

**LING 523. Morphology (3)**

Prerequisite: Linguistics 420 or 520.

Theoretical principles of words structure, including inflection, derivation, and compounding; organization of the lexicon; structure of inflectional paradigms; morphophonological and morphosyntactic alterations; and computational applications.

**LING 524. American Dialectology (3)**

Prerequisite: Upper division standing.

Development of American English. Regional, social, and ethnic differences in pronunciation, grammar, and vocabulary. Differences in men's and women's language. Black English.

**LING 525. Semantics and Pragmatics (3)**

Prerequisite: Linguistics 420 or 520.

Advanced semantic theory; systematic analysis of the interaction of sequences of language with real world context in which they are used.

**LING 530. English Grammar (3)**

Prerequisites: Six upper division units in linguistics.

English morphology, syntax, and discourse structure, including simple and complex sentence structure; lexical categories and sub-categories; discourse functions of selected constructions. Problems and solutions in teaching English grammar.

**LING 550. Theory and Practice of English as a Second Language (3)**

Prerequisite: Linguistics 420 or 520.

The nature of language learning; evaluation of techniques and materials for the teaching of English as a second language.

**LING 551. Sociolinguistics (3)**

Prerequisite: A course in introductory linguistics.

Investigation of the correlation of social structure and linguistic behavior.

**LING 552. Psycholinguistics (3)**

Prerequisite: Linguistics 420 or 520.

Psychological and mental processes related to comprehension, production, perception, and acquisition of language in adults and children.

**LING 553. Bilingualism (3)**

Prerequisite: Linguistics 420 or 520 or Speech, Language, and Hearing Sciences 300.

Bilingual societies; language choice by bilinguals; bilingual language acquisition; effects of bilingualism on language structure and use.

**LING 554. Child Language Acquisition (3)**

Prerequisite: Linguistics 420 or 520.

Theories and research methods in child language acquisition; quantitative and qualitative analyses of data at various levels of grammar (phonology, morphology, lexicon, syntax, and discourse) using language and acquisition corpora.

**LING 555. Practical Issues in Teaching English as a Second Language (3)**

Prerequisites: Linguistics 420 or 520; and credit or concurrent registration in Linguistics 550.

Practical approaches to applications of the theory of English as a Second Language (ESL) and methodology for speaking, reading, listening, writing; techniques for facilitating growth of communicative competence.

**LING 556. Computer Assisted Language Learning and Teaching (3)**

Prerequisites: Linguistics 420 or 520; and credit or concurrent registration in Linguistics 550.

Theory and practice of computer assisted language learning and language teaching. Hands-on experience with pedagogical aspects of using technology in the language classroom.

**LING 570. Mathematical Linguistics (3)**

Prerequisites: Two linguistics courses.

Mathematical tools for linguistics: set theory; basic algebraic structures such as groups, lattices, and Boolean algebras; formal language theory; propositional and 1st-order logic. Some emphasis on proofs. Applications to linguistics.

**LING 571. Computational Corpus Linguistics (3)**

Prerequisites: Two linguistics courses.

Practical introduction to computation with text corpora and introduction to Perl. Tokenizing, part-of-speech tagging, and lemmatizing (stemming) large corpora. Writing of Perl programs required.

**LING 581. Computational Linguistics (3)**

(Same course as Computer Science 581.)

Prerequisites: Linguistics 570 or Mathematics 245; Linguistics 571 or Computer Science 320.

Basic concepts in computational linguistics including regular expressions, finite-state automata, finite-state transducers, weighted finite-state automata, and n-gram language models. Applications to phonology, orthography, morphology, syntax. Probabilistic models. Statistical techniques for speech recognition.

**LING 582. Computational Syntax and Semantics (3)**

Prerequisites: Linguistics 522 and 581.

Review of finite-state and context free languages; unification grammars; problems of meaning and intention in computational systems. Example applications from information retrieval, dialogue, and machine translation systems.

**LING 596. Selected Topics in Linguistics (1-3)**

Prerequisite: Upper division standing.

Advanced study of selected topics. See Class Schedule for specific content. May be repeated with new content. Limit of nine units of any combination of 296, 496, 596 courses applicable to a bachelor's degree. Maximum combined credit of six units of 596 and 696 applicable to a 30-unit master's degree.

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**GRADUATE COURSES**  
Refer to the *Graduate Bulletin*.

MGT

**Management (MGT)**

*In the College of Business Administration*

**LOWER DIVISION COURSE****MGT 202. Business Professions (1) Cr/NC I, II**

Students explore career options, analyze and evaluate career decisions through self assessment and career research. Computer programs and resources in Career Services library used to identify potential career.

**UPPER DIVISION COURSES**  
(Intended for Undergraduates)**MGT 350. Management and Organizational Behavior (3) I, II**

Prerequisite: Approved upper division business major, business minor, or another major approved by the College of Business Administration. **Proof of completion of prerequisite required:** Change of major form or other evidence of acceptable major code.

Human behavior at individual, interpersonal, and group levels including effect of organization structure on behavior. Emphasis on managerial roles, historical evolution of management, ethics, and behavior in multicultural contexts.

**MGT 352. Human Resource Management (3) I, II**

Prerequisite: Management 350. Recommended: Information and Decision Systems 301.

The employment relationship. Functions and techniques; role of government, unions, behavior, and environmental variables in human resource management.

**MGT 356. Social and Ethical Issues in Business (3) I, II**

Prerequisite: Business Administration 300.

Corporate social responsibility, stakeholder theory, morality of capitalism, and corporate governance. Ethical theory and its application to ongoing issues and current events within the business context.

**MGT 357. Multinational Business and Comparative Management (3)**

Prerequisite: Management 350.

Context of international business, environment, institutions, and business practices. Cultural awareness, sensitivity, interpersonal, and leadership skills needed in an international context.

**MGT 401. Business Internship (3) Cr/NC I, II**

Prerequisites: Management 350 and consent of faculty adviser.

Internship with business firms, nonprofit organizations, or government agencies. Work done under joint supervision of intern organization and course instructor.

**MGT 405. International Business Strategy and Integration (3) I, II**

Prerequisites: Management 350, Business Administration 300, Finance 323, Information and Decision Systems 301 or 302, Marketing 370. **Proof of completion of prerequisites required:** Copy of transcript.

Integration of business administration principles and concepts for strategy design, implementation, and control in domestic, international, and global markets. Establishment of top management policy emphasized through case studies, experiential exercises, and simulations.

**MGT 450. Venture Management (3) I, II**

Prerequisites: Management 350, Business Administration 300, Finance 323, Information and Decision Systems 301 or 302, Marketing 370. **Proof of completion of prerequisites required:** Copy of transcript.

Process of initiating, expanding, purchasing, and consolidating businesses. Concepts, theories, and techniques of managerial innovation and implementation.

**MGT 451. Organization Design and Change (3) I, II**

Prerequisite: Management 350.

Management of organization design and development. Internal and external organizational factors such as environment, size, technology, power, politics, strategy, human resources, job design, and organization culture.

**MGT 454. Interpersonal Processes (3) I, II, S**

Prerequisite: Management 350.

Conceptual study and experiential training in interpersonal skills of management; acquisition of personal, managerial, and entrepreneurial behavioral competencies.

**MGT 458. Management Decision Games (1-3) II**

Prerequisites: Consent of instructor. Management 350, Business Administration 300, Finance 323, Information and Decision Systems 301 or 302, Marketing 370. **Proof of completion of prerequisites required:** Copy of transcript.

Integrated managerial decision making within a dynamic environment through the use of business games.

**MGT 496. Selected Topics in Management (1-4)**

Prerequisite: Consent of department chair.

Selected areas of concern in management; see Class Schedule for specific content. May be repeated with new content with consent of department chair. Limit of nine units of any combination of 296, 496, 596 courses applicable to a bachelor's degree. Maximum credit six units.

**MGT 498. Investigation and Report (1-3) I, II**

Prerequisites: Senior standing and consent of instructor.

A comprehensive and original study of a problem connected with management under the direction of one or more members of the management staff. May be repeated with new content. Maximum credit six units.

**MGT 499. Special Study (1-3) I, II**

Prerequisite: Consent of instructor.

Individual study. Maximum credit six units.

**UPPER DIVISION COURSE  
(Also Acceptable for Advanced Degrees)****MGT 596. Advanced Topics in Management (3)**

Prerequisite: Six upper division units in management.

Advanced special topics in management. See Class Schedule for specific content. Limit of nine units of any combination of 296, 496, 596 courses applicable to a bachelor's degree. Maximum credit of six units of 596 applicable to a bachelor's degree. Maximum combined credit of six units of 596 and 696 applicable to a 30-unit master's degree.

**GRADUATE COURSES  
Refer to the *Graduate Bulletin*.****Marketing (MKTG)**

*In the College of Business Administration*

**UPPER DIVISION COURSES  
(Intended for Undergraduates)****MKTG 370. Marketing (3) I, II, S**

Prerequisite: Approved upper division business major, business minor, or another major approved by the College of Business Administration. **Proof of completion of prerequisite required:** Change of major form or other evidence of acceptable major code. Marketing majors must complete this course with a minimum grade of C (2.0).

Function of marketing in the organization and in society. Topics include market analysis and consumer behavior, product planning, pricing, promotion, distribution, and international marketing.

**MKTG 371. Consumer and Buyer Behavior (4) I, II**

Prerequisite: Marketing 370 with a minimum grade of C (2.0). **Proof of completion of prerequisite required:** Copy of transcript.

Psychological, social and cultural aspects of consumers and organizational buyers to understand their needs, wants, preferences, and behaviors. Identify market segments, develop targeted marketing strategies and programs.

**MKTG 372. Retail Marketing Methods (4) I, II**

Prerequisite: Marketing 370 with a minimum grade of C (2.0). **Proof of completion of prerequisite required:** Copy of transcript.

Retail store and direct retail marketing organization, site location, personnel, promotion, purchasing, merchandising, inventory, and control methods.

**MKTG 373. Integrated Marketing Communications (4) I, II**

Prerequisite: Marketing 370 with a minimum grade of C (2.0). **Proof of completion of prerequisite required:** Copy of transcript.

Communication and promotion theory; emphasis on integration of various marketing communications tools including advertising, personal selling, media strategy and tactics, public relations, and publicity strategy, methods, measurement, and ethics.

**MKTG 376. Global Marketing Strategy (4) I, II**

Prerequisite: Marketing 370 with a minimum grade of C (2.0). **Proof of completion of prerequisite required:** Copy of transcript.

International marketing and trade principles; comparative analysis of economic, political, legal, and sociocultural systems; global market segmentation and market entry strategies, international pricing decisions, distribution systems, advertising, public relations, and promotion strategies; product standardization vs. localization.

**MKTG 377. Selling Strategy and Practices (4)**

Prerequisite: Marketing 370 with a minimum grade of C (2.0). **Proof of completion of prerequisite required:** Copy of transcript.

Selling strategy and practices as an integral part of the total marketing system, including territory management, consultative selling, negotiation, and system selling.

**MKTG 470. Marketing Research (4) I, II**

Prerequisites: Completion of lower division courses in the major or minor. A minimum grade of C (2.0) in Information and Decision Systems 301 and Marketing 370. **Proof of completion of prerequisites required:** Copy of transcript.

Marketing research process; research design, instrument development, measurement and scaling, sampling, primary and secondary data analysis, and research reporting for marketing decisions.

**MKTG 472. Advanced Integrated Marketing Communications (4) I, II**

Prerequisites: Marketing 373 with minimum grade of C; Marketing 371 and 470 with minimum grade of C or an average of 2.0 in both courses. **Proof of completion of prerequisites required:** Copy of transcript.

Management of marketing communications function with emphasis on integration and coordination of all activities. Planning, implementation, and coordination of marketing communications activities. Development, implementation, and program evaluation of an integrated marketing communications project.

**MKTG 473. Sales Management (4)**

Prerequisite: Marketing 370 with a minimum grade of C (2.0). **Proof of completion of prerequisite required:** Copy of transcript.

Management of recruitment, training, motivation, and compensation of a sales force, and evaluation, control, and organization of sales personnel.

**MKTG 474. Business Marketing (4)**

Prerequisite: Marketing 370 with a minimum grade of C (2.0). **Proof of completion of prerequisite required:** Copy of transcript.

Marketing practices and strategy designed for organizational customers; focuses on purchasing practices of organizational customers and development of marketing mixes for private, commercial, institutional, and governmental markets, both domestic and global.

**MKTG 475. Global Marketing Applications (4)**

Prerequisite: Marketing 376 with a minimum grade of C (2.0).

Applying global marketing concepts to conduct detailed market analysis through collecting demographic, cultural, political, legal, economic, financial data; developing international marketing plan focused on one world region for company with international entry, global marketing strategy issues. Region of focus varies.

**MKTG 476. Internet/Interactive Marketing (4) I, II**

Prerequisite: Marketing 370 with a minimum grade of C (2.0).

**Proof of completion of prerequisite required:** Copy of transcript.  
Marketing and communication in digital networked environments. Intersection of business issues, marketing programs, and interactive technology. Web site design and evaluation, e-commerce, online customer experience, search engine optimization, personalization, online advertising and mobile marketing.

**MKTG 479. Strategic Marketing Management (4) I, II, S**

Prerequisites: Marketing 371 and 470 with a minimum grade of C (2.0) or an average of 2.0 in both courses. Completion of lower division courses required in the major or minor. **Proof of completion of prerequisites required:** Copy of transcript.

Strategic planning, integration, management, and control of the marketing functions and mix; applying decision techniques for marketing problem solution.

**MKTG 496. Selected Topics in Marketing (1-4) I, II**

Prerequisite: Consent of department chair.

Selected areas of concern in marketing. See Class Schedule for specific content. May be repeated with new content with consent of department chair. Limit of nine units of any combination of 296, 496, 596 courses applicable to a bachelor's degree. Maximum credit six units.

**MKTG 498. Investigation and Report (1-3) I, II**

Prerequisites: Senior standing and consent of instructor.

A comprehensive and original study of a problem connected with marketing under the direction of one or more members of the marketing staff. May be repeated with new content. Maximum credit six units.

**MKTG 499. Special Study (1-3) I, II**

Prerequisite: Consent of instructor.  
Individual study. Maximum credit six units.

**GRADUATE COURSES**

Refer to the *Graduate Bulletin*.

**Mathematics (MATH)**

*In the Department of Mathematics and Statistics*

*In the College of Sciences*

**LOWER DIVISION COURSES**

**NOTE:** Proof of completion of Entry-Level Mathematics requirement required for Mathematics 118, 120, 121, 122, 141, 150, 210, 211: Copy of ELM score or verification of exemption.

**MATH 118. Topics in Mathematics (3) [GE] I, II**

Prerequisite: Satisfaction of the Entry-Level Mathematics requirement.

Topics selected from algebra, analysis, geometry, logic, probability, or statistics, designed to give student insight into structure of mathematical theories and their applications.

**MATH 120. Calculus for Business Analysis (3) [GE] I, II, S**

Prerequisite: Satisfaction of the Entry-Level Mathematics requirement.

Matrix algebra. Calculus including differentiation and integration. Graphing and optimization. Exponential and logarithmic functions. Multivariable calculus.

**MATH 121. Calculus for the Life Sciences I (3) [GE] I, II**

Two lectures and two hours of activity.

Prerequisites: Satisfaction of the Entry-Level Mathematics requirement and qualification on the Mathematics Departmental Placement Examination.

Basic concepts of differential calculus with life science applications. Not intended for physical science or engineering majors. Not open to students with credit in Mathematics 150.

**MATH 122. Calculus for the Life Sciences II (3) [GE] I, II**

Two lectures and two hours of activity.

Prerequisites: Satisfaction of the Entry-Level Mathematics requirement; qualification on the Mathematics Departmental Placement Examination; and Mathematics 121.

A continuation of Mathematics 121 with topics from integral calculus and an introduction to elementary differential equations. Not open to students with credit in Mathematics 150.

**MATH 141. Precalculus (3) [GE] I, II**

Prerequisite: Satisfaction of the Entry-Level Mathematics requirement.

Real numbers, inequalities; polynomials; rational, trigonometric, exponential and logarithmic functions; conic sections. Not open to students with credit in Mathematics 150.

**MATH 150. Calculus I (4) [GE] I, II, S**

Prerequisites: Knowledge of algebra, geometry, and trigonometry as demonstrated by either (1) satisfactory completion of Mathematics 141 with a grade of C (2.0) or above; or (2) satisfaction of the Entry-Level Mathematics requirement and qualification on the Mathematics Departmental Precalculus Proficiency Examination. Proof of completion of prerequisites required.

Algebraic and transcendental functions. Continuity and limits. The derivative and its applications. The integral and the fundamental theorem of calculus.

**MATH 151. Calculus II (4) [GE] I, II, S**

Prerequisite: Mathematics 150 with minimum grade of C. **Proof of completion of prerequisite required**

Techniques and applications of integration. Improper integrals. Differential equations. Infinite series. Conic sections. Curves in parametric form, polar coordinates.

**MATH 210. Number Systems in Elementary Mathematics (3) [GE] I, II**

This course or its equivalent is required for students working toward a multiple subject credential in elementary education.

Prerequisite: Satisfaction of the Entry-Level Mathematics requirement.

Number sense, operation concepts, estimation, mental arithmetic, algorithms, problem solving, whole, rational, real numbers, ratio, and number theory.

**MATH 211. Geometry in Elementary Mathematics (3) [GE] I, II**

Prerequisites: Satisfaction of the Entry-Level Mathematics requirement and Mathematics 210.

Two and three dimensional shapes and interrelationships, congruence, similarity and proportional reasoning, measurement of length, angle size, area, volume, metric system, and problem solving.

**MATH 215. Mathematics Placement Examination: Part LS Review (1) (Cr/NC)**

Prerequisite: Score of 12 or lower on either section of Mathematics Placement Examination: Part LS.

Required review for students who have failed Mathematics Placement Examination: Part LS. Basic numbers (quantities, number systems, basic computations with integers and fractions), measurement and geometry (two- and three-dimensional objects, measurements, and measure systems).

**MATH 241. Mathematics Software Workshop (1)**

(Selected sections offered as distance education.)

Prerequisite: Mathematics 151.

Introduction to mathematical software environment such as MATLAB, MAPLE, MATHEMATICA or the Geometers Sketchpad. May be repeated for credit with different software. See Class Schedule for specific content. Maximum credit two units.

**MATH 245. Discrete Mathematics (3) [GE] I, II, S**

Prerequisite: Mathematics 121 or 150.

Logic, methods of proof, set theory, number theory, equivalence and order relations, counting (combinations and permutations), solving recurrence relations.

**MATH 252. Calculus III (4) [GE] I, II, S**

Prerequisite: Mathematics 151 with minimum grade of C.

Functions of several variables. Vectors. Partial derivatives and multiple integrals. Line integrals and Green's Theorem.

**MATH 254. Introduction to Linear Algebra (3) [GE] I, II, S**

Prerequisite: Mathematics 151.

Matrix algebra, Gaussian elimination, determinants, vector spaces, linear transformations, orthogonality, eigenvalues, and eigenvectors.

**MATH 296. Experimental Topics (1-4)**

Selected topics. May be repeated with new content. See Class Schedule for specific content. Limit of nine units of any combination of 296, 496, 596 courses applicable to a bachelor's degree.

**MATH 299. Special Study (1-3)**

Prerequisite: Consent of instructor.

Individual study. Maximum credit six units.

**UPPER DIVISION COURSES  
(Intended for Undergraduates)**

**NOTE:** Proof of completion of prerequisites required for all upper division courses: Copy of transcript.

**MATH 302. Transition to Higher Mathematics (3) I, II**

Prerequisite: Mathematics 150.

Selected topics in mathematics to emphasize proof writing and problem solving. Intended for those planning to teach secondary school mathematics.

**MATH 303. History of Mathematics (3) [GE] I, II**

Prerequisites: Mathematics 141 or students using course to satisfy General Education must complete the General Education requirement in Foundations IIA., Natural Sciences and Quantitative Reasoning.

Major currents in the development of mathematics from ancient Egypt and Babylon to late nineteenth century Europe.

**MATH 311. Statistics and Probability in Elementary Mathematics (2)**

Prerequisites: Mathematics 211 and satisfactory performance on Mathematics Departmental Placement Examination, Part LS.

Topics from statistics and probability. Enrollment limited to liberal studies majors. Not open to students with credit in Mathematics 312.

**MATH 312. Topics from Elementary Mathematics I (3) I, II**

Prerequisites: Mathematics 211 and satisfactory performance on Mathematics Departmental Placement Examination, Part LS.

Topics from statistics and probability. Enrollment limited to future teachers in grades K-8. Not open to students with credit in Mathematics 311.

**MATH 313. Selected Topics in Elementary Mathematics (3) I, II**

Prerequisite: Mathematics 311 or 312.

Capstone course for prospective K-8 teachers. Advanced topics in mathematics selected from algebra, number systems, transformation geometry, and problem solving. Enrollment limited to future teachers in grades K-8.

**MATH 315. Special Topics in Algebra, Geometry, and Problem Solving (2)**

Prerequisites: Mathematics 210, 211, 311.

Capstone course for prospective elementary teachers to include algebra (describing change), geometry (rigid motions), and non-routine problem solving.

**MATH 336. Introduction to Mathematical Modeling (3) II**

Prerequisite: Mathematics 254.

Models from the physical, natural, and social sciences including population models and arms race models. Emphasis on classes of models such as equilibrium models and compartment models.

**MATH 337. Elementary Differential Equations (3) I, II**

Prerequisite: Mathematics 254 or 342A.

Integration of first-order differential equations, initial and boundary value problems for second-order equations, series solutions and transform methods, regular singularities.

**MATH 342A. Methods of Applied Mathematics I (3) I**

Prerequisite: Mathematics 252.

Vector analysis, divergence and Stokes' theorem and related integral theorems. Matrix analysis, eigenvalues and eigenvectors, diagonalization. Introduction to ordinary differential equations. Computer software packages for matrix applications, solving, and graphing differential equations. Not open to students with credit in Physics 340A.

**MATH 342B. Methods of Applied Mathematics II (3) II**

Prerequisite: Mathematics 342A with minimum grade of C.

Second order ordinary differential equations, power series methods, Bessel functions, Legendre polynomials. Linear partial differential equations, separation of variables, Fourier series, Sturm-Liouville theory, orthogonal expansions, Fourier Transforms. Use of computer software packages for symbolic algebra and solution of differential equations. Not open to students with credit in Physics 340B.

**MATH 413. Mathematics for the Middle Grades (3)**

Prerequisites: Senior standing and Mathematics 312.

Teacher-level look at mathematics taught in middle grades, to include proportional reasoning, rational and real numbers, probability, and algebra. Intended for those planning to teach mathematics in middle grades; cannot be used as part of major or minor in mathematical sciences with exception of major for single subject teaching credential. Students in the SSTC major must receive instructor permission.

**MATH 414. Mathematics Curriculum and Instruction (3)**

Prerequisites: Senior standing and 12 upper division units in mathematics.

Historical development of mathematics and mathematics curriculum. Principles and procedures of mathematics instruction in secondary schools. For secondary and postsecondary teachers and teacher candidates. Course cannot be used as part of the major or minor in mathematical sciences with exception of major for the single subject teaching credential.

**MATH 496. Experimental Topics (1-4)**

Selected topics. May be repeated with new content. See Class Schedule for specific content. Limit of nine units of any combination of 296, 496, 596 courses applicable to a bachelor's degree.

**MATH 499. Special Study (1-3) I, II**

Prerequisite: Consent of instructor.

Individual study. Maximum credit six units.

**UPPER DIVISION COURSES**  
(Also Acceptable for Advanced Degrees)

**NOTE:** Proof of completion of prerequisites required for all upper division courses: Copy of transcript.

**MATH 509. Computers in Teaching Mathematics (3)**

Two lectures and three hours of laboratory.

Prerequisite: Mathematics 252.

Solving mathematical tasks using an appropriate computer interface, and problem-based curricula. Intended for those interested in mathematics teaching.

**MATH 510. Introduction to the Foundations of Geometry (3) I, II**

Prerequisite: Mathematics 122 or 151.

The foundations of Euclidean and hyperbolic geometries. Highly recommended for all prospective teachers of high school geometry.

**MATH 511. Projective Geometry (3)**

Prerequisite: Mathematics 254.

Geometry emphasizing relationships between points, lines, and conics. Euclidean geometry and some non-Euclidean geometries as special cases of projective geometry.

**MATH 512. Non-Euclidean Geometry (3)**

Prerequisite: Mathematics 122 or 151.

History of attempts to prove the fifth postulate; emphasis on plane synthetic hyperbolic geometry; brief treatment of other types of non-Euclidean geometry.

**MATH 521A. Abstract Algebra (3) I, II**

Prerequisites: Mathematics 245 and 254.

Abstract algebra, including elementary number theory, groups, and rings.

**MATH 521B. Abstract Algebra (3) II**

Prerequisite: Mathematics 521A.

Continuation of Mathematics 521A. Rings, ideals, quotient rings, unique factorization, noncommutative rings, fields, quotient fields, and algebraic extensions.

**MATH 522. Number Theory (3) I**

Prerequisites: Mathematics 245 and 252.

Theory of numbers to include congruences, Diophantine equations, and a study of prime numbers; cryptography.

**MATH 523. Mathematical Logic (3)**

Prerequisite: Mathematics 245.

Propositional logic and predicate calculus. Rules of proof and models. Completeness and the undecidability of arithmetic. Not open to students with credit in Philosophy 521.

**MATH 524. Linear Algebra (3) I, II**

Prerequisites: Mathematics 245 and 254; or 342A.

Vector spaces, linear transformations, orthogonality, eigenvalues and eigenvectors, normal forms for complex matrices, positive definite matrices and congruence.

**MATH 525. Algebraic Coding Theory (3) I**

Prerequisite: Mathematics 254.

Linear codes, perfect and related codes, cyclic linear codes, BCH codes, burst error-correcting codes.

**MATH 528. Information Theory and Data Compression (3)**

Prerequisites: Mathematics 245 and 254.

Fundamental of discrete probability and information theory: joint and conditional distributions, Bayes' theorem, entropy, channel capacity. Noiseless coding theorem and data compression algorithms: Huffman codes, arithmetic coding, Ziv-Lempel codes. Information theory in error correction coding and cryptography.

**MATH 531. Partial Differential Equations (3) II**

Prerequisites: Mathematics 252 and 337.

Boundary value problems for heat and wave equations: eigenfunction expansions, Sturm-Liouville theory and Fourier series. D'Alembert's solution to wave equation; characteristics. Laplace's equation, maximum principles, Bessel functions.

**MATH 532. Functions of a Complex Variable (3) I**

Prerequisite: Mathematics 252.

Analytic functions, Cauchy-Riemann equations, theorem of Cauchy, Laurent series, calculus of residues, and applications.

**MATH 533. Vector Calculus (3)**

Prerequisite: Mathematics 254 or 342A.

Scalar and vector fields; gradient, divergence, curl, line and surface integrals: Green's, Stokes' and divergence theorems. Green's identities. Applications to potential theory or fluid mechanics or electromagnetism.

**MATH 534A. Advanced Calculus I (3) I, II, S**

Prerequisites: Mathematics 245 and 254; or 342A.

Completeness of the real numbers and its consequences, sequences of real numbers, continuity, differentiability and integrability of functions of one real variable.

**MATH 534B. Advanced Calculus II (3) II**

Prerequisite: Mathematics 534A.

Series and sequences of functions and their applications, functions of several variables and their continuity, differentiability and integrability properties.

**MATH 537. Ordinary Differential Equations (3)**

Prerequisite: Mathematics 337.

Theory of ordinary differential equations: existence and uniqueness, dependence on initial conditions and parameters, linear systems, stability and asymptotic behavior, plane autonomous systems, series solutions at regular singular points.

**MATH 538. Discrete Dynamical Systems and Chaos (3) II**

Prerequisites: Minimum grade of C in Mathematics 151; Mathematics 254 or 342A, 342B.

One- and two-dimensional iterated maps, equilibria and their stability, sensitive dependence on initial conditions, Lyapunov exponents, horseshoe maps, period doubling, chaotic attractors, Poincare maps, stable/unstable manifolds, bifurcations. Applications in biology, chemistry, physics, engineering, and other sciences.

**MATH 541. Introduction to Numerical Analysis and Computing (3) I, II, S**

Prerequisites: Mathematics 254 or 342A; and Computer Science 106 or 107 or 205.

Solution of equations of one variable, direct methods in numerical linear algebra, least squares approximation, interpolation and uniform approximation, quadrature.

**MATH 542. Introduction to Numerical Solutions of Differential Equations (3) II**

Prerequisites: Mathematics 337 and 541.

Initial and boundary value problems for ordinary differential equations. Partial differential equations. Iterative methods, finite difference methods, and the method of lines.

**MATH 543. Numerical Matrix Analysis (3)**

Prerequisite: Mathematics 541.

Gaussian elimination, LU factorizations and pivoting strategies. Direct and iterative methods for linear systems. Iterative methods for diagonalization and eigensystem computation. Tridiagonal, Hessenberg, and Householder matrices. The QR algorithm.

**MATH 544. Computational Finance (3)**

Prerequisite: Statistics 550 or 551A.

Risk evaluation. Numerical procedures for evaluating financial derivatives. Monte Carlo simulation techniques.

**MATH 561. Applied Graph Theory (3) I**

Prerequisite: Mathematics 245 or 254.

Undirected and directed graphs, trees, Hamiltonian circuits, classical problems of graph theory including applications to linear systems.

**MATH 562. Mathematical Methods of Operations Research (3) II**

Prerequisites: Mathematics 252 and 254.

Theory and applications concerned with optimization of linear and non-linear functions of several variables subject to constraints, including simplex algorithms, duality, applications to game theory, and descent algorithms.

**MATH 579. Combinatorics (3) II**

Prerequisite: Mathematics 245.

Permutations, combinations, generating functions, recurrence relations, inclusion-exclusion counting. Polya's theory of counting, other topics and applications.

**MATH 580. Risk Management: Stocks and Derivative Securities (3)**

Prerequisite: Statistics 550 or 551A.

Theory of derivative securities with focus on evolution of stock prices and pricing of options.

**MATH 581. Risk Management: Portfolio Selection and Other Features of Finance Markets (3)**

Prerequisite: Statistics 550 or 551A.

Derivatives and term structures, method of principal components, theory of portfolio optimization, some numerical methods.

**MATH 596. Advanced Topics in Mathematics (1-4) I, II**

Prerequisite: Consent of instructor.

Selected topics in classical and modern mathematical sciences. May be repeated with the approval of the instructor. See Class Schedule for specific content. Limit of nine units of any combination of 296, 496, 596 courses applicable to a bachelor's degree. Maximum credit of six units of 596 applicable to a bachelor's degree. Maximum combined credit of six units of 596 and 696 applicable to a 30-unit master's degree.

**Mathematics Education Course (MTHED)****LOWER DIVISION COURSE  
(Intended for Undergraduates)**

**NOTE:** Proof of completion of Entry-Level Mathematics requirement required for Mathematics 118, 120, 121, 122, 141, 150, 210, 211: Copy of ELM score or verification of exemption.

**MTHED 212. Children's Mathematical Thinking (1-1.5)**

Prerequisite: Credit or concurrent registration in Mathematics 210.

Children's mathematical thinking and in-depth analyses of children's understanding of operations (addition, subtraction, multiplication, and division) and place value. Students will observe individual children solving mathematics problems. Real, compact disc, and/or web-based experience included.

**Mathematics Specialist Certificate  
Program Courses (MATH) (MTHED)****UPPER DIVISION COURSES (MATH)  
(Intended for Undergraduates)**

**NOTE:** Proof of completion of prerequisites required for all upper division courses: Copy of transcript.

**MATH 487. Algebra in the Middle Grades (3)**

One lecture and four hours of activity.

Prerequisites: Teaching credential and consent of instructor.

Algebra as a powerful tool for analyzing, describing, and symbolizing physical relationships. Role of functions in algebra and in other areas of mathematics.

**MATH 488. Geometry in the Middle Grades (3)**

One lecture and four hours of activity.

Prerequisites: Teaching credential and consent of instructor.

Geometry as a powerful tool for analyzing, describing, and symbolizing physical and abstract relationships. Properties and relationships of two and three dimensional figures. Role of measurement in geometry and in other areas of mathematics.

**UPPER DIVISION COURSES (MATH)  
(Also Acceptable for Advanced Degrees)**

**NOTE:** Proof of completion of prerequisites required for all upper division courses: Copy of transcript.

**MATH 501A. Reasoning: Place Value and Arithmetic Operations (1)**

Prerequisites: Teaching credential and consent of instructor.

Place value and its role in development and understanding of arithmetic operations, to include numeration systems, student methods, standard algorithms, and mental computation. (Formerly numbered Mathematics 281A.)

**MATH 501B. Reasoning: Rational Numbers and Real Number Systems (1)**

Prerequisites: Teaching credential and consent of instructor.

Rational numbers and structure of real number system, to include meanings and models for fractions with attention to operations on rational numbers. (Formerly numbered Mathematics 281A.)

**MATH 502A. Reasoning: Geometric Shapes (1)**

Prerequisites: Teaching credential and consent of instructor.

Geometry to include classification and representation of polyhedra, hierarchical relationships among quadrilaterals, symmetry and transformations in the plane. (Formerly numbered Mathematics 281B.)

**MATH 502B. Reasoning: Measurement (1)**

Prerequisites: Teaching credential and consent of instructor.

Key ideas of measurement, development of area formulas for two-dimensional figures, size changes, and similarity. (Formerly numbered Mathematics 281B.)

**MATH 503A. Reasoning: Foundations of Quantitative Thinking (1)**

Prerequisites: Teaching credential and consent of instructor.

Reasoning about quantities and their measurement and relationships among these quantities, to include representations of these relationships. Understand situations that call for additive or multiplicative reasoning; important role of these ideas in development of quantitative reasoning skills in primary grades. (Formerly numbered Mathematics 381.)

**MATH 503B. Reasoning: Foundations of Algebraic Thinking (1)**

Prerequisites: Teaching credential and consent of instructor.

Pattern searching, equivalence, making and justifying conjectures. Preparation for teaching California required K-12 algebraic reasoning strand. (Formerly numbered Mathematics 382.)

**MATH 504A. Reasoning: Quantities and Mathematical Relationships (1)**

Prerequisites: Teaching credential and consent of instructor.

Reasoning about measurable characteristics in problem context, and relationships among these measurements. Additive, multiplicative reasoning, and proportional reasoning in middle grades. (Formerly numbered Mathematics 383.)

**MATH 504B. Reasoning: Algebra and Nature of Change (1)**

Prerequisites: Teaching credential and consent of instructor.

Pattern searching, generalizing, graphing to represent quantitative relationships, and role of these topics in preparing elementary and middle school students for algebra. (Formerly numbered Mathematics 384.)

**MATH 505A. Reasoning: Probability (1)**

Prerequisites: Teaching credential and consent of instructor.

Probabilistic situations, theoretical probabilities, and expected values. (Formerly numbered Mathematics 386.)

**MATH 505B. Reasoning: Statistics (1)**

Prerequisites: Teaching credential and consent of instructor.

Gathering, representing, and interpreting data sets, measures of central tendency, and characteristics of normal distributions. (Formerly numbered Mathematics 385.)

**UPPER DIVISION COURSES (MTHED)**  
**(Also Acceptable for Advanced Degrees)**

**MTHED 571. Children's Mathematics Understanding in Primary Grades (Part I) (1-3)**

Prerequisite: Admission to mathematics specialist certificate program.

Ongoing assessment and instructional decision-making for increasing children's achievement and understanding of number, operations, and algebra in the primary grades. Maximum credit three units.

**MTHED 572. Children's Mathematics Understanding in Primary Grades (Part II) (1-3)**

Prerequisite: Admission to mathematics specialist certificate program.

Ongoing assessment and instructional decision-making for increasing children's achievement and understanding of rational numbers, geometry, and measurement in the primary grades. Maximum credit three units.

**MTHED 573. Children's Mathematics Understanding in Upper Elementary Grades (Part I) (1-3)**

Prerequisite: Admission to mathematics specialist certificate program.

Ongoing assessment and instructional decision-making for increasing children's achievement and understanding of number, operations, and algebra in the upper elementary grades. Maximum credit three units.

**MTHED 574. Children's Mathematics Understanding in Upper Elementary Grades (Part II) (1-3)**

Prerequisite: Admission to mathematics specialist certificate program.

Ongoing assessment and instructional decision-making for increasing children's achievement and understanding of rational numbers, geometry and measurement in the upper elementary grades. Maximum credit three units.

**GRADUATE COURSES**  
**Refer to the *Graduate Bulletin*.**

## Mechanical Engineering (M E)

*In the College of Engineering*

**LOWER DIVISION COURSES**

**M E 101. Solid Modeling I (2)**

Six hours of laboratory.

Computer-aided solid modeling, including engineering documentation, dimensioning and tolerancing per ASME Y14.5M-1004. Elementary sketching and dimensioning of orthographic and pictorial drawings and sections. (Formerly numbered Engineering 190.)

**M E 102. Solid Modeling II (2)**

Six hours of laboratory.

Prerequisite: Mechanical Engineering 101.

Continuation of computer-aided solid modeling and engineering documentation with geometric tolerancing, thread, and thread notations per ASME Y14.5M-1994. Finite element analysis (FEA) of mechanical components. (Formerly numbered Engineering 195.)

**M E 203. Computer Programming and Applications (2) I**

Six hours of activity.

Prerequisites: Mechanical Engineering 101 and Mathematics 151. Recommended: Mechanical Engineering 102.

Principles of programming using C and Java. Graphical programming using Labview. Topics include data types, loops, control flow, arrays, memory acquisition, data structures. Applications related to mechanical system components. (Formerly numbered Mechanical Engineering 290.)

**M E 205. Simulation of Physical Systems (2) II**

Six hours of activity.

Prerequisites: Mechanical Engineering 102, 203, Mathematics 252.

Mechanical mechanisms and dynamic simulation analyses. Construction of web-based virtual machines which operate according to physics. Typical machines include roller coaster, machining center, gear assemblies, stress testing devices, crane and bridges. Network communication software used to connect virtual machines using Java3D. (Formerly numbered Mechanical Engineering 295.)

**M E 240. Introduction to Engineering Materials (3) I, II**

Prerequisites: Chemistry 202 and credit or concurrent registration in Engineering Mechanics 200 or 202. **Proof of completion of prerequisites required:** Copy of transcript and evidence of concurrent registration in Engineering Mechanics 200.

Atomic and molecular structure of materials utilized in engineering. Analysis of the relationships between structure of materials and their mechanical, thermal, electrical, corrosion, and radiation properties. Examples of material structure relevant to civil, electrical, aerospace, and mechanical engineering applications. (Formerly numbered Mechanical Engineering 260.)

**M E 241. Materials Laboratory (1) I, II**

Three hours of laboratory.

Prerequisite: Credit or concurrent registration in Mechanical Engineering 240.

Experimental methods used to characterize engineering materials and their mechanical behavior.

**M E 296. Experimental Topics (1-4)**

Selected topics. May be repeated with new content. See Class Schedule for specific content. Limit of nine units of any combination of 296, 496, 596 courses applicable to a bachelor's degree.

**UPPER DIVISION COURSES**  
**(Intended for Undergraduates)**

**NOTE: Proof of completion of prerequisites required** for all Mechanical Engineering 300-, 400-, and 500-level courses: Copy of transcript is acceptable as proof. In addition, Mechanical Engineering 351, 490A, and 530 require evidence of concurrent registration in appropriate courses.

**M E 310. Engineering Design: Introduction (3) I, II**

Two lectures and three hours of guided design activities.

Prerequisites: Mechanical Engineering 102, 203, and Engineering Mechanics 220. Every mechanical engineering student must have a master plan on file before enrolling in Mechanical Engineering 310.

Professional approach to engineering design problems. Problem definition, information gathering, feasibility studies, analysis, final design and communication. Several design studies and projects are completed.

**M E 312. Simulation of Engineering Systems (3) I, II**

Prerequisites: Mechanical Engineering 203, 350; Civil Engineering 301; Electrical Engineering 203; Engineering 280; Engineering Mechanics 340.

Modeling, simulation, and analysis of various mechanical systems: dynamic, vibrational, electromechanical, thermodynamic, and fluidic. Circuits for monitoring and controlling mechanical systems. (Formerly numbered Mechanical Engineering 512.)

**M E 314. Engineering Design: Mechanical Components (3) I, II**

Prerequisites: Mechanical Engineering 310 and Civil Engineering 301.

Application of mechanics, physical properties of materials, and solid mechanics to the design of machine elements. Student design projects.

**M E 330. Control Systems Laboratory (3) I, II**

Two lectures and three hours of laboratory.

Prerequisites: Mechanical Engineering 203; Electrical Engineering 203; Engineering 280; Engineering Mechanics 220, 340; Linguistics 200 or Rhetoric and Writing Studies 200.

Control theory (e.g. stability, feedback, PID control) with applications in microprocessor-based control of dynamic, vibrational, and mechatronic systems. "Bread-boarding" and BASIC programming of microcontrollers and graphical programming of PC-based controller interfaces.

**M E 340. Materials, Manufacturing, and Design (3) I, II**

Prerequisites: Mechanical Engineering 240, 241; Civil Engineering 301.

Fabrication and thermomechanical processing effects on properties and service behavior of engineering materials. Fracture mechanics and materials behavior under a range of design conditions. Design criteria for engineering materials including fatigue and creep. Case studies and failure analysis techniques.

**M E 350. Thermodynamics (3) I, II**

Prerequisites: Mathematics 252 and Engineering Mechanics 200.

Basic concepts and principles of thermodynamics with emphasis on simple compressible substances. First and second law analysis, entropy, exergy analysis and state relations.

**M E 351. Engineering Thermodynamics (3) I, II**

Prerequisites: Mechanical Engineering 350 and credit or concurrent registration in Engineering Mechanics 340.

Analysis and design of gas and vapor power cycles, and refrigeration systems. Generalized property relations for gases and gas-vapor. Air-conditioning. Combustion and chemical equilibrium. Design of engineering systems and processes. (Formerly numbered Mechanical Engineering 450.)

**M E 352. Thermodynamics and Heat Transfer (3) I, II**

Prerequisites: Engineering Mechanics 200 or 202 and Mathematics 252.

First and second laws of thermodynamics; heat conduction, convection and radiation. Not acceptable for mechanical engineering majors.

**M E 452. Principles of Heat Transfer (3) I, II**

Prerequisites: Mechanical Engineering 350 and Engineering Mechanics 340.

Analytical and numerical solutions of steady and transient one- and two-dimensional conduction problems, forced and natural convection in external and internal flows, and thermal radiation. Applications. (Formerly numbered Mechanical Engineering 470.)

**M E 490A-490B. Engineering Design: Senior Project (2-2) I, II**

Six hours of guided design activities.

Prerequisites for 490A: Mechanical Engineering 312, 314, 330, 340, 351, 452. Biology students enrolling in this course must have completed Biology 366, Civil Engineering 301, Electrical Engineering 203, Mechanical Engineering 352, and have credit or concurrent registration in Biology 590.

Prerequisites for 490B: Mechanical Engineering 490A, 495, 514. Biology majors: Mechanical Engineering 490A and Biology 590.

Applications of engineering principles and design techniques to the designing, building, and testing of an engineering system. A single project is completed in this two-course sequence and is judged completed upon presentation of an oral and a written report. In addition, issues related to ethics and engineering practice are discussed.

**M E 495. Mechanical and Thermal Systems Laboratory (2) I, II**

One lecture and three hours of laboratory.

Prerequisites: Mechanical Engineering 314, 330, 351, 452.

Data acquisition theory, instrumentation, sensors, data reduction, statistical and uncertainty analysis, and design of experiments. Experience in designing, performing, and reporting experiments on mechanical and thermal systems, mechanisms, vibrations, structures, thermodynamics, heat transfer.

**M E 496. Advanced Mechanical Engineering Topics (1-3) I, II**

Prerequisite: Consent of instructor. **Proof of completion of prerequisite required:** Copy of transcript.

Modern developments in mechanical engineering. See Class Schedule for specific content. Maximum credit nine units for any combination of Mechanical Engineering 496, 499 and 596.

**M E 499. Special Study (1-3) I, II**

Prerequisite: Consent of instructor. **Proof of completion of prerequisite required:** Copy of transcript.

Individual study. Maximum credit nine units for any combination of Mechanical Engineering 496, 499 and 596.

**UPPER DIVISION COURSES**  
(Also Acceptable for Advanced Degrees)

**NOTE: Proof of Completion of prerequisites required for all Mechanical Engineering 300-, 400-, and 500-level courses: Copy of transcript. In addition, Mechanical Engineering 351, 490A, and 530 require evidence of concurrent registration in appropriate courses.**

**M E 514. Advanced Machine Design (3) I, II**

Prerequisites: Mechanical Engineering 314 and 340.

Application of advanced mechanics of materials to design and analysis of mechanical elements. Probabilistic design and finite element methods and applications. Design projects involve extensive use of finite element programs. (Formerly numbered Mechanical Engineering 510.)

**M E 520. Introduction to Mechanical Vibrations (3)**

Prerequisites: Mechanical Engineering 312 and Civil Engineering 301.

Analysis of mechanical vibration; single- and multi-degree of freedom systems; free and forced vibrations; vibration isolation; vibration absorbers. Theory of vibration measuring instruments.

**M E 530. Automatic Control Systems (3)**

Prerequisite: Mechanical Engineering 312.

Dynamic characteristics of control components and systems. Stability and response of closed loop systems. Design of control systems.

**M E 540. Nonmetallic Materials (3)**

Prerequisites: Mechanical Engineering 314 and 340.

Fundamentals of ceramics, polymers, and composite materials. Materials design and selection. Statistical methods of brittle materials design, appropriate for ceramic materials, and rheological modeling of polymeric materials. Stress and strain analysis using classical lamination theory of multi-ply composite laminates.

**M E 542. Manufacturing with Nonmetallic Materials (3)**

Prerequisites: Mechanical Engineering 340 and Engineering 280 with a grade of C or better.

Engineering polymers and composites, processes, and manufacturing techniques. Polymer flow in extrusion, compression molding, RTM, and calendaring. Hands-on fabrication and test exercises included along with a capstone manufacturing project.

**M E 546. Computer Aided Manufacturing (3)**

Prerequisites: Mechanical Engineering 102, 314, 340; and Engineering 280 with a grade of C or better.

Computer controlled manufacturing and assembly techniques and devices. Databases and special languages. Agile manufacturing soft ware programs and technologies.

**M E 552. Heating, Ventilating, and Air-Conditioning (3)**

Prerequisites: Mechanical Engineering 351 and 452.

Fundamentals of air conditioning processes, psychrometrics, and building cooling load calculations. Design and analysis of HVAC systems. Equipment selection. Design codes and standards. Computerized cooling load calculations. (Formerly numbered Mechanical Engineering 582.)

**M E 555. Thermal Systems Analysis and Design (3)**

Prerequisites: Mechanical Engineering 351 and 452.

Analysis, design, and optimization of thermal systems using microcomputers. Modeling of thermal systems and components. Thermal system component characteristics and their effect on overall system performance. Relationship among thermal sciences in design process. Introduction to thermoeconomic optimization. (Formerly numbered Mechanical Engineering 570.)

**M E 556. Solar Energy Conversion (3)**

Prerequisites: Engineering Mechanics 340, Mechanical Engineering 351 and 452.

Application of thermodynamics, fluid mechanics and heat transfer to the thermal design of solar energy conversion systems. Computer simulations utilized. (Formerly numbered Mechanical Engineering 586.)

**M E 580. Biomechanics (3)**

Prerequisites: Civil Engineering 301 and Engineering Mechanics 340.

Application of engineering methodologies for quantitative understanding of biological/physiological phenomena. Continuum mechanics principles. Cardiovascular system and its components viewed from a mechanistic standpoint. (Formerly numbered Mechanical Engineering 590.)

**M E 596. Advanced Mechanical Engineering Topics (1-3) I, II**

Prerequisite: Consent of instructor. **Proof of completion of prerequisite required:** Copy of transcript.

Modern developments in mechanical engineering. See Class Schedule for specific content. Maximum credit of six units for any combination of Mechanical Engineering 496, 499 and 596 applicable to a bachelor's degree. Maximum combined credit of six units of Mechanical Engineering 596 and 696 applicable to a 30-unit master's degree.

**GRADUATE COURSES**  
Refer to the *Graduate Bulletin*.

## Military Science (MIL S)

*In the College of Professional Studies and Fine Arts*

**LOWER DIVISION COURSES**

**MIL S 96. Leadership Laboratory (1) I, II**

Application of individual skills and military tasks appropriate to a small unit leader. Prepares cadets for higher level leadership positions. Emphasis is on performance in leader roles which includes instruction. Maximum credit two units. Credit earned in this course not applicable to a bachelor's degree.

**MIL S 101. Introduction to the US Army I (3) I, II**

Structure, organization, and missions of the US Army. Preparation and development for officer status. (Formerly numbered Military Science 100A.)

**MIL S 102. Introduction to the US Army II (3) I, II**

Officer leadership, development, and functions. Emphasizing command responsibilities for a basic foundation of military fundamentals. (Formerly numbered Military Science 100B.)

**MIL S 201. Contemporary Military Leadership Theories: Individuals and Groups (2) I**

Scientific approach to leadership theory and its applicability to military settings through study of human behavior and leadership models at individual and group levels using simulations, case studies, and diagnostic instruments. (Formerly numbered Military Science 210.)

**MIL S 202. Contemporary Military Leadership Theories: Organizations (2) II**

Leadership at the organizational level with application to military settings with emphasis on developing leader skills and examination of theories and concepts of civil-military relations, using simulations, case studies, and diagnostic instruments. (Formerly numbered Military Science 211.)

**MIL S 221. Cadet Basic Field Training (3)**

Prerequisite: Sophomore standing.

Five-week field training with training in structure, organization, and missions of the US Army; officer leadership, development, and responsibilities; basic military skills; personal conditioning; oral and written military communications.

**MIL S 296. Experimental Topics (1-4)**

Selected topics. May be repeated with new content. See Class Schedule for specific content. Limit of nine units of any combination of 296, 496, 596 courses applicable to a bachelor's degree.

**MIL S 299. Special Study (1-4)**

Prerequisite: Consent of instructor.

Individual study. Maximum credit six units.

**UPPER DIVISION COURSES**  
(Intended for Undergraduates)

**MIL S 301. Skills of Military Leadership (3) I**

Prerequisite: Equivalent of two-year basic course program.

Techniques and skills required of military leaders. Military methods of instruction, review of essential map reading skills and case studies of military leadership techniques.

**MIL S 302. Theory and Dynamics of the Military Organization (3) II**

Prerequisite: Equivalent of two-year basic course program.

Current tactical doctrine and military techniques of planning and coordination required to apply doctrine to small unit operations.

**MIL S 401. Senior Leadership Seminar I (3) I, II**

Prerequisites: Military Science 301 and 302.

Leadership and management problems encountered in a mid-level sized organization. Role of the junior officer. Designed to prepare senior cadets for positions as leaders and managers of resources at the platoon/company level. (Formerly numbered Military Science 410.)

**MIL S 402. Senior Leadership Seminar II (3) II**

Prerequisites: Military Science 301 and 302.

Military justice system as it has evolved from international law principles and established national security policies. History of military law, the philosophy and structure of the system to include court-martial ethics and decision-making. (Formerly numbered Military Science 411.)

**MIL S 496. Experimental Topics (1-4)**

Selected topics. May be repeated with new content. See Class Schedule for specific content. Limit of nine units of any combination of 296, 496, 596 courses applicable to a bachelor's degree.

**MIL S 499. Special Study (1-3) I, II**

Prerequisite: Consent of department chair.

Individual study. Maximum credit six units.

## Music (MUSIC)

*In the School of Music and Dance*

*In the College of Professional Studies and Fine Arts*

### LOWER DIVISION COURSES

#### **MUSIC 101. Recitals (1) Cr/NC I, II**

Preparation for individual solo performances and attendance at a minimum of 12 concerts or recitals in accordance with music requirements. Maximum credit four units.

#### **MUSIC 102. Basic Musicianship for Non-Music Majors (3) I, II**

Rudimentary music theory involving the elements of music: melody, rhythm, and harmony. Developing the understanding of these elements through instrumental and vocal experiences which include the use of unison and part-singing, the keyboard, and simple melodic and harmonic instruments. For liberal studies and preservice teachers. Not open to students with credit in Music 105A or 105B.

#### **MUSIC 104. Music Technology (1)**

Two hours of activity.

Current technology in music composition, ear-training, score preparation, performance and research practices. Open to music majors and minors only. Not open to students with credit in Music 204.

#### **MUSIC 105A. Introduction to Elements of Music (3)**

Music from aesthetic, communicative, theoretical, and creative perspective. Development of understanding of aesthetic valuing, musical notation, rhythm, theory, pitch, aural skills, and musical terminology. Not open to students with credit in Music 102. (Formerly numbered Music 105.)

#### **MUSIC 105B. Introduction to Elements of Music (3)**

Prerequisite: Music 105A.

Continuation of Music 105A. Not open to students with credit in Music 102.

#### **MUSIC 110A-110B. Piano – Elementary Class Instruction (1-1)**

Two hours.

Prerequisite: For 110B: Music 110A with a grade of C (2.0) or better.

Basic keyboard experience through study of music reading, notation, scales, chords, and sight-reading covering a repertoire of beginning and intermediate songs and piano literature, with emphasis on keyboard harmony. Required of music majors and minors and credential candidates for teaching at the kindergarten-primary level. Music 110A not open to students with credit in Music 110B, 210A, 210B. Music 110B not open to students with credit in Music 210A or 210B.

#### **MUSIC 151. Introduction to Music (3) [GE] I, II**

Elements of music as exemplified by works representing different areas, cultures, styles, and forms. See Class Schedule for specific content.

#### **MUSIC 160. Introduction to Electro-Acoustic Music (2)**

One lecture and two hours of activity.

Historical overview of electro-acoustic music with hands-on introduction to analog multi-track recording/mixing, digital sequencing with emphasis on shared lineage of classical and popular idioms.

#### **MUSIC 161. Music and Dance of Africa (1)**

Two hours of activity.

Study and performance of African music and dance with attention to both historical/cultural elements and music performance.

#### **MUSIC 166. Elements of Jazz I (2)**

Fundamental harmonic analysis of basic jazz progressions, common modes and blues scale variations, solo transcription analysis, and ear-training.

### Performance Organization Courses (Music 170 through 189)

The performance organization courses are devoted to the study in detail and the public performance of a wide range of representative literature for each type of ensemble and designed to provide students with practical experience in rehearsal techniques.

#### **MUSIC 170. Chamber Music (1) I, II**

Three hours. Four hours for opera.

Prerequisite: Consent of instructor.

Sections for string, woodwind, brass, piano, vocal, and mixed ensemble groups of three or more players. May be repeated with new content. See Class Schedule for specific content. Maximum credit four units.

#### **MUSIC 174. Concert Band (1)**

Five hours.

Prerequisite: Consent of instructor.

Study and public performance of representative literature for ensemble. Practical experience in rehearsal techniques. Maximum credit four units.

#### **MUSIC 175. Marching Band (2) I**

More than six hours.

Prerequisite: Consent of instructor.

Study and public performance of literature for the ensemble. Practical experience in rehearsal techniques. Maximum combined credit for Music 175 and 375 eight units.

#### **MUSIC 176. Wind Symphony (1) I, II**

Five hours.

Prerequisite: Consent of instructor.

Study and performance of representative literature for the ensemble. Practical experience in rehearsal techniques. Maximum credit four units.

#### **MUSIC 177. Symphonic Band (1)**

Five hours.

Prerequisite: Consent of instructor.

Study and performance of representative literature for the ensemble. Practical experience in rehearsal techniques. Maximum credit four units.

#### **MUSIC 180. Symphony Orchestra (1) I, II**

Five hours.

Prerequisite: Consent of instructor.

Maximum credit four units.

#### **MUSIC 184. Opera Theatre (2) I, II**

Six or more hours per week.

The interpretation and characterization of light and grand opera. Specific work in coordination of operatic ensemble. Maximum credit eight units.

#### **MUSIC 185. Concert Choir (1) I, II**

Five hours.

Prerequisite: Consent of instructor.

Maximum credit four units.

#### **MUSIC 186. Chamber Singers (1) I, II**

Five hours.

Prerequisite: Consent of instructor.

Study and public performance of representative literature for the ensemble. Practical experience in rehearsal technique. Maximum credit four units.

#### **MUSIC 189. Jazz Ensemble (1) I, II**

More than three hours.

Prerequisite: Consent of instructor.

Study and public performance of representative literature for the ensemble. Practical experience in rehearsal techniques. Maximum credit four units.