focused environment, the engineer and scientist work to modify materials to optimize performance, reduce cost, and to develop materials with a greater range of capabilities.

Educational Objectives

Graduates of the Materials Science and Engineering program will be:

1. fully qualified as entry-level materials engineers, with an ability to adapt and progress in a rapidly changing field.
2. well-rounded individuals who both understand the principles and can undertake the practice of the science and engineering of materials.
3. able to operate as effective engineers or scientists in materials industries, academia, or related fields.

Degree Requirements

Materials Science and Engineering B.S.M.S.E.	
Course Number and Title	Credits
ENGL 101-102 English Composition	6
Area I — see page 44 for list of approved courses	
Area I core course in one field	3
Area I core course in a second field	3
Area II — see page 44 for list of approved courses	
COMM 101 Fundamentals of Speech Communication	3
Area II core course in a second field	3

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Chapter 12 — Academic Programs

Department of Materials Science and Engineering

Materials Science and Engineering (continued)	
*Area I-II Depth Elective	
Area I core course in a third field AND an elective depth course** which is a second course in an Area II field that has been approved by the student's advisor, not necessarily from the list of core courses OR	6
Area II core course in a third field AND an elective depth course** which is a second course in an Area I field that has been approved by the student's advisor, not necessarily from the list of core courses.	
Area III	
Area III requirements are automatically met by specific courses included in the major requirements below.	
CHEM 111, 111L-112, 112L General Chemistry I and II with Labs	9
COMPSCI 115 Introduction to C OR COMPSCI 117 Introduction to C++ OR COMPSCI 119 Introduction to JAVA	2-3
ENGL 202 Technical Communication	3
ENGR 120 Introduction to Engineering	3
ENGR 210 Engineering Statics	3
ENGR 240 Electrical and Electronic Circuits OR ECE 210 Introduction to Electric Circuits	3
ENGR 245, 245L Introduction to Materials Science and Engineering and Lab	4
MATH 170, 175 Calculus I and Calculus II	8
MATH 275 Multivariable and Vector Calculus	4
MATH 333 Differential Equations with Matrix Theory	4
MATH 360 Engineering Statistics OR MATH 361 Probability and Statistics I	3-4
MSE 215 Materials Processing	2
MSE 305 Bonding, Crystallography, and Crystal Defects	3
MSE 308 Thermodynamics of Materials	3
MSE 310 Electrical Properties of Materials	3
MSE 312 Mechanical Behavior of Materials	3
MSE 380 Materials Engineering Lab	2
MSE 404 Materials Analysis OR PHYS 423 Physical Methods of Materials Characterization	3
MSE 404L Materials Analysis Lab	1
MSE 408 Phase Transformations and Kinetics	3
MSE 480, 482 Senior Project I and II	4
MSE 485 Materials Selection	2
PHYS 211, 211L Physics I with Calculus and Lab	5
PHYS 212, 212L Physics II with Calculus and Lab	5
PHYS 309, 310 Introductory Modern Physics with Applications and Lab	4
*Technical electives in an area of concentration	18
Total	131-133

NOTE: *All university core courses and technical and design electives must be approved by the student's advisor.
**Courses that instill cultural values are acceptable while routine exercises of personal craft are not.

Materials Science and Engineering Minor	
Course Number and Title	Credits
CHEM 321 Physical Chemistry Lecture OR PHYS 309, 310 Introductory Modern Physics with Applications and Lab	3-4
CHEM 322 Physical Chemistry Lecture OR MSE 308 Thermodynamics of Materials OR PHYS 432 Thermal Physics	3
ENGR 245, 245L Introduction to Materials Science and Engineering and Lab	4

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Materials Science and Engineering Minor (continued)	
Courses chosen from the following list CE 340, CE 341, CHEM 401, ECE 323, ECE 440, ME 442, ME 444, ME 454, MSE 305, MSE 310, MSE 312, MSE 404, MSE 408, MSE 461, MSE 477, MSE 488, PHYS 415, PHYS 423	9
Total	19

Course Offerings

See page 65 for a definition of the course-numbering system.

MSE — MATERIALS SCIENCE AND ENGINEERING

Lower Division

MSE 215 MATERIALS PROCESSING (2-0-2)(F/S). Survey of manufacturing and processing techniques for technological materials including biomaterials, ceramics, metals, nanomaterials and polymers. PREREQ: ENGR 120 and ENGR 245.

Upper Division

MSE 305 BONDING, CRYSTALLOGRAPHY, AND CRYSTAL DEFECTS (3-0-3)(F/S). Crystal structure, symmetry, the reciprocal lattice, diffraction. Crystalline defects, interfaces and microstructure. Bonding potential, elasticity and phonons. PREREQ: CHEM 112, ENGR 245, and MATH 333.

MSE 308 THERMODYNAMICS OF MATERIALS (3-0-3)(F/S). Basic thermodynamics principles including energy, entropy, and free energy. Equilibrium states, phases and phase transitions of various materials systems. PREREQ: ENGR 245 and MATH 333.

MSE 310 (ECE 310) ELECTRICAL PROPERTIES OF MATERIALS (3-0-3)(F/S). Physical principles underlying the electrical properties of metals, insulators and semiconductors. The effects of energy band structure, thermal properties and impurities on electrical conduction. Concepts covered are applied to electrical devices including nanodevices, MOSFETs and optoelectronic devices. May be taken for MSE or ECE credit, but not both. PREREQ: ENGR 245 and MATH 333.

MSE 312 MECHANICAL BEHAVIOR OF MATERIALS (3-0-3)(F/S). Elastic and plastic deformation and fracture in engineering materials, including dislocation theory, alloy hardening and creep deformation, fracture mechanisms, fracture mechanics, toughening of metals, ceramics, and composites, environmentally assisted failure. PREREQ: ENGR 210 and ENGR 245.

MSE 380 MATERIALS SCIENCE AND ENGINEERING LABORATORY (1-4-2)(F/S). Introduction to laboratory test instrumentation and statistical methods used in materials engineering. Experiments using thermal and thermodynamic measurement techniques and characterization of electromagnetic properties of materials. PRE/COREQ: MSE 305, MSE 308, and MSE 310.

MSE 404 MATERIALS ANALYSIS (3-0-3)(F/S). Physical and chemical characterization of the bulk and physical properties of materials. Diffraction, imaging and spectroscopy using optical, electron, and x-ray methods. PREREQ: MSE 380.

MSE 404L MATERIALS ANALYSIS LAB (0-3-1)(F/S). Use of characterization techniques in materials engineering analysis including microscopy, spectroscopy and diffraction techniques. PRE/COREQ: MSE 404 or PHYS 423.

MSE 408 PHASE TRANSFORMATIONS AND KINETICS (3-0-3)(F/S). Kinetics of phase transformations, nucleation, crystallization, decomposition, chemical reactions, and atomic and molecular diffusion. Surface and interface phenomena, nanoparticle-matrix interactions, sintering, grain growth, recovery and recrystallization. PREREQ: MSE 305 and MSE 308.

MSE 461 MICROELECTRONIC PACKAGING MATERIALS (3-0-3)(F/S). Engineering analysis of electronic packaging materials and their effect on electrical design, assembly, reliability, and thermal management. Selection process for packaging materials, manufacturing and assembly, single and multi-chip packaging. PREREQ: ENGR 245.

MSE 477 (BIOL 477)(ME 477) BIOMATERIALS (3-0-3)(F/S). Theory of biomaterials science. Medical and biological materials and their applications. Selection, properties, characterization, design and testing of materials used by or in living systems. PREREQ: CHEM 112 or ENGR 245.

MSE 480, 482 SENIOR PROJECT I, II (1-4-2)(F/S). Culminating major design experience. Incorporating engineering standards and realistic constraints that include most of the following: economic, environmental, manufacturability, ethical, health and safety, social and political. PRE/COREQ: MSE 312, MSE 404 and MSE 408.

MSE 485 MATERIALS SELECTION (2-2-2)(F/S). Mechanical, chemical and thermal behavior of biomaterials, ceramics, metals, polymers and composites are compared and contrasted. Consideration of the trade-offs in selecting materials for specific applications are considered and exemplified by case studies. PRE/COREQ: MSE 310 and MSE 312.

MSE 488 BIOCOMPATIBILITY AND ENVIRONMENTAL DEGRADATION (3-0-3)(F/S). Theory of environmental degradation of metals, ceramics, polymers and biomaterials. Scientific principles of materials degradation with emphasis on material interactions within a living organism (in vivo). PREREQ: CHEM 112 or ENGR 245.

Mass Communication/Journalism — see Department of Communication