

HEBREW COURSES

The foreign language courses under this heading are offered on the campus of Rhodes College under the instruction of Rhodes faculty. See the Dean of School of Arts concerning these classes.

HEBR 101-102. BIBLICAL HEBREW.

Introduction to the grammar and vocabulary of the Hebrew Bible/Christian Old Testament. By the end of a year's study, students should be able to read much of the prose material of the Bible. Offered in sequence in Fall and Spring. *Two semesters; six credits*

HEBR 201. INTERMEDIATE HEBREW.

Readings in biblical Hebrew prose emphasizing grammar, vocabulary, syntax, and translation. Prerequisite: Hebrew 102 or the equivalent. Offered in Fall. *One semester; three credits*

HISTORY COURSES

Requirements for the degree are found on Page 51.

HIST 103. WESTERN CIVILIZATION TO 1660

A survey of western civilization from the ancient Middle East to the early modern era. *One semester; three credits*

HIST 104. WESTERN CIVILIZATION SINCE 1660

A survey of western civilization from the early modern era to the present. *One semester; three credits*

HIST 107. HISTORY OF NON-WESTERN CIVILIZATIONS TO 1500

An introduction to the political, economic, social, and cultural histories of Asia, the Middle East, Africa, and pre-Columbian Central and South America to 1500. *One semester; three credits*

HIST 108. HISTORY OF NON-WESTERN CIVILIZATION SINCE 1500

An introduction to the political, economic, social, and cultural histories of Asia, the Middle East, and Africa since 1500. *One semester; three credits*

HIST 151. AMERICAN SOCIETY TO 1877

Colonial America; the Revolution; Confederation and Constitution; Ante-Bellum Period; the Civil War and Reconstruction. *One semester; three credits*

HIST 152. AMERICAN SOCIETY SINCE 1877

Post-Civil War Industrialization and Reform; the Progressive Era; World War I; the Depression and the New Deal; World War II; the Cold War; Recent Developments. *One semester; three credits*

HIST 200-210. TOPICS IN HISTORY

Topics vary with instructor. Prerequisite: History majors and minors must receive the permission of the department chair and are permitted a maximum of 3 credit hours in this 200 level topics area. *One semester; three credits*

UPPER DIVISION COURSES ARE OPEN TO STUDENTS WHO HAVE MET SPECIFIC COURSE PREREQUISITES.

HIST 301. ANCIENT CIVILIZATION

A study of the origins of civilizations in the Near East and the Mediterranean area: Mesopotamia, Egypt, Israel, Persia, Greece, Rome. Prerequisite: HIST 103 or Permission of the instructor. *One semester; three credits*

HIST 305. THE MIDDLE AGES

A political, economic, social, and intellectual history of medieval western civilization. Among other things, the course will cover topics such as the transition from Roman to Medieval civilization, monasticism, feudal society, the religious and intellectual revival of the High Middle Ages, the Papal Monarchy and the Crusades, the Black Death and the transition from Medieval to early modern European civilization. Prerequisite: HIST 103 or Permission of the instructor. *One semester; three credits*

HIST 337. EUROPE AND THE TWO WORLD WARS

An examination of the First and Second World Wars and the inter-war period. The course will feature detailed discussions of strategy, military personalities, decisive battles and other important military developments. The political background and diplomacy will also be discussed. Prerequisite: HIST 104 or Permission of the instructor. *One semester; three credits*

HIST 338. RUSSIA SINCE 1861

A study of the political, economic, social, and intellectual history of 19th Century Imperial Russia, the Soviet Union, and Post-Soviet Russia. Prerequisite: HIST 104 or Permission of the instructor. *One semester; three credits*

HIST 339. GERMANY SINCE 1871

A study of the political, economic, social, and intellectual history of Germany from the Franco-Prussian War to the present. Prerequisite: HIST 104 or Permission of the instructor. *One semester; three credits*

HIST 340. NAZI GERMANY

An examination of Hitler's ideology and life, the tumultuous end of the Weimar Republic, the emergence of the Nazi party, the Nazi take-over of power, German society during the Third Reich, Germany during the Second World War, the murder of the Jews, and the Nazi legacy for postwar Germany. Prerequisite: HIST 104 or Permission of the instructor. (Same as POLS 340) *One semester; three credits*

HIST 342. COLONIAL AMERICA

A study of primarily British North America from settlement to 1763 with some discussion of Spanish, French and Indian cultures. Prerequisite: HIST 151 or Permission of the instructor. *One semester; three credits*

HIST 343. THE AMERICAN REVOLUTION AND EARLY NATIONAL PERIOD

A study of the origins, causes, and results of the American Revolution; the Confederation Period; the Constitutional Convention; the early years of the new nation; emphasis on the emergence of political parties and the Jefferson Presidency. Prerequisite: HIST 151 or Permission of the instructor. *One semester; three credits*

HIST 345. THE ANTEBELLUM SOUTH

The study of social, cultural, economic, and political developments in the antebellum South. Prerequisite: HIST 151 or Permission of the instructor. *One semester; three credits*

HIST 346. THE CIVIL WAR AND RECONSTRUCTION

An examination of the causes of the Civil War; a comparison of the Union and the Confederacy; military phases of the War; emphasis on Lincoln and Davis; aftermath of the Civil War

and the role of the Radical Republicans. Prerequisite: HIST 151 or Permission of the instructor. *One semester; three credits*

HIST 347. EMERGENCE OF MODERN AMERICA

A political, economic, social, and diplomatic history of America from the end of Reconstruction to the 1920s. Prerequisite: HIST 152 or Permission of the instructor. *One semester; three credits*

HIST 348. MODERN AMERICA

A political, economic, social, and diplomatic history of America from the 1920's to 1980. Prerequisite: HIST 152 or Permission of the instructor. *One semester; three credits*

HIST 349. THE SOUTH SINCE RECONSTRUCTION

A survey of the political, economic, social, and cultural history of the eleven former Confederate states since 1877. Prerequisite: HIST 152 or Permission of the instructor. *One semester; three credits*

HIST 350. HONORS AFRICAN-AMERICAN HISTORY

Social, cultural, economic, and political role of African-Americans in the United States from 1619 to the present. Prerequisite: HIST 151, 152, Membership in Honors Program or Permission of the instructor. *One semester; three credits*

HIST 360. AMERICAN POLITICAL THOUGHT

(Same as POLS 360) Prerequisite: HIST 151 or POLS 112 or Permission of instructor. Offered in the Fall semester. *One semester; three credits*

HIST 361. AMERICAN CULTURE

From 1860 to the present, a study of American thought, literature, education, the arts and amusements, including the influence of the film industry. Prerequisite: HIST 152 or permission of the instructor. *One semester; three credits*

HIST 376. HOLOCAUST AND GENOCIDE

A study of the origins and causes of the deep-rooted anti-Semitism which erupted in the years 1933-1945 in an attempt to destroy the Jewish people. The course will also explore the lessons of the Holocaust for our times. Prerequisite: HIST 104 or Permission of the instructor. *One semester; three credits*

HIST 385-389. SPECIAL TOPICS IN NON-WESTERN HISTORY

Topics vary with instructor. Prerequisite: Permission of the instructor. *One semester; three credits*

HIST 390-399. HONORS SPECIAL TOPICS

Special topics in history open to members of the Honors Program or by permission of instructor. *One semester; one to four credits*

HIST 401-402. INTERNSHIP

Content varies with specific internship program. Prerequisites: Permission of History Internship Director and Junior standing. *One semester each; one to three credits each*

HIST 490-497. TOPICS IN HISTORY

Topics vary with instructor. Prerequisite: Permission of instructor. *One semester; three credits*

HIST 498. HISTORY SEMINAR

Topics vary with instructors and may include historiography, philosophies of history, research methods and projects, readings, comprehensive tests, or other appropriate material. All history majors are required to pass this course with a minimum grade of "C." Prerequisite: Senior standing. Offered in the Fall semester. *One semester; three credits*

HUMANITIES COURSES**HUM 150. PERSPECTIVES ON PUBLIC LIFE**

This course will examine what it has meant throughout history and in different cultures to be a member of a society. Students will learn about and critically analyze the role of the individual in civil society from depictions in history, literature, religion, philosophy, and the fine arts. A key aim of the course is to provide students with essential insight into the opportunities and justification for lives of community involvement. Offered in the Fall and Spring. *One semester; three credits*

HUM 160. HONORS PERSPECTIVES ON PUBLIC LIFE

This honors seminar will examine what it has meant throughout history and in different cultures to be a member of society. The primary focus will be on the role of the individual in civil society as depicted in history, literature, religion, philosophy, and the fine arts. Students will be required to complete a service learning project and follow-up paper/class presentation in which opportunities and justifications for lives of community involvement are explored. Prerequisite: Membership in the Honors Program. *One semester; three credits*

HUM 254. CHRISTIANITY AND PEACE (Formerly HUM 354)

(Same as RS 254) *One semester; three credits*

HUM 256. RELIGION AND NON-VIOLENT SOCIAL CHANGE (Formerly HUM 356)

(Same as RS 256) *One semester; three credits*

HUM 295, 395. COMMUNITY SERVICE

A structured opportunity for students to select and participate in a community service project in the Memphis area. Includes regular meetings with the faculty advisor, group meetings for reflection and discussion. Normally involves a minimum of 60 hours of service. *One semester; three credits*

HUM 306. COMPUTERS AND SOCIETY

An examination of the social implications of computer technology and of the special social and ethical issues raised by the growing use of computers in all aspects of human life, including business and finance, science, education, government, etc. Among topics considered will be privacy and security, quality of work life, the potentials and problems of computer modeling, information systems and artificial intelligence, and the responsibilities of computer professionals and others for the use of computers. *One semester; three credits*

HUM 498. HONORS INTEGRATIVE SEMINAR

As a required capstone experience, each Honors student will participate in the Honors Integrative Seminar in either the Junior or Senior year. Using an interdisciplinary approach and drawing upon a special topic or theme that can vary from year to year, students will critically reflect upon their academic major and previous Honors courses in the context of broader moral visions and public commitments.

INFORMATION TECHNOLOGY MANAGEMENT COURSES

Requirements for the major are found on Page 78. ITM courses with an asterisk () are "Key ITM Skill Courses," and as such have a final comprehensive exam. A student must get a passing grade to pass the entire course.*

ITM 153. INTRODUCTION TO MICROCOMPUTERS AND BUSINESS APPLICATIONS

This course is intended to provide a working knowledge of microcomputers and their more common applications, including word processing, presentation, spreadsheet, and data base

management software. The integration of these products will also be covered. Offered in the Fall and Spring. *One semester; three credits*

ITM 251. INTRODUCTION TO PROGRAMMING AND ALGORITHMS

The purpose of this course is to introduce the ITM major to the computational environment, algorithms, and elementary programming. Use of CBU computational resources will also be covered including: email, ftp, telnet, and operating system commands (unix, dos, etc.). Topics include an overview of number systems, data representation, data organization, boolean logic, digital circuit design, algorithm discovery and expression using pseudocode and flowcharts, algorithm implementation and efficiency, and programming syntax and constructs (control structures and iteration). The Java language (both command line and IDE implementations) will be used for programming exercises and projects; however, other language features and syntax will also be illustrated. Prerequisite: ITM 153. Offered in the Fall. *One semester; three credits*

ITM 252. COMPUTATIONAL LOGIC

The purpose of this course is to introduce the ITM major to computational logic and discrete math. Topics include data organization (sets, vectors, matrices), graphing applications, computer languages and programming syntax and constructs (functions and arrays), and computation models. The Java language will be used for programming exercises and projects. Prerequisite: ITM 251. Offered in the Spring. *One semester; three credits*

ITM 255. C/C++ PROGRAMMING LANGUAGES*

This course introduces the C and C++ languages with a focus on developing solutions to business problems. Topics such as data types, program control flow, structured design, functions, arrays, pointers, strings, standard file I/O, and structures/classes are included. Prerequisites: ITM 251, 252. Offered in the Fall and Spring. *One semester; three credits*

ITM 271. ITM SEMINARS

Through contractual arrangements with companies, government agencies, and/or organizations, the ITM Department of the School of Business will offer courses on selected topics. Students may take up to nine seminars as long as titles and content are clearly distinctive. Credit awarded may be used as free electives hours only. Enrollment is limited and requires permission of the Director of the associated program or Dean of the School of Business. Offered as needed. *One semester; one, two, or three credits*

ITM 280. OPERATING SYSTEMS

This lab-based course examines the design, implementation, philosophy, and structure of modern operating systems. Topics include file structures, memory structures, process control, protection, commands, shells, and usage. Lab exercises involving planning, implementation and configuration of distributed systems are used to reinforce concepts presented. The course compares and examines the design, philosophy, and structure of modern operating systems such as Unix, Linux, Microsoft Windows, IBM's MVS, etc. Prerequisite: ITM 251. Offered as needed. *One semester; three credits*

ITM 291. TELECOMMUNICATIONS I*

This class is the first of a two-part sequence that introduces students to the world of telecommunications. Beginning with an introduction to basic electrical concepts, this course covers the concepts in first three levels of the ISO/OSI model of communications. These concepts include signaling, transmission media characteristics, encoding, interfacing, data-link control and multiplexing. Prerequisites: ITM 153; MATH 105. Offered in the Fall. *One semester; three credits*

ITM 292. TELECOMMUNICATIONS II*

This class builds on ITM 291 and covers the concepts found in the upper four levels of the ISO/OSI model. These include coverage and analysis of protocols and technologies utilized in local and wide area networking. Prerequisite: ITM 291. Offered in the Spring. *One semester; three credits*

ITM 351. SYSTEMS ANALYSIS AND DESIGN*

This course presents methods for analyzing and designing appropriate and defensive solutions to business problems. The course emphasizes the Systems Development Life Cycle (SDLC) methodology. Classical and structured tools are applied to business analysis and problem solving situations with adjustments as required to today's business environment. Included are process flows, data structures, justification and costing techniques, conversion and implementation procedures and the underlying SDLC methodology. A case study is employed to provide a practical "hands-on" approach. Prerequisite: ITM 153. Offered in the Fall. *One semester; three credits*

ITM 352. OBJECT ORIENTED ANALYSIS AND DESIGN

An exploration of current issues related to the use of object oriented analysis and design techniques, tools, and methodologies. Emphasis is placed on the use of object oriented techniques to develop solutions to business problems. Prerequisite: ITM 255. Offered as needed. *One semester; three credits*

ITM 356. ADVANCED C++ PROGRAMMING

An introduction to object oriented programming using the C++ language to solve business problems. This class includes a solid understanding of C pointers and C++ classes and references. Topics such as object oriented analysis and design, member functions, templates, composition, inheritance, and graphical user interfaces will be covered. Prerequisites: ITM 255, 352, or Permission of the instructor. Offered as needed. *One semester; three credits*

ITM 400. INFORMATION TECHNOLOGY MANAGEMENT INTERNSHIP

(Formerly BUS 400) Under the supervision of a faculty member from the appropriate department, students in the School of Business, after receiving the approval of the faculty, are placed in the offices of cooperating firms to receive on-the-job training under the supervision of members of the firm. Credit is granted upon acceptance of periodic reports and a final summary report of work done verified by the authorized supervisor and the instructor. Prerequisites: ITM 251, 252, 291, and 351. Offered as needed. *Pass/Fail Grading. One semester; three credits*

ITM 451. DATA BASE DESIGN*

The course presents database design and management and emphasizes the relational model and Structured Query Language. Topics include database models, query languages, query optimization, database implementation, distributed processing, and security. Prerequisites: ITM 153, 251 or Permission of the instructor. Offered in the Fall semester. *One semester; three credits*

ITM 455. INFORMATION SYSTEMS MANAGEMENT

This course is designed to explore and put to practical use the entire body of knowledge gained in previous ITM courses. Topics will principally focus upon the managerial aspects of effective information technology deployment. Case studies will be utilized to challenge students to understand the management of technology coupled with technology skills necessary to recommend effective technology solutions. Class discussion and preparation of "position statements" on technology issues will be a main focus of the course. A final project will test student's ability to apply technology and business skills to develop a workable, manageable,

and effective information systems solution. Prerequisites: ITM 251, 292, 351. Prerequisite or corequisite: ITM 451. Offered in the Spring semester. *One semester; three credits*

ITM 456. JAVA PROGRAMMING

In this course, students will learn the Java programming language and the class libraries (packages) supporting same. Both Java Applets, Applications, and Servlets will be covered. Students will complete business projects in the areas of Graphical User Interfaces, Internet Networking, and Database interconnection. Prerequisites: ITM 251, 252. Offered as needed. *One semester; three credits*

ITM 457 SPECIAL TOPICS IN ITM

Course designed to permit intensive study into topics of special interest and timeliness in the area of Information Technology Management. Prerequisites depend upon topics and approval of instructor. Offered as needed. *One semester; three credits*

ITM 458. VISUAL BASIC AND NET PROGRAMMING

This course introduces students to Visual Basic programming and its applications in the business world. The students will be introduced to the Visual Basic Integrated Development Environment (IDE) and its development tools. Visual Basic programming fundamentals such as working with variables and subroutines, procedures and functions, number and string manipulation, and control structures will be covered. Through projects and hands-on exercises, students will learn to design and develop visual interfaces for data storage management and data processing. Prerequisites: ITM 251, 252. Offered as needed. *One semester; three credits*

ITM 460-466. SPECIAL TOPICS IN INFORMATION TECHNOLOGY MANAGEMENT

Courses are designed to permit intensive study into topics of special interest and timeliness in the area of information technology management. Offered as needed. *One semester; three credits*

ITM 470. INTERNET PROGRAMMING

This course familiarizes students with the total Internet programming environment, teaches students the basics of key Internet programming technologies (HTML, JavaScript, Dynamic HTML, CSS, CGI, PHP, Servlets/JSP, and XML), and trains students in the application and usage of key Internet programming tools. Upon completion of this course, students will be able to create and maintain modern advanced dynamic web sites. Prerequisites: ITM 251, 252. Offered as needed. *One semester; three credits*

ITM 480. DECISION SUPPORT (Formerly ITM 380)

This course provides an examination of the role of technology and information systems in the business decision making process. The focus will be on decision support systems and will provide introductions to important modern decision-aiding tools and approaches including network analysis, linear and non-linear programming, optimization, simulation, groupware, artificial intelligence (expert systems, neural networks, genetic programming), pattern recognition, executive information systems, data warehousing, and data mining. Prerequisites are ITM 153, 451. Offered as needed. *One semester; three credits*

ITM 492. COMMUNICATION NETWORKS

This course is designed to cover current technologies, wired and wireless, used in network systems to handle voice, data and image transmission. Emphasis is placed on the design, implementation, and management of wide area networks (WANs) as well as local area (LANs) from a software and hardware perspective. Prerequisite: ITM 292. Offered as needed. *One semester; three credits*

LATIN COURSES

The foreign language courses under this heading are offered on the campus of Rhodes College under the instruction of Rhodes faculty. See the Dean of School of Arts concerning these classes.

LATN 101-102. ELEMENTARY LATIN.

An introduction to the fundamentals of the Latin language. Although the primary goal of the elementary sequence of courses through Latin 201 is to prepare students to use Latin documents in a wide variety of academic contexts, students will develop all four language skills: reading, writing, listening, and speaking. Offered in sequence in Fall and Spring. *Two semesters; eight credits*

LATN 201. INTERMEDIATE LATIN.

The final course in the elementary language sequence. To prepare students for the advanced reading courses, the course will emphasize reading and discussing documents primarily from the late republic and Augustan Age. In addition to developing their reading comprehension, students will continue to work on their aural-oral proficiency. Prerequisite: Latin 102 or the equivalent. Offered in Fall. *One semester; four credits*

LATN 210-219. READING COMPONENT IN LATIN.

Readings from classic texts of literature, history, culture, biography, or religion. Prerequisite: Latin 201 or the equivalent. Offered in Fall or Spring. *One semester; one to three credits*

MANAGEMENT COURSES

Requirements for the degree are found on Page 79.

MGMT 300. INTERNATIONAL BUSINESS & CULTURAL EXPERIENCE

This course introduces students to the business, political, economic, and cultural environments of a selected country. Experiential study, classroom lectures, and activities including site visits, guest lectures, and cultural experiences are integrated to develop a comprehensive understanding of the country selected. The course content includes a visit to the country selected for study. Open to all students with approval from the Dean of the School of Business. Students must have a valid passport. Course may be repeated for different countries. (Same as MKTG 300) *One semester; three credits*

MGMT 337. PRINCIPLES OF ORGANIZATION AND MANAGEMENT

An examination of the management functions and the basic concepts and principles of management. Major topics include the history of management, planning and decision making, organizational structure and design issues, leadership theory, and control. Social, legal and ethical principles and an international perspective are also developed. Offered in the Fall and Spring. *One semester; three credits*

MGMT 338. HONORS PRINCIPLES OF ORGANIZATION AND MANAGEMENT

An examination of the management functions and the basic concepts and principles of management. Major topics include the history of management, planning and decision making, organizational structure and design issues, leadership theory, and control. Social, legal, and ethical principles and international perspective are also developed. Prerequisite: Membership in the Honors Program. Offered in the Fall semester. *One semester; three credits*

MGMT 339. OPERATIONS MANAGEMENT

An in-depth look at the production/operations functions of organizations. Topics will include product and process strategies, quality programs, location and layout strategies, inventory

control techniques, and a comparison of the operational strategies used by both manufacturing and service organizations. The course will integrate quantitative modeling with business problem solving. Prerequisites: STAT 222 and MGMT 337. Offered in the Fall semester. *One semester; three credits*

MGMT 352. ORGANIZATIONAL BEHAVIOR

The psychology of organizations and their effect on individuals and groups. Topics include motivation theory, power and authority, communication, teamwork, leadership, job design and organizational structures. Other issues include globalization, cultural diversity, ethics and technology. Prerequisite: MGMT 337. (Same as PSYC 352) Offered in the Spring semester. *One semester; three credits*

MGMT 400. MANAGEMENT INTERNSHIP (Formerly BUS 400)

Under the supervision of a faculty member from the appropriate department, students in the School of Business, after receiving the approval of the faculty, are placed in the offices of cooperating firms to receive on-the-job training under the supervision of members of the firm. Credit is granted upon acceptance of periodic reports and a final summary report of work done verified by the authorized supervisor and the instructor. Offered in the Fall and Spring. *Pass/Fail Grading. One semester; three credits*

MGMT 404, 405, 406, 407. NETWORKING FOR PROFESSIONAL DEVELOPMENT

These courses are aimed at providing information about area firms, their products, organization, management philosophies and employment opportunities. Each month during the semester, an area firm is invited to the campus for Partners Appreciation Day. Students will have the opportunity to hear the chairman, president, or CEO of major firms in the Memphis area. In addition, the students would have contact with other representatives of the firm including personnel or human resources directors. Offered in the Fall and Spring. *One semester; one credit*

MGMT 412. HUMAN RESOURCES MANAGEMENT

Personnel administration principles and philosophy. Man as employer and employee. Major topics include recruiting, hiring, training, promotion, health and welfare, and employee safety. In addition, the legal environment surrounding human resource issues will be studied. Prerequisite: MGMT 337. Offered in the Fall semester. *One semester; three credits*

MGMT 420. INTERNATIONAL BUSINESS

An introduction to the field of international business and the implications of international trade and globalization upon American business. Topics include the comparison of political economies and cultures, global trade and investment strategies, foreign investment, regional economic integration, foreign exchange markets, strategic alliances and global marketing. Prerequisite: MGMT 337. Offered in the Spring semester. *One semester; three credits*

MGMT 460-466. SPECIAL TOPICS IN MANAGEMENT

These courses are designed to permit intensive study into topics of special interest and timeliness in the area of Management. Prerequisite: MGMT 337. Offered in the Fall or Spring. *One semester; three credits*

MGMT 490. SEMINAR IN MANAGEMENT

Readings, critical evaluation and analysis of selected topics in current management literature, research and practice. Individual and group analyses and presentations of assigned topics. Major research project to be presented to faculty and senior students. Prerequisites: MGMT 337, MKTG 311, and FIN 327. Offered in the Spring semester. *One semester; three credits*

MGMT 498. BUSINESS POLICY/STRATEGIC PLANNING

This course will consist of a series of lectures and practice exercises in research methods and case analysis. The study of corporate and business level policy and strategy making is developed using a top-management perspective. A research report along with case analysis papers will be prepared by each member of the class. In-class case assignments will be used for discussion and evaluation. Prerequisite: FIN 327, MGMT 337, and MKTG 311. Offered in the Fall and Spring. *One semester; three credits*

MARKETING COURSES

Requirements for the major are found on Page 80.

MKTG 300. INTERNATIONAL BUSINESS & CULTURAL EXPERIENCE

(Same as MGMT 300) *One semester; three credits*

MKTG 311. PRINCIPLES OF MARKETING

Addresses the marketing functions directed toward organizational customers and prospects who buy goods and services necessary for the operation of their own businesses. Concepts of purchasing strategy, material management, and organizational buying behavior are integrated into electronic developments, strategic alliances and partnerships, and just in time. Offered in the Fall and Spring. *One semester; three credits*

MKTG 312. HONORS PRINCIPLES OF MARKETING

Addresses the marketing functions directed toward organizational customers and prospects who buy goods and services necessary for the operation of their own businesses. Concepts of purchasing strategy, material management, and organizational buying behavior are integrated into electronic developments, strategic alliances and partnerships, and just in time. Prerequisite: Membership in the Honors Program. Offered in the Spring semester. *One semester; three credits*

MKTG 324. MARKETING RESEARCH AND INTELLIGENCE

The study of techniques and principles for systematically monitoring environments-collecting, recording, analyzing, and interpreting data that can aid decision makers who are involved with marketing of goods, services, or ideas. The application of intelligence and research findings in the development of marketing strategy is emphasized. The class employs research cases and projects to enhance students' practical research and intelligence skills. Prerequisite: MKTG 311. Offered in the Spring semester. *One semester; three credits*

MKTG 334. MARKET AND CONSUMER BEHAVIOR

This investigation into consumer behavior brings together relevant research and applications from the behavioral sciences and other fields of marketing. The course will evaluate the decision process that individuals use as they obtain and use goods and services. The course will investigate the factors employed to identify and measure market segments. Emphasis is placed on an analysis of consumer behavior as a basis for marketing strategy. Prerequisite: MKTG 311. Offered in the Spring semester. *One semester; three credits*

MKTG 338. SELLING AND SALES MANAGEMENT

This course will provide a detailed investigation of that portion of the Marketing Mix pertaining to promotion with specific emphasis on Personal Selling. While some discussion will be given to sales techniques, the major emphasis will be concerned with the management of the outside sales force and the activities of that sales force. Prerequisite: MKTG 311. Offered in the Spring semester. *One semester; three credits*

MKTG 348. BUSINESS TO BUSINESS MARKETING

Addresses the marketing functions directed toward organizational customers and prospects who buy goods and services necessary for the operation of their own businesses. Concepts of purchasing strategy, material management and organizational buying behavior are integrated into electronic developments, strategic alliances and partnerships, and JIT. Prerequisite: MKTG 311. Offered in the Fall semester. *One semester; three credits*

MKTG 400. MARKETING INTERNSHIP (Formerly BUS 400)

Under the supervision of a faculty member from the appropriate department, students in the School of Business, after receiving the approval of the faculty, are placed in the offices of cooperating firms to receive on-the-job training under the supervision of members of the firm. Credit is granted upon acceptance of periodic reports and a final summary report of work done verified by the authorized supervisor and the instructor. Offered in the Fall and Spring. *Pass/Fail Grading. One semester; three credits*

MKTG 411. MARKETING POLICY AND STRATEGY

This course is aimed at bridging the gap between classroom training and the business/marketing environment. Case studies are developed to address marketing opportunities and problems. A methodology is developed to evaluate marketing situations within a logical and practical framework. This framework is supported by sound marketing theories and concepts. Instruction by the case method requires high participation by students. Emphasis is placed on the development and implementation of marketing strategies to accomplish missions of organizations. Prerequisite: MKTG 311. Offered in the Spring semester. *One semester; three credits*

MKTG 418. PHYSICAL DISTRIBUTION AND TRAFFIC MANAGEMENT

This course offers the basic elements of physical distribution. Topics include inventory management, warehouse location and management, packaging and materials handling, transportation modes and selection, and the interaction of these elements in an integrated physical distribution center. Prerequisite: MKTG 311. Offered in the Fall semester. *One semester; three credits*

MKTG 433. PROMOTIONAL STRATEGY

This course is designed to provide the student with the communication processes used in marketing. The course builds on the base of an understanding of consumer behavior by treating the fields of advertising, sales promotion, personal selling, reseller stimulation, and other communications skills as part of the overall promotional mix. The course develops fundamental considerations as a background to a focus on managerial issues and problems. The various communication methods are treated as variables to communicate the want satisfying attributes of products and services. Prerequisite: MKTG 311. Offered in the Fall semester. *One semester; three credits*

MKTG 440. ENTREPRENEURSHIP

This course provides a foundation for an understanding of the variables and functions in the start-up of new business ventures. More and more businesses are being started, and the opportunities are there for such actions. The development of strategic plans and feasibility studies are essential for successful introduction of new businesses. It includes the study of theory, while developing a practical knowledge of the marketing management system and key concepts for new ventures. This course is designed to enable new enterprises a stronger opportunity to achieve a higher quality of success. Prerequisites: MGMT 337 and MKTG 311. Offered in the Fall semester. *One semester; three credits*

MKTG 460-466. SPECIAL TOPICS IN MARKETING

Courses are designed to permit intensive study into topics of special interest and timeliness in the area of marketing. Prerequisite: MKTG 311. Offered in the Fall or Spring. *One semester; three credits*

MATHEMATICS COURSES

Requirements for the degree are found on Page 104 and 105.

Note: Most Mathematics courses require the use of a graphing calculator.

MATH 101. FUNDAMENTALS OF ALGEBRA

The course is designed to give the student fundamental quantitative and algebraic skills needed in other mathematics and science courses. Topics include: equations and inequalities, linear systems, exponents, factoring, rational expressions, rational exponents, quadratic equations, and functions. The course does not supply any portion of the mathematics credits required in any CBU degree program. You may not receive credit for MATH 101 after completing any mathematics course numbered above 101. Prerequisite: One year of high school algebra. *One semester; three credits*

MATH 105. FINITE MATH (Formerly MATH 112)

This course contains introductory topics in mathematics for students in arts and business. Topics include lines, linear systems, matrices, linear programming, introduction to probability and statistics, financial math. Prerequisites: MATH 101 or Passing a placement exam. Offered in the Fall and Spring. *One semester; three credits*

MATH 106. APPLIED MATH WITH AN INTRODUCTION TO CALCULUS

(Formerly MATH 111) This course contains introductory topics in mathematics for students in arts and business. Topics include: functions; graphs; linear, polynomial, rational, exponential, and logarithmic models; introduction to differential and integral calculus. A student can receive credit for only one of MATH 106 or MATH 131. A student can receive credit for only one of MATH 106 or MATH 108. Prerequisite: MATH 105 or MATH 117. Offered in the Fall and Spring. *One semester; three credits*

MATH 108. MATH MODELING FOR THE LIBERAL ARTS

The course uses models appropriate to arts majors to motivate the study of algebra. Topics include: algebraic expressions; symbol manipulation; linear and quadratic equations; functions; graphs; linear, polynomial, rational, exponential, and logarithmic models. The course stresses interpretation of the mathematical model and its diverse applications. A student may receive credit for only one of MATH 108 or MATH 117. A student may receive credit for only one of MATH 106 or MATH 108. Prerequisite: MATH 105. Offered in the Fall and Spring. *One semester; three credits*

MATH 117. PRECALCULUS

The goals of the course are to teach the student the basic concepts of college algebra, linear equations, quadratic equations, word problems, functions, graphs, exponential and logarithmic functions, right triangle trigonometry, trigonometric functions. The course stresses problem solving by the student with the use of a graphing calculator. Prerequisite: MATH 101 or equivalent. Offered in the Fall and Spring. *One semester; three credits*

MATH 131. CALCULUS I

The goals of the course are to teach the student important concepts of calculus and its applications. Topics include functions, the derivative and its interpretations, the definite integral and its interpretations, the Fundamental Theorem of Calculus, rules of differentiation, applications of the derivative and antiderivatives. Three lectures and one laboratory period per week. Prerequisite: MATH 117. This prerequisite is waived for a student who passes a departmental placement test. Offered in the Fall and Spring. *One semester; three credits*

MATH 132. CALCULUS II

The goals of the course are to teach the student additional important concepts of calculus begun in MATH 131. Topics include integration including parts, partial fractions and use of tables, applications of integration, differential equations and modeling, approximations using Taylor and Fourier polynomials and series. Prerequisite: MATH 131. Offered in the Fall and Spring. *One semester; three credits*

MATH 141. INTRODUCTION TO DISCRETE MATHEMATICS

This course considers a variety of discrete mathematical themes and subjects. These themes include problem solving, abstraction, representation, mathematical reasoning and proof, recursion, induction, modeling and synthesis. Topics include logic, graphs, sets, algorithms and combinatorics. Prerequisite: MATH 106 or 117. Offered in the Spring semester. *One semester; three credits*

MATH 201. APPLIED STATISTICS

The course concerns the use of statistical methodology in planning, presentation, analysis and interpretation of scientific experiments and field observations. Topics are chosen from elements of probability and statistical inference, including estimates of parameters, confidence intervals, tests of hypotheses for quantitative and qualitative observations, correlation, non-parametric methods. Its goal is to allow science majors to analyze real data in a correct statistical manner. Offered in the Fall semester. Prerequisite: MATH 131. *One semester; three credits*

MATH 231. DIFFERENTIAL EQUATIONS

This course is an introduction to the concepts and methods of ordinary differential equations. Topics include: first-order equations, elementary numerical methods, qualitative analysis, second-order homogeneous linear equations, the methods of undetermined coefficients and variation of parameters for nonhomogeneous equations, Laplace transforms, and models in science and engineering. Prerequisite: MATH 132. Offered in the Fall and Spring semesters. *One semester; three credits.*

MATH 232. CALCULUS III

Algebra of vectors in a plane and in space; the calculus of vectors; vector functions; basic concepts of multivariable calculus; partial derivatives; multiple integrals. Prerequisite: MATH 231. Offered in the Fall and Spring. *One semester; three credits*

MATH 301. GEOMETRY AND HISTORY OF MATHEMATICS

The course contains topics in geometry and the history of mathematics. Topics include Euclidean and non-Euclidean geometry, mathematical structures and the historical development of mathematical concepts. Prerequisite: MATH 132. Offered every other year. *One semester; three credits*

MATH 308. STATISTICS

The course considers statistical methods with applications in engineering and science. Topics are selected from an introduction to probability, descriptive statistics, sampling methods, design of statistical experiments, concepts of hypothesis testing and confidence intervals, correlation, linear regression and analysis of variance. Offered in the Spring semester. Prerequisite: MATH 232. *One semester; three credits*

MATH 309. PROBABILITY

The course considers fundamental topics in probability with applications in engineering and science. Topics are selected from: basic concepts in probability, random variables, expectation, variance, covariance, moment generating functions, common distributions such as binomial,

hypergeometric, Poisson, geometric, uniform, normal, exponential, chi-square, T and F distribution, probability models, central limit theorem and functions of a random variable, bivariate, marginal, and conditional distributions. Offered in the Fall semester. Prerequisite: MATH 232. *One semester; three credits*

MATH 329. APPLIED NUMERICAL ANALYSIS

The course teaches the student the basic techniques of modeling and numerical computation with emphasis on applications and the use of numerical software. Topics will be chosen from the following: modeling of physical systems with algebraic, differential and integral techniques; algorithms for approximation; fitting functions to data; algorithms for the solution of linear systems and for finding eigenvalues and eigenvectors; algorithms for the solution of differential and integral equations; Fourier transforms. Offered in the Fall semester. Prerequisite: MATH 232 and a computer language. *One semester; three credits*

MATH 401. LINEAR ALGEBRA

This course contains an introduction to the basic concepts of linear algebra; namely Gaussian elimination, the theory of simultaneous linear equations, determinants, vector spaces, eigenvalues, eigenvectors and linear transformations. The course includes applications of linear algebra to selected topics from engineering, biology, and business. Prerequisite: MATH 232. Offered every other year. *One semester; three credits*

MATH 402. ABSTRACT ALGEBRA

The course contains an introduction to some basic concepts of abstract algebra, namely groups, rings, and fields and includes applications. Prerequisite: MATH 232. Offered in the Spring semester of even numbered years. *One semester; three credits*

MATH 405. DISCRETE MATHEMATICS

This course is an introduction to graph theory and combinatorics. The topics will be chosen from the following: the basic properties of graphs and digraphs, graphs as models, Eulerian and Hamiltonian circuits, graph coloring, trees, network algorithms, generating functions, and recurrence relations. Prerequisite: MATH 231. Offered every other year. *One semester; three credits*

MATH 413. COMPLEX ANALYSIS (Formerly MATH 403)

This course concerns itself with the rudiments and techniques of complex analysis. Topics that are covered include: complex sequences, the derivative of a complex function, the Cauchy-Riemann equations, integration in the complex plane and the Cauchy-Goursat theorem, Cauchy's integral formula, Morera's theorem, Taylor and Laurent series, residue theory, and the evaluation of definite integrals. Prerequisite: MATH 232. Offered in the Fall semester of even numbered years. *One semester; three credits*

MATH 414. REAL ANALYSIS (Formerly MATH 302)

The course develops the theory of calculus. It stresses the proofs of the theorems for functions of one variable. Topics include sequences, series, functions, limits, continuity, differentiation and integration. Prerequisite: MATH 232. Offered in the Spring semester of odd numbered years. *One semester; three credits*

MATH 461-462. SENIOR SEMINAR I AND II

The student conducts an independent investigation in some field of mathematics. The course requires both written and oral reports. In addition, the student must pass a comprehensive assessment test in mathematics. Prerequisites: Junior or Senior standing and approval of the

department head. Offered in sequence in the Fall and Spring. *Pass/Fail Grading for Math 461. One semester each; zero and two credits respectively.*

MATH 470-479. TOPICS IN MATHEMATICS

This course is designed to meet the current needs of the students and to express the particular interests of the instructor. Prerequisites: Junior standing, MATH 232 and Permission of instructor. *One semester; one to three credits*

MECHANICAL ENGINEERING COURSES

Requirements for the degree are found on Page 91.

ME 112. SCIENTIFIC PROGRAMMING

This course covers fundamental programming techniques used to solve engineering problems that require repetitive or iterative calculations. Emphasis is placed on writing structured, portable, efficient, and understandable Fortran programs. Also covered: interfacing Fortran codes with other languages and high-level applications, syntax for other computer languages. Corequisite: MATH 131. Offered in the Spring semester. *One semester; three credits*

ME 121. SOLIDS MODELING (Formerly ME 111)

Emphasis on visual aspects of engineering communications, expression of ideas, developing spatial concepts as related to design. Design is taught using 3-D modeling and parametric design. CAD applications. Offered in the Fall and Spring. *One semester; three credits*

ME 200. MECHANICS OF SOLIDS

Principles of statics, equilibrium of coplanar and non-coplanar force systems. Axial load, shear and bending moment diagrams. Differential equations of beams. Study of stresses due to axial, bending and torsional loads and combined loading. Mohr's circle of stress. Design techniques. Column design equations. Prerequisite: PHYS 150. (Same as CE 200) *One semester; three credits*

ME 201. MANUFACTURING PROCESSES

Production of common engineering materials. Heat treatment theory and processes. Study of machining, casting, metal forming, fabrication of plastics, ceramics, composites, welding, inspection, material testing, automation. Plant tours. Reports. Demonstrations. Two lectures and one three-hour lab each week. Prerequisite: ME 121. Offered in the Fall semester. *One semester; three credits*

ME 202. DYNAMICS

Kinematics and kinetics of particles and rigid bodies in two dimensions. Force-mass-acceleration, work-energy, and impulse-momentum methods will be covered. Prerequisites: ME 200 or CE 201. Offered in the Fall and Spring. *One semester; three credits*

ME 301. ENGINEERING INSTRUMENTATION LABORATORY

A laboratory course designed to instruct the student in the theory and use of various engineering instruments and transducers. Emphasis is placed on appropriate error analysis in the reduction, analysis, and reporting of data. Technical report preparation is emphasized. Two lecture periods and one laboratory period of three hours. (Same as ECE 201) Prerequisite or corequisite: ECE 221. Offered in the Fall semester. *One semester; two credits*

ME 302. ENERGY SYSTEMS LABORATORY

Experimental study of basic fluid flow and heat transfer phenomena, flow-measurements, impulse turbine, centrifugal pump, fluid circuit systems, electrical analogies, basic heat con-

duction experiments, free and forced convection, thermal radiation, temperature measurements, subsonic wind tunnel model studies, lift and drag measurements. Technical report preparation and presentation is emphasized. One laboratory period of three hours and lecture. Prerequisites: ME 301, 313. Corequisite: ME 306. Offered in the Spring semester. *One semester; two credits*

ME 305. ENGINEERING THERMODYNAMICS I

Fundamental laws and basic development of the classical macroscopic approach to thermodynamics. First and second laws, state relations, cycles. Applications to engineering systems. Prerequisites: MATH 132 and PHYS 150. Offered in the Fall and Spring. *One semester; three credits*

ME 306. HEAT TRANSFER

An introductory treatment of conduction, convection, and radiation heat transfer. Analysis of steady and unsteady heat conduction in simple geometries, boundary layer analysis and empirical correlations for convection, and basic theory of radiation heat transfer. Prerequisite: ME 313. Prerequisite or corequisite: MATH 329. Offered in the Spring semester. *One semester; three credits*

ME 312. MECHANICS OF DEFORMABLE SOLIDS

Axial load, shear, and bending moment diagrams. Differential equations of beams. Study of stresses due to axial, bending, and torsional loads and combined loading. Mohr's circle of stress. Design techniques. Column design equations. Prerequisite: CE 201. Offered in the Spring semester. *One semester; three credits*

ME 313. FLUID MECHANICS

Mechanical and thermodynamic properties of fluids. Theory of fluid statics. Conservation laws in integral and differential form. Dimensional analysis and dimensionless groups. Dynamics of frictionless incompressible flow. Modified Bernoulli equation. Flow of viscous fluids. Pipe flow theory. Empirical formulas and charts. Introduction to boundary layer theory, turbulence, one-dimensional steady compressible flow, and open channel flow. Prerequisites: MATH 232 and ME 202, 305. Offered in the Fall semester. *One semester; three credits*

ME 314. ENGINEERING ECONOMY (Formerly ME 314 Engineering Factors in Design)

Fundamentals of engineering economy. Cost concepts. Time value of money and equivalence. Economic analysis of alternatives. Replacement analysis. Depreciation and after-tax analysis. Effects of inflation on economic analysis. (Same as CH E 314, ECE 314, CE 314) *One semester; three credits*

ME 316. ENGINEERING THERMODYNAMICS II

Concepts of reversibility, irreversibility, and availability. Power and refrigeration systems. First Law analysis of gas-vapor mixtures. Introduction to psychrometry. Thermochemical reactions including combustion processes, fuel properties, and equilibrium composition. Prerequisite ME 305. Offered in the Fall semester. *One semester; three credits*

ME 317. KINEMATICS

A study of relative motion and geometry of machine parts and mechanisms without reference to force or mass. Graphical and analytical solutions for the displacement, velocity, and acceleration of planar mechanisms. General case of acceleration including Coriolis component. Computer programming and numerical techniques applied to velocity and acceleration analysis of cycles. Prerequisites: ME 121, 202. Offered in the Fall semester. *One semester; three credits*

ME 318. DYNAMICS OF MACHINES

The dynamic analysis of machine parts by use of the principles of linear and angular momen-

tum and the work-energy relationships. Graphical and analytical methods. Analysis and balancing of shaking forces in machines, flywheel analysis, basic gear analysis, gyroscopic forces in machines. Three lectures each week. Prerequisite: ME 317. Offered in the Spring semester. *One semester; three credits*

ME 319. PRINCIPLES OF PACKAGING

(Same as CH E 319). *One semester; three credits*

ME 320. DISTRIBUTION/MEDICAL DEVICE PACKAGING

(Same as CH E 320). *One semester; three credits*

ME 400. THE COMPLETE ENGINEER (Same as CH E 400, ECE 400, and CE 400)

This course deals with a wide array of issues facing the practicing engineer. Topics include: engineering ethics; regulatory issues; health, safety, and environmental factors; reliability, maintainability, producibility, sustainability; and the context of engineering in the enterprise, in society, and as part of the global economy. Prerequisite: Permission of the department. *One semester; three credits*

ME 401. MECHANICAL SYSTEMS LABORATORY

Laboratory experiments are performed in stress analysis and experimental mechanics on a project team basis. Emphasis is placed on experimental technique, data analysis and report preparation and presentation. Each student also prepares a state of the art report on a topic selected by the department faculty. Prerequisite: ME 301. Corequisite: ME 420. Offered in the Fall semester. *One semester; two credits*

ME 407-408. MECHANICAL ENGINEERING PROJECT

Industry sponsored projects are initiated early in the first semester of the student's senior year and are completed and formally presented in a report (written and oral) to the sponsor, faculty and students in the following semester. Prerequisite: Permission of the department, ME 407 prerequisite for ME 408. Taken in sequence in the Fall and Spring. *Two semesters; six credits*

ME 416. THERMAL ENVIRONMENTAL ENGINEERING

Refrigeration, vapor compression and absorption. Psychrometrics, basic air-conditioning processes, physiological effects, heat load calculations. Air conditioning system design will be emphasized. Three lectures each week. Prerequisites: ME 306, 316. *One semester; three credits*

ME 419. MECHANICAL VIBRATIONS

Fundamentals of vibration theory applied to mechanical systems. Un-damped and damped, single and multiple degree of freedom, vibrating systems. Steady state analysis of free and forced vibrations; critical speeds and balancing, vibration isolation, instrumentation. Three lectures each week. Prerequisites: ME 202 and MATH 231. *One semester; three credits*

ME 420. MACHINE DESIGN

An integrated treatment of the design of mechanical systems combining static and dynamic load analysis, stress analysis, material selection, and failure analysis. Includes many advanced topics in stress analysis. Three lectures each week. Prerequisites: ME 201, 318. Corequisite: ME 401. Offered in the Fall semester. *One semester; three credits*

ME 421. THERMAL SYSTEMS ANALYSIS AND DESIGN

An integrated treatment of the analysis and design of thermal systems. Primarily concerned with industrial thermal processes, cycles and associated equipment. Prerequisite: ME 306. Offered in the Fall semester. *One semester; three credits*

ME 422. CONTROL SYSTEMS ENGINEERING

Analysis and design of linear control systems. Transfer functions, block diagrams, and state-variable representation. Feedback concepts and stability analysis in both the frequency and time domain. Design by Root locus, Bode plots, and State variable methods. Emphasis on use of computational software for complex cases. (Same as ECE 322 Linear Control Systems) Prerequisites: MATH 231 and ME 202. Offered in the Spring semester. *One semester; three credits*

ME 424. DESIGN OF MACHINE ELEMENTS

An examination of the processes commonly used in the design of typical mechanical system components. Exploration of standardized design conventions, including design codes and handbooks, and the original design of non-standard components. Case studies and code histories are discussed. Subjects include: screw threads, mechanical connections, welding, bonded joints, springs, lubrication, bearings, gears, shafts, clutches and brakes, couplings, and mechanical drive systems. Two lectures and one discussion class each week. Prerequisites: ME 401, 420. *One semester; three credits*

ME 425. DISCRETIZATION METHODS

An introduction to the numerical solution of ordinary and partial differential equations. The concepts of round-off error, truncation error, consistency and stability. Solution methods for elliptic, parabolic, and hyperbolic partial differential equations. Comparisons and contrasts of various finite-difference, finite-element, and finite-volume methods. Students will apply various techniques to obtain solutions for mechanical and energy system problems. A design project is required. Prerequisites: ECE 112, MATH 232, and ME 200, 313. *One semester; three credits*

ME 428. MATERIALS SCIENCE

Fundamental concepts of materials science including the structure and properties of materials. The internal structures of metals, ceramics, and polymers are examined to develop an understanding of their mechanical, electrical, physical, and chemical properties. Prerequisites: CHEM 115 and Junior standing. *One semester; three credits*

ME 429. SELECTION OF MATERIALS

Importance of materials selection as part of the design process will be discussed. Fundamental relationships that govern the properties of materials will be examined and used to optimize the selection of engineering materials. Materials covered will include metals, plastics, ceramics, and composites. Prerequisite: ME 200. *One semester; three credits*

ME 432. PRINCIPLES OF GAS DYNAMICS

Concepts of compressible flow. Steady streamtube flow. Supersonic flow and shock waves. Prandtl-Meyer flow. Supersonic nozzle and diffuser flow. Fanno and Rayleigh flow. Unsteady one-dimensional flow. *One semester; three credits*

ME 433. PROPULSION SYSTEMS

Design and operating fundamentals of air-breathing and rocket engines. Propulsion dynamics. Flow and combustion thermodynamics. Engine system and component performance characteristics. Advanced propulsion systems. Prerequisites: ME 313, 316. *One semester; three credits*

ME 435. INTERMEDIATE MANUFACTURING

Introduction to advanced parametric computer-aided design and manufacturing (CADM) techniques. Students learn to design parts and assemblies using tools that enable parametric design. A design project is carried through from "blank screen" to production of computer numerical control (CNC) code and fabrication. Also provided is an introduction to structural and thermal analysis tools that are integrated with the CADM program. An oral report on advanced manu-

facturing technology is required. Occasional field trips to local manufacturing facilities. Prerequisites: ME 201 and Senior standing. *One semester; three credits*

ME 442. INTERNAL COMBUSTION ENGINES

Principles of spark ignition and compression engines. Both two and four-stroke engines are considered. Fuel combustion, cooling, and turbocharging effects. Experimental methods of determining engine performance. Guest lecturers and plant tours. Prerequisites: ME 306, 316. *One semester; three credits*

ME 444. DESIGN OPTIMIZATION

An intermediate design synthesis course with emphasis on strategies for determining optimum design. Includes optimum design problem formulation, numerical methods for constrained and unconstrained optimization, heuristic procedures, algorithmic strategies, thermal and mechanical systems applications. Industrial design cases are studied. Prerequisite: Permission of instructor. *One semester; three credits*

ME 445. CONCURRENT DESIGN

An advanced design methods course with emphasis on concurrency of analysis, design, and manufacturing. Working in teams, students take several mechanical engineering projects from “blank sheet” to working hardware. Aggressive schedules highlight the inadequacy of traditional sequential design methods; extensive use of computer aided design and manufacturing (CADM) technology allows realistic training in modern product design practice. Two lectures and one three-hour team activity each week. Prerequisites: ME 435, Junior standing and Permission of instructor. *One semester; three credits*

ME 446. DESIGN OF MECHANISMS

A fundamental design course with emphasis on graphical and analytical mechanism synthesis techniques for path generation, function generation, and rigid body guidance. A design project is required. Prerequisite or corequisite: ME 420. *One semester; three credits*

ME 448. ROBOTICS

An intermediate level treatment of the multifaceted nature of robotics. Overview of robotic components and subsystems. Autonomous robots; industrial robots. Kinematics, statics, and dynamics of manipulators; trajectory planning and control; sensors for unstructured environments; hierarchical control; machine vision based control; applications. One design and testing project is required. Prerequisites: ME 317 and Permission of the instructor. *One semester; three credits*

ME 495. INTERNSHIP IN MECHANICAL ENGINEERING

Students majoring in mechanical engineering may be placed in the engineering offices of contracted firms to receive job training under the supervision of qualified engineers. Tasks completed as part of the internship must be approved by an authorized work supervisor. Credit is granted upon faculty approval of periodic review reports and a final summary report describing the work performed. Minimum time 200 hours. Prerequisites: Junior standing and Permission of the department. *Pass/Fail Grading. One semester; three credits*

ME 498. TOPICS IN MECHANICAL ENGINEERING

Lectures, readings, discussions and research on special areas and advancements in mechanical engineering. Problems or projects of an interdisciplinary nature are encouraged. A written report may be required. Prerequisites: Senior standing and Approval of department. *One semester; one to three credits*