

Engineering Technology curriculum. Approval for enrollment in this course shall be with the concurrence of the individual instructor and the department head. The student must be currently enrolled in one of the majors offered in the Engineering Technology Department. Prerequisite: completion of 30 or more hours in the Department of Engineering Technology.

495-3 Engineering Technology Projects. (2-4) A capstone projects course emphasizing a team approach to the analysis and solutions of manufacturing problems. Projects will be supplied by industry whenever possible. Emphasizes scheduling, design, working in teams, final written report and presentation. Restricted to Engineering Technology majors. Prerequisite: Senior standing. Lab fee \$15.

586-v Problems. (Credit variable) Open to students who are pursuing graduate work and have a background in Engineering Technology. Problem chosen by the student and developed through conferences and activities directed by the supervising professor. Prerequisite: Graduate classification and approval of department head.

LIBERAL STUDIES (L S)

498-3 Liberal Studies Capstone Course. (3-0) This course requires students to integrate and use fundamental concepts learned in previous courses within the students' degree concentrations including research and analysis of real-world phenomena and problems. Students will present written reports on their research, supplemented by appropriate internet and multimedia materials, as well as portfolios documenting their research. This is a writing intensive course for Liberal Studies majors. Prerequisites: CIS 103 or 300; ENGL 309; senior standing, approved degree plan for Bachelor of Science in Liberal Studies program.

MANAGEMENT (MGMT)

301-3 Principles of Management. (3-0) A study of the basic managerial functions of planning, organizing, staffing, directing, and controlling resources to accomplish organizational goals. The systems concept of management and role of the manager in each level of the organization are emphasized. Prerequisite: Junior classification or approval of department head.

302-3 Personnel/Human Resources Management. (3-0) Fundamental functions of human resources management; relationship between personnel management and organizations' emerging role of personnel administration in development of strategic policy for organizations. Prerequisite: MGMT 301.

303-3 Supervisory Management. (3-0) Investigates the role, function, and responsibilities of the supervisor in modern organizations through study of sociological and psychological theories in human relations. The primary emphasis is on development of supervisory skills in communications, motivation, discipline, morale, and grievances as they arise in superior-subordinate relationships. Prerequisite: MGMT 301 or approval of department head.

304-3 Small Business Management. (3-0) Oriented toward planning for and managing a small business, starting a business, and buying a business franchise. May include computer simulation and consultation for actual small business. Prerequisites: MGMT 301, ACC 204, MKTG 314 or department head approval.

320-3 Industrial Safety. (3-0) A study of principles and practices used to establish a safe and healthful environment for industrial personnel. Includes a study of

general industrial safety, safety and health regulation agencies, hazard recognition and correction, and first aid. Credit for both I T 320 and MGMT 320 will not be awarded.

- 325-3 Advanced Leadership Applications (3-0)** Advanced studies of contemporary leadership issues; the history of leadership; leadership theories; leadership ethics and values; group dynamics; organizational behavior; methods of effective team building; community activism; the politics of gender, race, disability, and age; the dynamic of power; and the aspect of professional networking. Course will include in depth study of above mentioned topics, as well as extensive discussion and research of related leadership issues. Prerequisites: MGMT 301 or approval of department head.
- 350-3 Organization Behavior. (3-0)** This course provides a comprehensive analysis of the behavior of people at work in all types of organizations. Topics include fundamentals of organizational behavior: values, ethics, motivation, group dynamics, individual differences, attitudes, decision-making, conflict, power, change, stress, leadership, rewarding behavior, communication, and organizational structure.
- 402-3 Creating Productive Relationships. (3-0)** A practical and theoretical course dealing with behavior. Emphasis will be on identifying and classifying behavior in order to better understand behavior and to develop strategies for effectively managing interpersonal relationships. Exercises and role playing are used to illustrate major points. Materials fee required.
- 403-3 Wage and Salary Administration. (3-0)** Wage and salary administration in public and private organizations; determinants of general wage and salary levels and structures; total compensation systems, interrelationship among employee performance, intrinsic and extrinsic rewards, perceived equitable payments, employee satisfaction. Prerequisite: MGMT 302.
- 404-3 Recruitment, Selection and Placement. (3-0)** Recruitment and selection of human resources for organizations; optimal utilization of human resources within organizations; use of tests and other techniques in human resource management. Prerequisite: MGMT 302.
- 405-3 Human Resource Development. (3-0)** Practical and theoretical approaches to training and development of employees in an organization. Topics include organization, role and scope, training and development functions, philosophies, strategies, need analysis, development of program content, methods, materials and techniques, and evaluation and control of the training and development function. Prerequisite: MGMT 302.
- 406-3 Employee and Labor Relations. (3-0)** Collective bargaining, labor market fundamentals, unionism, and related issues of labor economics.
- 407-3 Business Ethics. (3-0)** An analysis and examination of significant contemporary ethical issues and problems existing throughout the professional business arena. Emphasis will be upon the manager's social and environmental responsibilities to employees, customers, and the public.
- 412-3 Entrepreneurship. (3-0)** Addresses the process of generating ideas for new business, writing comprehensive business plans. Emphasis on information sources, industry analysis. Prerequisite: Senior classification in a business discipline or permission of instructor.
- 421-3 Production and Operations Management. (3-0)** Topics covered include: industrial organization, scientific management, planning and control, building locations and layouts, wage rates, corporation relationships, and research. Prerequisites: MGMT 301, FIN 301, G B 311.

- 422-3 Management Science. (3-0)** Applications and use of quantitative techniques of decision making with emphasis on management needs. Relation of techniques to computer-generated solutions. Prerequisites: CIS 104, G B 311, and 6 hours of MATH; or instructor's permission.
- 450-3 Management Information Systems. (3-2)** This course investigates management issues related to business information systems designed to meet the informational needs of the various business subsystems. The concepts of systems development, security, privacy and ethics associated with information systems are stressed. Credit will be awarded for only 1 of the following courses: CIS 405, ACC 450, CIS 450, or MGMT 450. Lab Fee \$15.
- 454-3 International Management. (3-0)** A global approach to the study of management to include international dimensions of the marketplace and environment, the role of culture, international strategic management, organizational behavior and human resource management.
- 484-3 Internship. (1-6)** Preapproved and supervised work experience in a management related position with a public or private business organization. May be repeated for a total of 6 hours credit. Prerequisites: Junior classification and approval of department head. Field experiences fee \$75.
- 485-3 Seminar in Management (3-0)** Deals with current issues in management. Readings are required from current management publications and other related periodicals. May be repeated for credit when topics vary. Prerequisites: 15 hours in MGMT and approval of department head.
- 486-v Problems. (variable)** A directed study of selected problems in management. May be repeated with department head approval. Prerequisites: Senior classification and approval of department head.
- 489-3 Global Management Practices. (3-0)** A study of basic international business concepts, cultural literacy, and discipline specific content are then applied to practical experiences and activities in the foreign country visited. A study abroad at the student's expense is required. Student may complete a maximum of six hours of COBA sponsored study abroad toward degree completion. Prerequisites: Junior or Senior status. GB 489, MGMT 489, or MKTG 489 may not be taken concurrently. Field assignment fee of \$75.
- 500-3 Foundations of Management. (3-0)** Students develop an integrated strategic, operational, and process view of the organization. Focus is on operations, marketing, information systems, research processes and statistical techniques for decision making, management, leadership and ethics, and human resource management. Students demonstrate mastery of secondary research techniques, case analysis methodology, communication skills, and hands-on computer skills. Prerequisite: For MBA, MS HRM, and MS ML majors: Course must be taken within the first 12 graduate hours OR with the approval of the department head. Prerequisite for all other majors: Approval of the instructor.
- 501-3 Organizational Behavior. (3-0)** Behavioral theory in organizational context. A study of individual and group dynamics in the business environment. Specific emphasis is given to leadership, motivation, communication, employee supervision, and morale.
- 504-3 Personnel Problems Seminar. (3-0)** Concerned with developing the student's proficiency in applying principles and technical tools to such personnel problems as employment, employee education and training, labor relations, industrial health and safety, wage and salary administration, and employee services.

- 505-3 Analytical Methods for Management Decisions. (3-0)** A study of analytical techniques which may be used to facilitate decisions analysis. Topics include the concept of utility, break even analysis, network models, linear programming, game theory and computer simulation. Course activity will consist of surveying analytical techniques which may be used to facilitate analysis of alternative decisions and practice in applying the techniques through problem solving. Prerequisites: G B 311 or MATH 300 and graduate standing.
- 506-3 Influencing Organizational Productivity through Interpersonal Relations. (3-0)** A practical and theoretical course dealing with interpersonal behavior and its influence on organizational productivity. Emphasis will be on identifying and classifying behavior in order to better understand behavior and to develop strategies for creating productive relationships with others. Particular emphasis is directed toward the impact of interpersonal behavior in business organizations and the potential effect on productivity. Materials fee required.
- 507-3 Responsibilities and Ethics of Leadership. (3-0)** An examination of an organization's social and environmental responsibilities to its employees, customers, and the general public. Practical emphasis is given to the case study method for evaluating the performance of various organizations. Establishes a theoretical framework for understanding ethics, principles and values of leadership as they affect the organization, the organizational environment and society.
- 508-3 Analysis & Design of Organizations. (3-0)** Examines theories, processes and "fit" models of organization design. Emphasizes alignment of structure, technology, information systems, reward systems, people and culture, and management processes with organizational goals. Compares and contrasts the flexible, adaptive learning organization with the traditional centralized, standardized, and formalized organization.
- 509-3 Seminar on Management and Leadership. (3-0)** Examines and explores the distinctions between management and leadership. Emphasis is on the case study method for examining the applications of leadership principles and theoretical models to varied organizational situations. This course focuses on developing leaders who can effectively deal with the rapidly changing leadership challenges that modern organizations face. MS, Management students must take this course as their integrating capstone course having completed or be concurrently completing the core courses for the program.
- 511-3 Managing Operations and Services. (3-0)** A study of concepts, models and methods used to effectively manage the manufacturing and/or service operations of for-profit and not-for-profit organizations. Emphasis will be placed on the design and use of cross-functional operations planning, control, and support systems. Topics of contemporary relevance will be examined to include supply chain management, enterprise resource planning, time-based competition, and quality improvement.
- 513-3 Strategic Impact of Technology. (3-0)** Explores the strategic implications of emerging information systems and communication technology on both for-profit and not-for-profit organizations. Students will research, evaluate, present, and discuss case situations of current and potential technology applications. Students will have opportunities to interact with representatives of national and global entities that are either developing or applying technology. Emphasis will be on trend and issue identification,

managing and interfacing with technology, organizational implications, and strategic insight.

- 568-3 Organizational Development and Change. (3-0)** Study, research and analysis of pro-active strategies for organizational change using the theories and techniques of applied behavioral science. Examines the phases of consulting, strategies, intervention decisions and actions, multiple roles, skills and phases of internal and external consultants, ethical dilemmas and guidelines and the implementation of action research. A complete, step-by-step, intervention strategy is developed during this course.
- 585-3 Management Seminar. (3-0)** Selected management topics of current importance to business management. May be repeated once for credit when topics vary.
- 586-v Problems. (Credit variable)** This course offers students the opportunity to study management topics and perform research within the student's area of interest as directed by the responsible professor. Prerequisite: Approval of the department head.
- 589-3 Global Management Practices. (15-0)** A study of basic international business concepts, cultural literacy, and discipline specific content are then applied to practical experiences and activities in the foreign country visited. A study abroad at the student's expense is required. Student may complete a maximum of six hours of COBA sponsored study abroad toward degree completion. Prerequisites: Admission into a COBA graduate program and permission of the instructor.
- 595-3 Internship. (1-8)** Prepared and supervised work experience in a management-related position with a public or private business organization. May be repeated for a total of 6 hours credit. Prerequisite: Approval of MBA Director. Field experiences fee \$75.

MANUFACTURING ENGINEERING TECHNOLOGY (MET)

- 216-3 Introduction to Manufacturing Systems. (2-4)** A study of organizational and production techniques used in manufacturing. A thematic team approach will be used to design and produce a product using principles of mass production. Concepts of manufacturing that will be studied will include: principles of tooling, quality, plant layout, resource planning and scheduling. Lab fee \$10.
- 326-3 Ergonomics and Work Methods. (2-3)** Introduction to the design of man-machine systems with particular emphasis on the application of ergonomics to the manufacturing workplace and environment. Use of anthropometric data in design; limitations of human performance; effects of environmental stress on work performance, safety, and health. Prerequisite: MATH 107 and 3 hours of statistics or concurrent enrollment. Lab fee \$10.
- 336-3 Industrial Controls. (3-2)** The theory and application of electronic programmable devices such as programmable logic controllers, temperature controllers, counters, etc. Emphasis is also given to control devices using pneumatics and hydraulics. Ladder logic and input/output devices will be emphasized. Prerequisite: MATH 109. Lab fee \$10.
- 386-3 Quality Management. (2-2)** A study of the application of various methods used by manufacturing to quantify product quality. This will include a review of the ASTM, ANSI, and ISO tests as they apply to metallic, polymeric, ceramic, and composite materials. Statistical Quality Control, Statistical Process Control, Total Quality Management, and ISO 9000 will also be investigated. Laboratory assignments will acquaint the student with the

variety of instrumentation that is used in quality control and their use. Prerequisite: 3 hours of statistics or concurrent enrollment. Lab fee \$10.

- 426-3 Computer Simulation. (2-2)** An introduction to systems simulation with special emphasis on discrete event simulation, random number generators, common simulation approaches, independence issue, steady state conditions, survey of simulation languages, model validation, and output analysis. The student will be able to develop simulation models of industrial systems and to understand the issues involved in simulation studies. Lab fee \$10.
- 436-3 Production Planning. (3-0)** A study of the principles and theory used in the design and maintenance of production operations and inventory systems. These include forecasting techniques, inventory models, production control models and assembly line balancing. Particular emphasis is on MRP, Just-in-Time, and Synchronous Manufacturing. Prerequisites: MATH 120 and 3 hours of statistics or concurrent enrollment.
- 446-3 Manufacturing Management. (3-0)** Applications of modern manufacturing principles including: design for manufacturability, group technology, just-in-time, synchronous manufacturing, concurrent engineering, flexible manufacturing, and product management to effectively manage the manufacturing environment. Prerequisite: MATH 107.
- 476-3 Automated Manufacturing Systems. (3-0)** An analysis of materials flows to design automated manufacturing systems in the manufacturing environment. This will include material handling systems, how computer-aided manufacturing software improves productivity, automated storage and retrieval systems, automated guided vehicles, bar-coding systems, automated warehousing, and the programming and application of robots. Prerequisites: MET 336, 386.

MANUFACTURING QUALITY AND LEADERSHIP (MQL)

- 524-3 Statistics for Quality. (3-0)** Introduction to decision making for technologists using quantitative methods. The emphasis will be on identifying opportunities for process/product improvement in manufacturing using statistical applications. Besides exploratory data analysis, basic probability, distribution theory and statistical inference will be covered. Special topics will include experimental design, regression, control charts and acceptance sampling.
- 525-3 Six Sigma and Design of Experiments. (3-0)** Introduction to design and analysis of experiments. Applications in product and process design and development; process correction and quality improvement. Taguchi's loss-function approach to quality. Strategies for reliable data acquisition and validation will be addressed. Prerequisites: MQL 568, MQL 524.
- 536-3 Manufacturing Planning. (3-0)** Topics that will be covered include strategic issues such as the design of products and services, and the design of processes and facilities. Planning and controlling activities including capacity planning, quality control, inventory control, scheduling, and project planning are covered. The emphasis of this course will be on the development and application of analytical methods and techniques. Prerequisites: MQL 524 or concurrent enrollment.
- 546-3 Manufacturing Systems Management. (3-0)** A study of concepts and models used as a competitive advantage in the management of processes to produce and supply goods in the manufacturing/ service industries. Topics will include operations management and strategy, product design and learning curves, project management, Manufacturing/Service process

selection and design. Applications of Operations Research science techniques enable the development of the Manufacturing Systems Management methodologies.

- 562-3 Supply Chain Management. (3-0)** Exploration of the key issues associated with the design and management of industrial supply chains. Supply Chains are concerned with the efficient integration of suppliers, factories, warehouses and stores so that products are distributed to customers in the right quantity and at the right time. The course will focus on minimizing the total supply chain cost subject to various service requirements.
- 568-3 Quality Management. (3-0)** The course focuses on manufacturing related principles and best practices reflected in ISO 9000 Standards. Topics included are: manufacturing process improvement; process orientation; quality function deployment; process control and capability; role of inspection; economics of quality; and productivity measurement. Emphasizes role of ISO certification in the global market along with the contributions of Deming, Juran, and Crosby. Prerequisites: MQL 524 or concurrent enrollment.
- 576-3 Automated Manufacturing Systems. (3-0)** An analysis of materials flow to design automated manufacturing systems in the manufacturing environment. Preconditions for manufacturing automation in manufacturing, principles for and quality by automated machine tools, NC-technology, adaptive control, FMS, computer communication, simulation, monitoring, maintenance, human factors.
- 588-v Thesis. (1 to 6 variable)** Scheduled when student is ready to begin the thesis. No credit is awarded until thesis is completed. Prerequisites: MQL 525 and consent of major professor.
- 598-3 Seminar in Manufacturing Quality Topics. (3-0)** This course guides the student toward an in-depth understanding of the principles, techniques and applications of quality in modern manufacturing companies. The student will review current literature in the field of quality management and write a comprehensive proposal or report on the topic. Prerequisites: MQL 525 or concurrent enrollment

MARKETING (MKTG)

- 312-3 Public Relations. (3-0)** A study of the techniques used in planning public relations programs for businesses, schools, churches, and civic associations. Topics include press relations, crisis management, advertising, speech writing, and campaign activities. Credit for both COMS 312 and MKTG 312 will not be awarded. Prerequisite: 3 hours of COMS.
- 314-3 Marketing. (3-0)** Examination of the principles and concepts of marketing goods, services, and intangibles by profit and non-profit organizations in a free enterprise and global economy. Prerequisite: Junior classification.
- 315-3 Personal Selling. (3-0)** A study of the role and function of personal selling as a part of the marketing mix. Techniques in identifying and locating prospective customers, approaching the prospect, presentation, and demonstrations of products and services, closing the sale, and servicing customer accounts are covered in theory and practice. Prerequisite: MKTG 314 or approval of department head.
- 316-3 Consumer Behavior. (3-0)** Acquaints students with individual and group behavior of people performing in consumer role. Considers such topics as buying motives, social class, and research techniques in consumer behavior. Prerequisite: MKTG 314.

- 317-3 Retailing. (3-0)** Fundamental operations of retailing, studying of buying practices, pricing, store locations and layout, sales promotions, personnel management, and stock control. Designed to aid the student seeking a general knowledge of the retail field as well as those specializing in Marketing. Prerequisite: MKTG 314.
- 318-3 Promotional Strategy. (3-0)** The study of a controlled, integrated program of promotional variables. Designed to present a company and its products to prospective customers; to promote need-satisfying attributes of products toward the end of facilitating sales and long-run performance. Prerequisite: MKTG 314.
- 319-3 Internet Marketing. (3-0)** An application-based course on the utilization of the Internet, e-mail, and the world wide web for commercial purposes. In the course students will examine e-commerce techniques and database management for both business-to-customer and business-to-business activities as well as construction of effective web pages and other marketing strategies for both. Prerequisites: MKTG 314 and CIS 103.
- 399-v Cooperative Education. (Credit variable)** This course is designed to offer students the opportunity to integrate academic study with work experience that is germane to their major or minor. Enrollment requires a two-semester minimum commitment that may be accomplished by 1) alternating semesters of full-time study with semesters of curriculum-related employment, or 2) enrolling in courses at least half-time (6 semester hours) and working part-time in parallel positions of curriculum-related employment. The department Cooperative Education advisor will supervise the student's experience and assign the final grade based on the student's final report which is required to complete the course. Students may participate in the Cooperative Education program for an unlimited number of semesters but a maximum of 6 hours credit may be counted toward a degree. Prerequisite: Completion of 30 semester hours which includes 12 hours in the major or minor discipline in which the Cooperative Education course is desired, minimum overall GPA of 2.5 and a minimum GPA of 3.0 in the appropriate major or minor field, and department head approval. Field experiences fee \$75.
- 401-3 Advertising. (3-0)** Analysis of advertising in modern media. Study of the history, design, and effects of advertising. Students will also study the uses of different media for advertising purposes. Credit for both COMS 401 and MKTG 401 will not be awarded.
- 402-3 Services Marketing. (3-0)** Introduce the student to the service environment. An in-depth analysis of the most successful service-oriented industries and firms within the world's fastest-growing economic sector will be presented. Prerequisite: MKTG 314.
- 412-3 Sales Management. (3-0)** Administration of an effective sales force, including strategy, planning, recruiting, training, motivating, coordinating, leading, and directing sales forces at all levels of marketing enterprises. Prerequisites: MKTG 314 and 315.
- 415-3 Marketing Research. (3-0)** Familiarizes students with the accurate, objective, and systematic gathering, recording, and analyzing of data about problems relating to marketing goods and services. Prerequisites: G B 311, MKTG 314.
- 416-3 Marketing Management. (3-0)** The application of strategic planning and management of all functional aspects of the marketing operation of an enterprise using comprehensive analytical methods and an integrated marketing mix. Prerequisites: Senior classification and 9 hours of MKTG.

- 454-3 International Marketing. (3-0)** A global approach to the study of comparative marketing systems, including economic, social, technological, governmental, and political environments as they affect international marketing operations. Prerequisites: MKTG 314 and G B 444 or approval of department head.
- 479-3 The Technology of E-Business. (3-2)** This course examines the linkage of organizational strategy and electronic methods of delivering products, services, and exchanges in inter-organizational, national, and global environments. Information technology strategy and technological solutions for enabling effective business processes within and between organizations in a global environment are considered. Credit for both CIS 479 and MKTG 479 will not be awarded. Prerequisites: CIS 103 or CIS 300. Lab fee \$15.
- 484-3 Internship. (1-8)** Pre-approved and supervised work experience in a marketing-related position with a public or private business organization. May be repeated for a total of 6 hours credit. Prerequisites: Junior classification and approval of department head. Field experiences fee \$50.
- 486-v Problems. (Credit variable)** A directed study of selected problems in marketing. May be repeated with approval of the department head. Prerequisite: Senior classification and approval of department head.
- 489-3 Global Marketing Practices. (3-0)** A study of basic international business concepts, cultural literacy, and discipline specific content are then applied to practical experiences and activities in the foreign country visited. A study abroad at the student's expense is required. Student may complete a maximum of six hours of COBA sponsored study abroad toward degree completion. Field assignment fee of \$50. Prerequisites: Principles of Marketing (MKTG 314), Junior or senior status and permission of instructor. GB 489, MGMT 489, or MKTG 489 may not be taken concurrently.
- 490-v Special Topics in Marketing. (Credit variable)** An examination of current topics in marketing. Readings required from current marketing publications and other related periodicals. May be repeated for credit when topics vary. Prerequisite: 9 hours of MKTG
- 506-3 Marketing for Non-Profit Institutions. (3-0)** An examination of marketing principles and strategies as they apply to non-profit institutions. This course is designed for non-MBA graduate students who need to be familiar with marketing for non-profit institutions.
- 508-3 Marketing Management. (3-0)** Study of the planning and coordination of marketing functions specifically related to product, pricing, promotion, and distribution strategies. Includes case analysis and presentation of results. Prerequisite: MGMT 500 or approval of department head.
- 509-3 Marketing Strategy. (3-0)** Develops the role of product, pricing, promotion, and channel and physical distribution in the development of a firm's integrated marketing program. Cases are used to evaluate and compose alternative courses of action.
- 512-3 Marketing Theory and Practice. (3-0)** Historical development and current trends in marketing theory. Critical evaluation of the significance of their implications to the various functional areas of marketing. Prerequisite: Graduate standing.
- 554-3 International Marketing. (4.5-0)** A global approach to the study of comparative marketing systems, including economic, social, technological, governmental, and political environments as they affect international

marketing operations. Graduate students will be required to complete an extensive research project in addition to other course requirements.

585-3 Marketing Seminar. (3-0) Selected marketing topics of current importance to business marketing. May be repeated once for credit when topics vary.

586-v Problems. (Credit variable) This course offers students the opportunity to become acquainted with current research being conducted within the student's area of interest; directed reading of a number of sources selected in concert with the student's professor. Prerequisite: Approval of department head.

MATHEMATICS (MATH)

100-3 Basic Mathematics. (3-0) This course features an intensive study of basic arithmetic concepts and skills, and the introduction to basic algebra as a preparatory course for MATH 101, Fundamentals of College Algebra. It does not count for degree credit. A student must earn a grade of at least C in order to progress to MATH 101. Course fee \$10.

101-3 Fundamentals of College Algebra. (3-0) A study of functions, polynomials (including operations and factoring), rational expressions and equations, systems of linear equations in two and three variables, and exponents. Approved graphing calculator required. Not for degree credit. A student cannot get credit for MATH 101 if credit has previously been received for MATH 107. A student must earn a grade of at least C in order to progress to MATH 107. Enrollment in this course will be in accordance with the Mathematics Placement and Continuing Enrollment Rules. Course fee \$10.

107-3 College Algebra. (3-0) (TCCNS = MATH 1314) The study of quadratic, polynomial, exponential, and logarithmic functions and equations; conic sections; sequences and series; and the Binomial Theorem. Additional topics may include: mathematical induction and matrices. Approved graphing calculator required. Prerequisite: Enrollment in this course will be in accordance with the Mathematics Placement and Continuing Enrollment Rules. Course fee \$10.

108-3 Elementary Applied Mathematics. (3-0) Elementary mathematical applications to problems of finance, probability, statistics, and geometry, and the development of reasoning skills. This course cannot be counted on a degree program for a mathematics major. Prerequisite: high school Algebra I and II or a grade of C or better in MATH 101. Course fee \$10.

109-3 Plane Trigonometry. (3-0) (TCCNS = MATH 1316) Angles and coordinates, trigonometric functions, solutions of triangles and applications, reduction theorems and formulas, identities and conditional equations, addition formulas and derived relations, angular and linear speed, logarithms, and radian measure. Prerequisite: MATH 107 or concurrent registration. Course fee \$10.

110-3 Math for Business I. (3-0) (TCCNS = MATH 1324) Linear equations and applications, linear forms and systems of linear equations, matrix algebra and applications, linear programming, probability and applications, and statistics. Prerequisite: three credits of high school mathematics including two credits in Algebra I and II or a grade of C or better in Math 1013. Course fee \$10.

111-3 Mathematics for Business II. (3-0) (TCCNS = MATH 1325) Application of mathematical concepts to topics from finance, management science, marketing, and economics. Concepts addressed include linear models, exponential functions, probability and statistics, and introductory calculus

concepts. This course cannot be counted on a degree program for a mathematics major. Prerequisite: MATH 107 or 110. Course fee \$10.

- 118-4 Precalculus. (3-2)** (TCCNS = MATH 2412) Applications of algebra and trigonometry to the study of elementary functions and their graphs including polynomial, rational, exponential, logarithmic, and trigonometric functions. Additional topics will be chosen from analytical geometry, mathematical induction, sequences, and series. Prerequisite: 3 credits of high school mathematics including 1 credit in algebra II, or a grade of C or better in MATH 101. Course Fee \$10. Lab fee \$5.
- 120-4 Calculus I. (3-3)** (TCCNS = MATH 2413) Limits, continuity, the derivative, differentiation techniques, optimization, curve sketching, the definite integral, applications of the definite integral. Use of computer technology and laboratory assignments will be required in this course. Prerequisites: MATH 109 or concurrent registration or MATH 116. Course fee \$10.
- 131-3 Introduction to Probability and Statistics. (3-0)** Introduction to sets, counting techniques, probability, random variables, mean and variance, distributions, and statistical inference. Credit for MATH 131 will not be given if credit for MATH 300 has previously been awarded. Prerequisite: College Algebra or higher mathematics. Course fee \$10.
- 209-4 Calculus II. (3-3)** (TCCNS = MATH 2414) Derivatives and integrals related to inverse trigonometric, hyperbolic, and inverse hyperbolic functions; techniques of integration, indeterminate forms, improper integrals, Taylor's formula, sequences, series, power series. Use of computer technology and laboratory assignments will be required in this course. Prerequisite: MATH 120. Course fee \$10.
- 232-3 Applied Matrix Algebra. (3-0)** An introduction to matrix and vector arithmetic, Gaussian Elimination, matrix factorization, determinant, matrix inverse, eigenvalues and eigenvectors. Applications to be chosen from linear models, linear optimization and the Simplex Method, orthogonal projections and least-square problems, matrix diagonalization, discrete dynamical systems, cryptology and computer graphics. Technology will be emphasized. Prerequisite: MATH 120. Course fee: \$10.
- 300-3 Principles of Statistics. (3-0)** Data collection and analysis, elementary probability, discrete and continuous distributions, regression, correlation, estimation, and nonparametric methods. This course cannot be counted on a degree program for a mathematics major. Credit cannot be awarded for both MATH 300 and MATH 350. Prerequisite: MATH 107. Course fee \$10.
- 301-3 Number Theory. (3-0)** The study of congruence relations, rational integers, diophantine equations, quadratic reciprocity law, linear forms, integral domains, and related topics. Prerequisite: 6 hours of Mathematics including MATH 120.
- 302-3 Principles of Geometry. (3-2)** Introduction to Euclidean geometry. Topics will include an introduction to logic, properties of parallel lines, triangles, quadrilaterals, and measurement. Similarity and proportionality will also be addressed. Prerequisite: MATH 120. Course fee \$10. Lab fee \$5.
- 303-3 Concepts of Elementary Mathematics I. (3-2)** Problem solving, sets, functions, logic, elementary number theory, concepts of properties of whole numbers, rational numbers, integers, and real numbers. Designed for those planning to teach in elementary school. Prerequisites: MATH 107 and Junior standing. Course fee \$15.
- 305-3 Concepts of Elementary Mathematics II. (3-2)** Basic concepts in algebra, geometry, calculators and computers, metric system and measurement, and probability and statistics. Prerequisite: MATH 303. Course fee \$15.

- 306-3 Differential Equations. (3-0)** Solutions and applications of homogeneous and nonhomogeneous ordinary differential equations, including first-order equations and higher-order linear equations. Qualitative properties of solutions are investigated, as well as exact methods for solving differential equations and initial value problems including series, Laplace transform, separation of variables, variation of parameters, and undetermined coefficients. Prerequisite: MATH 209.
- 307-3 Abstract Algebra. (3-0)** The study of preliminary notions, group theory, the theory of rings and ideals, and polynomial rings. Prerequisite: MATH 332.
- 309-3 Algebraic Functions. (3-0)** Surveys elements of Algebra with in-depth examination of sets, functions, quadratic equations, polynomials, exponential and logarithmic functions. To fulfill degree requirements for math or for electives, students must earn a grade of C or better. (May be used to fulfill the College Algebra requirement except for teacher education.)
- 310-3 Discrete Mathematics. (3-0)** Introduces students to the techniques and tools of reasoning, decision making and combinatorial problem solving. Topics include sets and logic, combinations, probability, relations and functions, Boolean properties and graph theory. Prerequisite: College Algebra or MATH 309.
- 311-3 Probability and Statistics. (3-0)** Topics will include probability axioms, sampling distributions, descriptive statistics, finite random variables, infinite discrete random variables, continuous random variables, Central Limit Theorem, estimation, tests of significance, and regression. Prerequisites: MATH 209.
- 332-3 Linear Algebra. (3-0)** A study of the theory of real vector spaces and linear transformations. Topics include vector spaces, inner product, norm, distance, subspaces, spanning sets, linear dependence and independence, bases, dimension, linear systems, coordinates, linear transformations, kernel, image, isomorphisms, inverse linear transformations, matrix representations of linear transformations, similarity, direct sums, and canonical forms. Prerequisites: MATH 209, Math 232.
- 333-4 Calculus III. (3-3)** The calculus of two dimensional vectors, parametric equations, cylindrical and spherical coordinates, multivariable differential calculus, directional derivatives and their applications, multiple integration, vector analysis, line and surface integrals, Green's Theorem, Stokes's Theorem. Use of computer technology and laboratory assignments will be required in this course. Prerequisite: MATH 209. Course fee \$10. Lab fee \$5.
- 350-4 Principles of Bio-Statistics. (3-2)** An introduction to statistical methods that are applied in biology and agriculture. Use of technology and hands-on laboratory assignments will be required in this course. This course cannot be counted on a degree program for a mathematics major. Credit cannot be awarded for both MATH 300 and 350. Prerequisite: MATH 107. Course fee \$10.
- 360-3 Numerical Analysis. (3-0)** An introduction to numerical analysis. Topics will be selected from error analysis, solving algebraic equations, interpolation, numerical differentiation and integration, methods for solving systems of equations, approximation theory, and initial value problems of ordinary differential equations. Prerequisite: MATH 209.
- 400-3 Introductory History of Mathematics. (3-0)** An introduction to the historical and philosophical development of the various branches of mathematics. The evolution of mathematical ideas will be studied from their developmental

stages to the modern concepts used today. Prerequisites: 6 advanced hours in MATH or department head approval.

- 402-3 College Geometry. (3-2)** Topics will include logic, properties of circles and transformations, projective and non-Euclidean geometry. Technology will be included when appropriate. Prerequisite: MATH 120. Course fee \$10. Lab fee \$5.
- 404-3 Survey of Mathematical Ideas. (3-0)** This course is designed to bring together and supplement the technical material of other mathematics courses to communicate mathematics effectively. Topics in algebra, trigonometry, geometry, statistics, and discrete mathematics will be explored. Technology will be used where appropriate. Prerequisites: MATH 120 and MATH 302 or MATH 402 or concurrent enrollment. Course fee \$10.
- 405-3 Concepts of Elementary Mathematics III. (3-0)** This course is designed to develop and extend the mathematical content knowledge of prospective middle school teachers. Topics will include the development of algebraic reasoning through the use of patterns, relations, and functions with an emphasis on multiple representations (numerical, graphical, verbal, and/or symbolic). Technology will be integrated into the curriculum where appropriate. Prerequisite: MATH 305. Course fee \$10.
- 409-3 Advanced Analysis. (3-0)** A study of the theory of the calculus of functions of a single variable. Topics include the topology of the real line, functions, sequences and their limits, continuity, differentiation, and integration. Prerequisite: MATH 209.
- 420-3 Mathematical Modeling. (3-0)** An advanced course in mathematical modeling requiring students to build and validate deterministic models of complex phenomena. The course will emphasize both qualitative and quantitative computational techniques of applied mathematics. Prerequisites: MATH 209 and 6 hours of advanced MATH.
- 486-v Mathematics Problems. (Credit variable)** Special problems in mathematics. Not covered by any course in the curriculum. Work may be either theory or laboratory. May be repeated with approval of the department head for additional credit when fewer than four credits have been earned. Prerequisite: Approval of department head.
- 488-v Undergraduate Research Project. (Credit variable)** Methods of research in the mathematical sciences or in mathematics education through a research project directed by a departmental faculty member. The student is required to prepare a final report and presentation. No credit is earned until the student has enrolled in at least 3 credit hours and the final report and presentation are certified as completed by the faculty member directing the project, at which time the student will receive 3 credit hours. Prerequisite: Mathematics major, junior standing and 24 semester hours MATH.
- 490-3 Math Topics. (3-0)** Topics will be selected from areas of mathematics suitable for upper level study. This course may be repeated once, with department head approval, as topics change. Prerequisite: MATH 209 and 6 hours of upper level mathematics.
- 500-3 History of Mathematics. (3-0)** A historical and philosophical development of mathematics from earliest times down to the present. Mathematical topics are presented in a historical and philosophical setting not only to provide a unifying theme, but also to illustrate how the evolution of mathematical ideas finally led to modern concepts in the field. Students having prior credit for History of Mathematics will not receive credit for MATH 500. Prerequisite: Approval of department head.

- 501-3 Nonparametric Statistics. (3-0)** Introduction to nonparametric statistics. Topics will include hypothesis testing, contingency tables, rank tests, and goodness-of-fit tests. Prerequisite: Junior or senior level statistics course.
- 505-3 Probability and Statistics. (3-0)** Topics will be selected from: distributions and stochastic processes, parametric and nonparametric statistics, and time series analysis. Prerequisite: MATH 311.
- 506-3 Dynamical Systems. (3-0)** Advanced study of dynamical systems. Topics will be selected from discrete and continuous dynamical systems, sensitivity analysis, models of the physical, life, and social sciences, and bifurcation analysis. Prerequisite: MATH 306 and 332.
- 508-3 Abstract Algebra. (3-0)** Topics will be selected from: groups, homomorphism, isomorphism, direct products and sums, invariant properties, rings, and fields. Prerequisite: MATH 307.
- 509-3 Complex Variables. (3-0)** An introduction to complex analysis. Topics will be selected from elementary operations and analytic functions, curves and integrals, power series, Cauchy's theorem, zeroes and singularities of analytic functions, Laurent series, maximum principle, analytic continuation, harmonic functions, conformal mapping and transformations. Prerequisite: MATH 209 or approval of department head.
- 511-3 Operations Research. (3-0)** This course examines the theoretical support and applications of the simplex algorithm for linear programming and for dynamic programming. Transportation and scheduling problems are among the applications to be emphasized. Prerequisite: MATH 332.
- 520-3 Real Analysis. (3-0)** Topics will be chosen from: sets and operators; cardinal numbers and ordinal types; metric spaces and Lebesgue measure; metric properties of sets; differentiation and integration. Prerequisite: MATH 409.
- 530-3 Mathematical Modeling. (3-0)** An advanced course in mathematical modeling. Topics will be selected from scaling, dimensional analysis, regular and singular perturbation theory, stability theory, and asymptotic analysis. Prerequisites: MATH 306, 332.
- 540-3 Topology. (3-0)** An introduction to point set topology. Topics will include open and closed sets, interior, closure, boundary, neighborhoods, continuous functions, separation and subspaces. Additional topics will be selected from compactness, connectedness and continua. Prerequisite: MATH 409.
- 550-3 Linear Algebra. (3-0)** An advanced course in linear algebra. Topics to be selected from linear spaces and operators, canonical forms, quadratic forms and optimization, computation and condition, and compatible systems. Prerequisite: MATH 332.
- 560-3 Numerical Analysis. (3-0)** An advanced study of numerical analysis. Topics will be selected from linear systems, approximation theory, numerical differential and integral equations, integration theory. Prerequisite: MATH 360.
- 580-3 Selected Topics in Mathematical Theory. (3-0)** An examination of topics in mathematical theory appropriate for secondary mathematics educators. Topics will be selected from geometry and topology, number theory, modern algebra, and library research in mathematics. This course may be repeated for credit as the topic changes. Prerequisite: Approval of department head.
- 586-v Advanced Special Problems in Mathematics. (Credit variable)** Special problems in mathematics. Work may be either theory or laboratory. May be repeated with approval of the department head for additional credit when

fewer than four credits have been earned. Prerequisite: Approval of department head.

588-3 Thesis. (3-0) Scheduled when the student's committee chair determines the student is ready to begin the thesis. No credit is earned until the student has enrolled in at least 6 credit hours of thesis and the thesis is certified as completed by the student's committee, at which time the student will be awarded 6 credit hours of thesis. Prerequisite: 18 hours of approved graduate credit toward the degree and consent of the student's committee.

590-3 Selected Topics in Mathematics. (3-0) An examination of topics in applied mathematics. Topics for study will be selected from advanced mathematical modeling, advanced numerical techniques, practical optimizations, calculus of variations, dynamic programming, integral equations, optimal control, perturbation methods, and library research in applied mathematics. This course may be repeated for credit as the topic changes. Prerequisite: Approval of department head.

MATHEMATICS EDUCATION (MAED)

510-3 Topics in Secondary Mathematics. (3-0) This course applies the standards of the National Council of Teachers of Mathematics to the curriculum of secondary mathematics. It explores techniques to implement the standards through the use of manipulatives, graphing calculators, and computer technology. Prerequisite: 12 semester hours MATH or approval of department head. Course fee \$15.

520-3 Teaching and Learning Geometry. (3-0) This course focuses on important geometric concepts of Euclidean and non-Euclidean geometry. The course activities highlight the importance of building conceptual understanding for students while incorporating concrete models and appropriate technology. Prerequisite: 3 hours of undergraduate geometry. Course fee \$15.

530-3 Teaching and Learning Precalculus. (3-0) This course is designed to extend teachers' understanding of the foundational concepts developed in precalculus. The course begins by developing foundations for functions and exploring functions as a unifying theme. These concepts include foundations of functions, transformations, exponential and logarithmic functions, and power functions and polynomials. Matrices, linear programming, quadratic and square root functions, rational functions, and conic sections will also be developed. Prerequisite: MATH 120 or equivalent. Course fee \$15.

540-3 Statistical Reasoning. (3-0) This course focuses on the mathematical foundations of statistical reasoning and sound decision making. Teachers engage in activities and discussions that strengthen their own content knowledge in probability and statistics, enabling them to provide their students with a depth of understanding. The course activities incorporate technology and real-world applications. Prerequisite: 3 hours of undergraduate statistics. Course fee \$15.

550-3 In-depth Secondary Mathematics. (3-0) In this course, teachers study and reflect on the depth and richness of actual concepts and problems of high school mathematics courses. Ideas from algebra, geometry, and trigonometry are integrated in the analysis of a small number of particular problem situations to show what it means to treat them in a deep and general way. The focus will be on mathematical content of algebra, geometry, and functions as well as mathematical habits of mind. Prerequisite: MAED 530 or permission of the instructor. Course fee \$15.

- 560-3 Instructional Technology. (3-0)** The technological resources available to mathematics educators and the implementation of these resources will be studied. The technological resources to be discussed may include graphing calculators, data collection devices, computer software packages, and internet resources. This course may be repeated for credit as the topic changes. Course fee \$15.
- 570-3 Trends and Issues in Mathematics Education. (3-0)** In this seminar-style course, students have a forum for discussion and presentation of inquiries into the history, current trends, and issues pertaining to analysis of research trends in mathematics education and its effect on policy, curriculum, and the teaching and learning of mathematics. Course fee \$15.

MEDICAL LABORATORY TECHNICIAN (MLT)

- 214-2 Introduction to Urinalysis. (1-5)** An introduction to urinalysis and body fluid analysis, including the anatomy and physiology of the kidney, and physical, chemical and microscopic examination of urine, cerebrospinal fluid, and other body fluids. Lab fee \$15.
- 224-4 Introduction to Hematology. (2-6)** Introduction to the theory and practical application of routine procedures, both manual and automated. Red blood cell and white blood cell physiology, morphology (normal and abnormal), maturation sequences and associated diseases are included. Lab fee \$15.
- 228-2 Coagulation. (2-2)** A course in coagulation theory, procedures, and practical applications. Includes laboratory exercises which rely on commonly performed manual and semi-automated methods.
- 234-5 Introduction of Medical Microbiology. (4-5)** Instruction in the theory, practical application and pathogenesis of clinical microbiology, including specimen collection, processing, identification, susceptibility testing and reporting procedures. Lab fee \$15.
- 244-4 Introduction to Immunohematology. (2-8)** A study of blood group antigens and antibodies. Performance of routine blood banking procedures, including blood group and Rh typing, antibody screens, antibody identification, cross matching, elution and absorption techniques. Lab fee \$15.
- 264-3 Introduction to Immunology-Serology. (2-4)** An introduction to the theory and application of basic immunology, including the immune response, principles of antigen-antibody reactions, and principles and techniques of serologic procedures. Lab fee \$15.
- 274-4 Laboratory Operations. (2-7)** An intermediate course in the clinical laboratory sciences that includes the principles of laboratory instrumentation and automation, quality control concepts, point of care testing and phlebotomy. Supervised laboratory experiences in instrument operation, calibration and maintenance, and point of care testing and phlebotomy. Lab fee \$15.
- 276-5 Introduction to Clinical Chemistry. (3-8)** An introduction to the principles and procedures of various tests performed in clinical chemistry. Presents the physiological basis for the test, the principle and procedure for the test and the clinical significance of the test results including quality control and normal values. Also includes basic chemical laboratory techniques and safety for electrolytes, acid-base balance, proteins, carbohydrates, lipids, enzymes, metabolites, endocrine function, therapeutic drug monitoring, and toxicology. Lab fee \$15.

- 282-1 Introductory Skills for Medical Laboratory Science. (1-1)** An introductory course in the medical laboratory sciences program that includes basic laboratory safety practices, computer applications, lab mathematics, quality control and basic laboratory equipment. This course must be taken during the first semester of enrollment on the MLT and HT certification programs. Course fee \$25.
- 285-2 Advanced Topics and Capstone Review. (2-0)** This course examines the integration of all areas/concepts of the laboratory and correlates laboratory test data with diagnostic applications and pathophysiology using critical thinking skills. This course includes a capstone examination and may only be taken during the last semester of the MLT/HT programs.
- 292-2 MLT Field Practicum IV. (0-14)** Structured, supervised work-based instruction that helps students gain practical experience in the clinical laboratory. Opportunities are centered in the rural health setting. Course must be taken in the last semester of the MLT program. Grading in this course is satisfactory/unsatisfactory, S/U. Field experience fee \$75.
- 293-1 MLT Field Practicum III. (0-7)** Structured supervised work-based instruction that helps students gain practical experience, enhance skills and integrate knowledge in microbiology and urinalysis. Grading in this course is satisfactory/unsatisfactory, S/U. Field experience fee \$75.
- 294-1 MLT Field Practicum I. (0-7)** Structured supervised work-based instruction that helps students gain practical experience, enhance skills and integrate knowledge in blood bank, serology and automation. Grading in this course is satisfactory/unsatisfactory, S/U. Field experience fee \$75.
- 295-1 MLT Field Practicum II. (0-7)** Structured supervised work-based instruction that helps students gain practical experience, enhance skills and integrate knowledge in chemistry and hematology. Grading in this course is satisfactory/unsatisfactory, S/U. Field experience fee \$75.

MILITARY SCIENCE (M S)

- 101-2 Foundations of Leadership. (2-2)** The purpose of this course is to introduce issues and competencies that are central to a commissioned officer's responsibilities. These initial lessons establish a framework for understanding officership, leadership, and Army values. Additionally, the course addresses "life skills" including fitness and time management. This course is designed to provide accurate insights into the army profession and the officer's role within the Army.
- 102-2 Basic Leadership. (2-2)** This course expands upon the fundamentals introduced in the previous course by focusing on communications, leadership, and problem solving. "Life skills" lessons include: problem solving, goal setting, and interpersonal communication skills. The course also provides current information about life in the Army, the organizations of the Army, employment benefits, and work experiences expected of junior officers.
- 201-3 Individual Leadership Studies. (3-2)** The first semester of the M S II year is designed to develop cadet's knowledge of self, self-confidence, and individual leadership skills. Through experiential learning activities, cadets develop problem solving and critical thinking skills, and apply communication, feedback and conflict resolution skills.
- 202-3 Leadership and Teamwork. (3-2)** The second semester of the M S II year focuses on self development, guided by knowledge of self and group processes. Experiential learning activities are designed to challenge cadets' current beliefs, knowledge and skills. This course also prepares enrolled

students for the ROTC Advanced Course, as well as the summer Leaders Training Course.

Note: Prerequisites for enrollment in advanced courses are determined by the Professor of Military Science.

301-3 Leadership & Problem Solving. (3-2) This course is designed to enable a student with no prior military or cadet experience to quickly learn essential cadet knowledge and skills. The course introduces the principles of physical fitness, healthy lifestyles and the Leader Development Program that will be used to evaluate leadership performance and provides cadets with developmental feedback, used throughout the year. Cadets learn how to plan and conduct individual and small unit training, as well as basic tactical principles. The course conducts a four-week study of reasoning skills and the military-specified application of these skills in the form of the Army's troop leading procedures. The final four weeks examines officership. This course serves as the first and primary course of the ROTC Advanced Courses.

302-3 Leadership and Ethics. (3-2) This course is designed to continue the development of cadets as leaders by presenting instructions in the areas of leadership, interpersonal communications, values and ethics. The leadership module expands on key leadership concepts and provides feedback for cadet leadership self-development efforts. Interpersonal communications lessons address general communication theory as well as written and spoken communication skills. The highlight of the communication module is the opportunity for cadets to present an information briefing and receive feedback from both instructor and fellow students.

401-3 Leadership and Management. (3-2) This course concentrates on Army operations and training management, communications and leadership skills and supports the beginning of the final transition from cadet to lieutenant. The course enables cadets to attain knowledge and proficiency in several critical areas needed to operate effectively as an Army officer. These subjects have the added benefit of preparing cadets to lead the cadet battalion throughout the remainder of the year. At the end of this semester, cadets possess the fundamental skills, attributes, and abilities required to operate as competent leaders in the cadet battalion.

402-3 Officership. (3-2) The final semester course of the M S IV year trains cadets on Military Law, task organizations, maintenance, supply management, and physical training. Cadets conduct a Capstone Practical Exercise, assuming leadership roles as a lieutenant entering a new unit. The course is designed to prepare transition and groom senior cadets to become Army Officers.

486-v Independent Study. (Credit variable) A course open to Military Science students. Topics vary according to student need. May be repeated for a maximum of 6 hours. Open to students of junior or senior classification. Prerequisite: Approval of the department head.

MUSIC (MUSC)

100-1 Marching Band. (1-4) Marching Band membership is open to all students of the University with approval of the director. Activities include half-time performances, pep rallies, parades, and other concerts. Prerequisites: Prior marching band experience in high school or junior college or approval of department head. Credits may substitute for required P ED and may be repeated.

- 115-1 Italian Diction. (1-1)** Italian pronunciation for singers. Lab fee \$10.
- 121-1 Applied Music for Music Minors or Non-Majors. (.5-0)** Course fee \$25. Lab fee \$15.
- 122-1 Applied Music for Music Minors or Non-Majors. (.5-0)** Course fee \$25. Lab fee \$15.
- 125-1 German Diction. (1-1)** German pronunciation for singers. Lab fee \$10.
- 131-1 Applied Music Concentration. (1-0)** Course fee \$50. Lab fee \$30.
- 132-2 Applied Music Concentration. (2-0)** Course fee \$50. Lab fee \$30.
- 147-4 Theory I: Basics of Music. (3-2)** Introduction to music fundamentals, staff, clefs, key signatures, scales, time signatures and notation; meter and rhythm; chords; harmony; melodic organization and structure; use of Musical Instrument Digital Interface (MIDI); aural skills. Computer software used for some written and ear-training assignments. Prerequisite: A passing grade on the placement examinations in theory and aural skills. Course fee \$10. Lab fee \$5.
- 148-4 Theory II: Diatonic Harmony. (3-2)** Part writing of figured bass requiring all diatonic triads and seventh chords; nonharmonic tones and elementary modulation, harmonization of melodies in eighteenth-century style; aural skills. Prerequisite: MUSC 147. Course fee \$10. Lab fee \$5.
- 151-1 Beginning Class Piano I. (3-1.5)** (TCCNS = MUSC 1181) Course fee \$10. Lab fee \$10.
- 152-1 Beginning Class Piano II. (3-1.5)** (TCCNS = MUSC 1182) Course fee \$10. Lab fee \$10.
- 161-1 Intermediate Class Piano I. (3-1.5)** Course fee \$10. Lab fee \$10.
- 162-1 Intermediate Class Piano II. (3-1.5)** Course fee \$10. Lab fee \$10.
- 213-3 Fundamentals of Music. (3-1)** (TCCNS = MUSC 1300) Development of music reading, performance, and listening skills. May be taken by all who desire to develop basic music skills. Course fee \$10. Lab fee \$10.
- 221-1 Applied Music for Minors or Non-Majors. (.5-1.5)** Course fee \$25. Lab fee \$15.
- 222-1 Applied Music for Minors or Non-Majors. (.5-1.5)** Course fee \$25. Lab fee \$15.
- 226-2 String Class. (2-1)** Beginning string class for music majors; maintenance of instruments; evaluation of materials and literature. Students develop a basic performance technique on two instruments. Lab fee \$10.
- 227-2 Woodwind Class. (2-1)** Instruction on basic woodwind instruments for music majors; maintenance of instruments; evaluation of materials and literature. Students develop a basic technique on two instruments. Lab fee \$10.
- 228-2 Brass Class. (2-1)** Performance instruction on basic brass instruments for music majors; maintenance of instruments; evaluation of materials and literature. Students develop a basic technique on two instruments. Lab fee \$10.
- 229-1 Percussion Class. (1-2)** Fundamental performance techniques on the most frequently used percussion instruments, both of definite and indefinite pitch; conventions of notation, instrument maintenance, evaluation of materials, and literature. For music majors. Lab fee \$10.
- 231-2 Applied Music for Majors. (1-3)** Course fee \$50. Lab fee \$30.
- 232-2 Applied Music for Majors. (1-3)** Course fee \$50. Lab fee \$30.
- 235-1 French Diction (1-1)** French pronunciation for singers. Lab fee \$10.
- 247-4 Theory III: Counterpoint. (3-2)** Practice in contrapuntal composition in eighteenth-century tonal styles. A review of Musical Instrument Digital Interface (MIDI) systems will be presented early in the semester. Computer

software will be used for some written and ear-training assignments.
Prerequisites: MUSC 147, 148. Course fee \$10. Lab fee \$5.

- 248-4 Theory IV: Chromatic Harmony. (3-2)** Part writing of figured bass exercises and melody harmonizations requiring altered chords, 9th, 11th, and 13th chords; remote modulations, study of sonata, rondo, variation and other nineteenth-century forms; aural skills. Introduction to analysis of tonal music according to the theory of structural levels. Prerequisites: MUSC 147, 148, 247. Course fee \$10. Lab fee \$5.
- 311-2 Conducting I. (2-1)** Introduction of conducting techniques, rehearsal procedures, development of interpretive skills in music. Prerequisite: Completion of all first- and second-year music courses or approval of department head. Lab fee \$5.
- 312-2 Conducting II. (2-1)** Special emphasis on instrumental and choral conducting techniques. Prerequisite: MUSC 311 or approval of the department head. Lab fee \$5.
- 313-3 Music Appreciation. (3-0)** This course provides opportunities to become familiar with the basic elements of music. Emphasis is on learning to listen to music and on the role it plays within the wider contexts of history and society. Listening materials are drawn from a variety of sources: classical music, non-Western music, American popular music (particularly jazz, country, and rock), and the American folk tradition. Course fee \$10. Lab fee \$5.
- 315-3 Developmental Musical Experiences. (3-0)** Study and appraisal of music teaching techniques, elementary music literature, learning activities, curricular plans and materials essential to the sequential development of musical learning in the elementary school. Designed to provide knowledge of psychology, theory and practice of music education in the elementary schools. Emphasis is placed upon the nature, organization and maintenance of the elementary music program. Prerequisite: junior or senior-level status.
- 316-3 Performance Practices of Ensembles. (3-0)** Development of effective management and discipline procedures, audition process, professional development, administration of a music program, student and ensemble assessment, and public performance practices of musical ensembles. Functional knowledge of voice, wind, string, and percussion instruments is emphasized.
- 321-1 Applied Music for Minors or Non-Majors. (.5-1.5)** Course fee \$25. Lab fee \$15.
- 322-1 Applied Music for Minors or Non-Majors. (.5-1.5)** Course fee \$25. Lab fee \$15.
- 324-3 Popular Music in America. (3-0)** An introductory study of popular music in the U.S., emphasizing development and application of analytic skills oriented toward the popular arts. Concert attendance and listening requirements. Course fee \$10. Lab fee \$5.
- 325-3 Jazz History. (3-0)** An in-depth study of the recordings, history, major figures, musical forms and social importance of an original American art form. Principal styles to be covered include ragtime, blues, Dixieland, big band swing, bop, cool, hard bop, free, fusion and funk. This course fulfills the core visual and performing arts requirement.
- 326-3 History of Music I. (3-0)** Study of history, social setting, and style of Western art music from Greek antiquity to the end of the Renaissance period. MUSC 247 or approval of department head.

- 327-3 History of Music II. (3-0)** Study of the history, social setting and style of Western art music in the Baroque and Classical periods. Prerequisite: MUSC 326 or approval of department head.
- 328-3 History of Music III. (3-0)** Study of the history, social setting and style of Western art music during the Romantic and 20th century periods. Prerequisite: MUSC 327 or approval of department head.
- 329-2 World Music. (2-0)** Historical and analytical survey of the great variety of musical styles from around the world. Music cultures of sub-Saharan Africa, India, indigenous America, and Japan are among those explored. Emphasizes the complex interrelationships of music to culture, society, and daily life. MUSC 247 or approval of the department head.
- 331-2 Applied Music for Majors. (1-3)** Course fee \$50. Lab fee \$30.
- 332-2 Applied Music for Majors. (1-3)** Course fee \$50. Lab fee \$30.
- 335-3 Choral Techniques. (3-0)** Choral techniques, materials and rationale for the development of superior choral ensembles to include: budgeting, acoustical considerations, music selection criteria, historical development of choral music and style, programming, public relations, sight reading, and development of a philosophy of music.
- 345-2 Class Composition. (2-1)** Advanced instruction in composition; the writing and study of small- and larger-form musical compositions employing contemporary styles and techniques. May be taken 2 times for credit. Prerequisites: MUSC 248 or approval of instructor. Lab fee \$5.
- 349-3 Twentieth Century Theory. (2-1)** A study of scales, chords, key centers, set-theory, polytonality, sound mass, electronic and computer techniques in analysis and writing. Course fee \$10. Lab fee \$5.
- 411-2 Piano Literature. (2-0)** This course will encompass the study of piano literature from the Renaissance period to present day with emphasis given to the Classical, Romantic, and Contemporary eras. Genres include sonata, suite, concerto, and chamber works with piano of varying cultures. Prerequisites: Must be at the junior level of applied piano lessons or have consent of the instructor.
- 412-2 Vocal Literature. (2-0)** This course will encompass the study of solo vocal literature from the Renaissance period to present day. Emphasis will be given to the development of German and French art song in Europe. Prerequisite: Junior level in applied voice or consent of instructor.
- 421-1 Applied Lessons for Music Minors or Non-Majors. (.5-1.5)** Course fee \$25. Lab fee \$15.
- 422-1 Applied Music for Minors or Non-Majors. (.5-1.5)** Course fee \$25. Lab fee \$15.
- 431-2 Applied Music for Majors. (1-3)** Course fee \$50. Lab fee \$30.
- 432-2 Applied Lessons for Majors. (1-3)** Course fee \$50. Lab fee \$30.
- 433-1 Capstone Course in Music. (1-12)** The capstone experience is the culmination of undergraduate music study and provides students with an opportunity to make their personal statement of preparedness for a post-college life with music. Projects may include a 50-minute solo recital, a lecture-recital, or an undergraduate thesis or research paper. In conjunction with the student's advisor, study abroad and other formats may be acceptable. Prerequisites: Senior standing. Music majors seeking education certification must take this course before the semester in which they are student teaching. Lab fee \$10.
- 442-2 Band Techniques. (2-1)** Introduction and materials of band techniques to include drill design and the development of the marching ensemble; the organization, administration, programming, repertoire, band literature,

budgeting, and historical development of the modern concert wind ensemble; the development of a functional philosophy of music. Prerequisites: Two semesters MUSC 100 or approval of department head.

- 444-2 Pedagogy in Applied Music. (2-0)** Techniques of instruction in student's major instrument or voice.
- 448-2 Scoring and Arranging for Ensembles. (2-0)** A practical study of the skill of scoring music for various instrumental and choral groups. Projects in adapting music from a variety of sources. Emphasis is placed on transcribing and arranging for elementary, junior, and senior high ensembles. Prerequisite: MUSC 248 or approval of department head.
- 451-2 Piano Pedagogy. (2-0)** This course will encompass the study of piano pedagogy from beginner level through intermediate and advanced level piano study, including present and past techniques of piano instruction. Prerequisites: Must be at the junior level of applied piano lessons or have consent of the instructor.
- 453-2 Instrumental Pedagogy (2-1)** This course will focus on the study of instrumental pedagogy, from beginner level through advanced study, used primarily in one-on-one instruction in the studio. Lab fee \$10.
- 486-v Music Problems. (Credit variable)** A directed study of selected problems in music.
- 540-3 Foundations of Music Education. (3-0)** An investigation of historical and philosophical principles that provide the context for contemporary music education. The course focuses on developing a vision of music education for the future. Topics include philosophical principles of music education, psychological theories relevant to music teaching, and practical application of these principles through the National Standards for Music. Prerequisites: Admission to the graduate program.

NURSING (NUR)

- 120-4 Survey of Nursing Science (3-3)** Provides an introduction to nursing as a scientific discipline with its own unique body of knowledge. Contemporary health care and professional nursing practice are examined from historical, legal, and ethical perspectives. Gives pre-nursing students an introduction to program concepts, the professional role, and an opportunity for client interaction. Prerequisites: BIOL 219, CHEM 103 or 105, ENGL 111, MATH 107, and PSY 101. Lab fee \$10.
- 201-6 Foundations of Nursing Practice. (3-9)** Establishes the nursing process as a systematic approach to provide care for clients experiencing alterations in health. Focuses on safe performance and understanding of direct care activities and diagnostic procedures. A human needs perspective is used. Basic assessment and data analysis, effective communication, and critical thinking skills receive special attention. Clinical experiences are conducted in the skills lab, hospitals, and extended care settings. Prerequisites: Admission to the Nursing Program, BIOL 220, ENGL 112, H S 210, and HLTH 101. Pre- or corequisites: PSY 201 and BIOL 203. Lab fee \$10.
- 205-4 Clinical Pharmacology and Pathophysiology. (3-3)** Emphasizes concepts relevant to various adaptive and disease processes that alter human functioning. The effects of pharmacotherapeutic agents on these processes and the effect of these processes on medication metabolism are highlighted. Clinical experiences will include interpretation and integration of selected laboratory findings. Prerequisite: NUR 120. Pre-or corequisite: NUR 201. Lab fee \$10.