

# ACADEMIC COURSES

*References to the timing of course offerings which follow apply only to day courses. Professional Studies and summer school course offerings are scheduled according to need. Christian Brothers University reserves the right to cancel classes at any time due to insufficient enrollment.*

## ■ ACADEMIC PLANNING COURSE

### ACAD 150. ACADEMIC PLANNING

Intended for students interested in developing and/or strengthening college study and test-taking skills, memory training, time and stress management, and educational and career planning, this course provides students with opportunities to assess their individual strengths and weaknesses and to explore campus resources for academic assistance. No prerequisites. *One semester; three credits*

## ■ ACCOUNTING COURSES

*Requirements for the major are found on Page 64.*

### ACCT 260. FINANCIAL ACCOUNTING (Formerly ACCT 261 & ACCT 262)

This course will provide the student with an understanding of how financial accounting information is used in business decision making and its importance as a field of study regardless of major. Basic transaction analysis, journal entries, and T-accounts are used to provide the structure for understanding the interplay between management decisions and the analysis of financial statements. Prerequisites: MATH 105 or 106; MIS 153. A grade of “C” or better in this course is required to proceed to ACCT 264 or 265 or ACCT 270. Corequisite: ACCT 260L. Offered in both Fall and Spring semesters. *One semester; three credits*

### ACCT 260L. FINANCIAL ACCOUNTING LABORATORY

Laboratory experience to illustrate and explain the principles covered In ACCT 260. Corequisite: ACCT 260. Pass/Fail Grading. *One semester; zero credits.*

### ACCT 264 INTERMEDIATE FINANCIAL ACCOUNTING I

First of a series of three courses containing an in-depth study of Generally Accepted Accounting Principles. Topics covered include accounting standards and the conceptual framework underlying financial accounting, accounting information systems, the income statement, the balance sheet and the time value of money. Various pronouncements of the Financial Accounting Standards Board are covered. Prerequisite: ACCT 260. A grade of “C” or better in this course is required to proceed to any other upper level accounting courses. Offered in the Spring semester. *One semester; three credits*

### ACCT 265. INTERMEDIATE ACCOUNTING I (Formerly ACCT 361)

This course provides an in-depth study of accounting theory and records, the reporting process, inventories, tangible and intangible assets, cash and temporary investments, receivable, and long-term investments such as stocks and bonds. Various pronouncements of the Financial Accounting Standards Board are covered. Prerequisite: ACCT 260. A grade of “C” or better in this course is required to proceed to any other upper level accounting courses. Corequisite: ACCT 265L. Offered in the Spring semester. *One semester; three credits*

### ACCT 265L. INTERMEDIATE ACCOUNTING I LABORATORY

Laboratory experience to illustrate and explain the principles covered In ACCT 265. Corequisite: ACCT 265. Pass/Fail Grading. *One semester; zero credit*

### ACCT 270. MANAGERIAL ACCOUNTING (Formerly ACCT 360)

Managerial accounting introduces the student to methods of using accounting information within an organization to plan operations, control activities, and make decisions. Accounting methods covered include cost-volume profit analysis, profit planning, variance analysis and other techniques that aid in decision making and evaluation of business performance. Prerequisite: ACCT 260 with a grade of “C” or better, MATH 105 or 106, MIS 153. Corequisite ACCT 270L. Offered in both Fall and Spring semesters. *One semester; three credits*

### ACCT 270L. MANAGERIAL ACCOUNTING LABORATORY

Laboratory experience to illustrate and explain the principles covered In ACCT 270. Corequisite: ACCT 270. Pass/Fail Grading. *One semester; zero credits.*

### ACCT 312. ACCOUNTING SYSTEMS (Formerly ACCT 410)

Principles underlying establishment of complete accounting systems; application to typical business organizations; emphasis on the functions of control and protection. Prerequisite: ACCT 364 or 365 with a grade of “C” or better. Offered in the Spring semester. *One semester; three credits.*

### ACCT 319. COST ACCOUNTING

The course is designed to provide in-depth coverage of cost accounting concepts, objectives, and accumulation and reporting procedures. Particular attention is given to material, labor and overhead costs in job order and process cost accumulation systems. The importance of cost accounting as a management tool in planning, controlling, and analysis is emphasized throughout the course. Prerequisite: ACCT 264 or 265 with a grade of “C” or better. Offered in the Fall semester. *One semester; three credits*

### ACCT 364. INTERMEDIATE FINANCIAL ACCOUNTING II

Second of a series of three courses containing an in-depth study of Generally Accepted Accounting Principles. Topics covered include cash and receivables, inventories, property plant and equipment, depreciation, intangible assets, current and long-term liabilities and stockholders’ equity. Various pronouncements of the Financial Accounting Standards Board are covered. Prerequisite: ACCT 264 with a grade of “C” or better. A grade of “C” or better in this course is required to proceed to any other upper level accounting courses. Offered in the Fall semester. *One semester; three credits*

**ACCT 365. INTERMEDIATE ACCOUNTING II** (Formerly ACCT 362)

Coverage of corporate accounting is continued; accounting for bonds; special purpose funds; correction of prior periods, special problems of income determinations, comparative statements, ratio analysis, statement of cash flows. Various pronouncements of the Financial Accounting Standards Board are covered. Prerequisite: ACCT 265. A grade of "C" or better in this course is required to proceed to ACCT 312 or any 400 level accounting courses. *One semester; three credits*

**ACCT 366. INTERMEDIATE FINANCIAL ACCOUNTING III**

Third of a series of three courses containing an in-depth study of Generally Accepted Accounting Principles. Topics covered include earnings per share, investments, revenue recognition, accounting for income tax, pensions and leases, accounting changes and the cash flow statement. Various pronouncements of the Financial Accounting Standards Board are covered. Prerequisite: ACCT 364 with a grade of "C" or better. A grade of "C" or better in this course is required to proceed to ACCT 312 or any 400 level accounting course. Offered in the Spring semester. *One semester; three credits*

**ACCT 385. FRAUD EXAMINATION**

This course gives a comprehensive view of the growing significance of fraud in today's business world. This course will examine the nature of fraud, the types of fraud, recent developments in fraud, and the victims of fraud. Students will learn to perform an analysis of fraud using specialized software. Prerequisite: Must be a Business Major. Grade of "C" or better in ACCT 260 and ACCT 270. Junior standing.

**ACCT 400. ACCOUNTING 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. *Pass/Fail Grading. One semester; three credits*

**ACCT 412. AUDITING** (Formerly ACCT 405)

This course is an introduction to the auditing profession. Particular attention is given to the Generally Accepted Auditing Standards, audit reports, ethical and legal responsibilities, evidence, audit risk and materiality, internal control, audit programs and the overall audit plan. The auditor's decision-making process is emphasized throughout the course. Prerequisite: ACCT 312 and ACCT 366 with a grade of "C" or better. Offered in the Fall semester. *One semester; three credits*

**ACCT 430. FEDERAL INCOME TAXATION I** (Formerly ACCT 321)

This course introduces the student to the current Income Tax Code and the effect the Internal Revenue Service and the courts have had on the evolution of Federal tax law. Application of the Federal Income Tax to individuals, and the determination of their tax liability is explained. Basic tax research is introduced through the use of various tax services, court decisions, and regulations. This research is considered a prerequisite for success in tax practice. Principles and procedures of sound tax planning are introduced. Prerequisite: ACCT 365 or 366 with a grade of "C" or better. Offered in the Fall semester. *One semester; three credits*

**ACCT 431. FEDERAL INCOME TAXATION II** (Formerly ACCT 322)

This course is a follow-on course with more advanced tax areas such as gain and loss determination, net operating loss concepts, and other topics. The application of the Internal Revenue Code to partnerships and corporations and the development of their tax reporting are introduced. Tax research, as it applies to advanced tax topics, and further discussion of sound tax planning are continued. Prerequisite: ACCT 430. Offered in the Spring semester. *One semester; three credits*

**ACCT 460-464. SPECIAL TOPICS IN ACCOUNTING.**

Each course is designed to permit intensive study into topics of special interest and timeliness in the area of Accounting. Offered as needed. *One semester; three credits*

**ACCT 465. ADVANCED ACCOUNTING I** (Formerly ACCT 375 and ACCT 423)

Advanced Accounting I is a continuation of Intermediate Accounting in that it further explores financial accounting topics with an emphasis on consolidated financial statements. Coverage also includes accounting for branch offices and partnerships. Prerequisite: ACCT 365 or 366 with a grade of "C" or better. Offered in the Fall semester. *One semester; three credits*

**ACCT 475. GOVERNMENTAL ACCOUNTING** (Formerly Advanced Accounting II)

This course examines the procedures used by government units, particularly municipalities and not-for-profit entities. Emphasis in the course is on budgetary and fund accounts. Prerequisites: ACCT 465 with a grade of "C" or better. Offered in the Spring semester. *One semester; three credits*

**ACCT 480. FINANCIAL STATEMENT ANALYSIS**

This course is a review of financial statements for fairness and completeness in reporting. The focus is on the analysis of financial statements and related footnotes from the standpoint of the different users of financial reports. Required of all Accounting majors. Open to any interested student. Prerequisite: ACCT 260 with a grade of "C" or better and FIN 327 with a grade of "C" or better. Offered in the Spring semester. *One semester; three credits*

**ACCT 485. FORENSIC ACCOUNTING**

This course gives a comprehensive view of forensic accounting including both civil and criminal accounting fraud related activities. This course will explore false business valuations, employer fraud, information security fraud, and counter-terrorism. Prerequisite: ACCT 412. Offered in the Spring semester. *One semester; three credits.*

**ACCT 490. PROFESSIONAL ACCOUNTING ETHICS**

This course provides the student with an understanding of, and an appreciation for, the various ethics requirements of the accounting profession. Specific attention is given to the Code of Ethics of the AICPA, the IMA, and the FEI. Students will also understand the ethics requirements for certification by the State Boards of Accountancy. Prerequisites: ACCT 365 or 366 with a grade of "C" or better and PHIL 220. Offered in the Fall semester. *One semester; three credits*

**ACCT 491 INTERNATIONAL FINANCIAL REPORTING STANDARDS**

Similarities and differences between GAAP and International Financial Reporting Standards (IFRS); international issues related to taxation and financial statement analysis. Prerequisite: ACCT 412. Offered in the Spring semester. *One semester; three credits.*

**ACCT 499. ACCOUNTING COMPREHENSIVE EXAMINATION**

Seniors will be required to take a comprehensive examination in all areas of accounting before graduation. The examination date will be announced. A passing score is required for graduation. Prerequisite: Permission of Dean of the School of Business. Pass/Fail Grading. *One semester, zero credits.*

**■ AIR FORCE ROTC**

Air Force ROTC courses are offered through The University of Memphis under the instruction of The University of Memphis faculty.

**■ ALGEBRA COURSES****ALG 110. ALGEBRAIC EXPRESSIONS**

This course is designed for students who need a review in basic math skills. Topics include fractions, exponents, rational exponents, factoring and algebraic expressions. The course does not supply any portion of the mathematics credits required in any CBU degree program. Students may not receive credit for Algebra 110 after completing any Math course numbered 100 or above. *Two credits*

**ALG 115. BASIC ALGEBRAIC EXPRESSIONS**

This course provides the student a review of basic math skills. Topics include algebraic expressions, polynomial operations, factoring, rational expressions and exponents. The course does not supply any portion of the math credits required in any CBU degree program. Students may not receive credit for both Algebra 110 and Algebra 115. Also, students may not receive credit for Algebra 115 after completing any Math course numbered 100 or above. *One credit*

**ALG 120. ALGEBRAIC EQUATIONS**

This course is a continuation of Algebra 110 or 115. Topics include solving equations and inequalities and an introduction to functions and graphing. The course does not supply any portion of the mathematics credits required in any CBU degree program. Students may not receive credit for Algebra 120 after completing any Math course numbered 100 or above. Prerequisite: ALG 110 or 115. *Two credits*

**■ ANTHROPOLOGY COURSES****ANTH 126. FORENSIC ANTHROPOLOGY**

This course is the subspecialty of Physical Anthropology that involves excavation and identification of human remains for legal purposes. Students are exposed to the human skeleton and taught to examine bones for sex, age, ancestry, and stature differences. Interpretation of skeletal crime trauma is stressed. The most recent techniques and analyses in the forensic sciences, along with current and controversial trends in anthropology are discussed. Authentic case studies are used to illustrate the applied field of anthropology. This course is intended for applied psychology and science students. It assumes a basic familiarity with skeletal anatomy. Prerequisite: MATH 105 or higher. Corequisite: ANTH 126L. (Same as NSCI 126) *One semester; three credits*

**ANTH 126L. FORENSIC ANTHROPOLOGY LAB**

Laboratory to accompany ANTH 126. Hands-on laboratory sessions will be used to teach basic techniques of skeletal analysis. Laboratory topics to include basic anatomy of the human skeleton, differences between animal and human remains, determination of the time interval since death, age, sex, ancestry, stature, the cause and manner of death, facial reconstruction, case report writing, etc. **Please note: Students will be expected to respectfully handle animal and human remains.** (Same as NSCI 126L) Corequisite: ANTH 126. *One semester; one credit*

**ANTH 128. PHYSICAL ANTHROPOLOGY**

This course is designed to introduce the student to the field of physical/biological anthropology, with an emphasis on human evolution. The larger themes investigated are the fundamentals of biological anthropology, major principles underlying our evolutionary history, and a review of the fossil evidence in an attempt to understand the development of the human species. Prerequisite: MATH 105 or higher. Corequisite: ANTH 128L. (Same as NSCI 128) *One semester; three credits*

**ANTH 128L. PHYSICAL ANTHROPOLOGY LAB**

Laboratory to accompany ANTH 128. It includes working with hominid casts, and primate and modern human skeletal material. (Same as NSCI 128L) Corequisite: ANTH 128. *One semester; one credit*

**ANTH 160. CULTURAL ANTHROPOLOGY (Formerly ANTH 150 and SOC 150)**

This course, which deals primarily with the concerns of cultural anthropology, focuses on the study of human diversity, and what defines humanity. It explores the beliefs, values, behaviors, technologies, and environments of a wide variety of cultures in an attempt to understand and appreciate variations within the human community in addition to evolution and modern biological variation. In attempting to understand the world's diversity, students have the opportunity to better understand themselves, their potentials, and their limitations. (Same as SOC 160) *One semester; three credits*

**ANTH 190-199. SPECIAL TOPICS IN ANTHROPOLOGY**

Courses in different areas of anthropology that are not offered on a regular basis. Corequisite: Corresponding lab course. *One semester; three credits*

**ANTH 190L-199L. SPECIAL TOPICS IN ANTHROPOLOGY LABORATORIES**

Laboratories to accompany ANTH 190-199. Corequisite: Corresponding ANTH 190-199 course. *One semester; one credit*

**ANTH 280-287. SELECTED TOPICS IN ANTHROPOLOGY**

Directed work on a special topic or project in anthropology. *One semester; one to three credits*

**ANTH 290-299. HONORS SPECIAL TOPICS IN ANTHROPOLOGY**

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

**ANTH 301. MEDICAL ANTHROPOLOGY** (Formerly ANTH 305 and SOC 305)

Health, illness and treatment can be regarded very differently in various parts of the world and even within American society. This course will focus on the impact of beliefs and values on medicine. A range of definitions of health and illness, as well as the treatments which flow from these definitions, will be considered. (Same as SOC 301). *One semester; three credits*

**ANTH 350. GLOBAL HEALTH**

The course will introduce students to the main concepts of the public health field and the critical links between public health and social and economic development. Students will get an overview of the determinants of health, how health status is measured, and the influences of various factors including social, economic, and political issues on the health of individuals and of communities. It will also introduce students to key concerns regarding nutrition, reproductive health, infectious diseases, and chronic diseases. Material will include key concepts, be practical in orientation, and global in coverage but with an important focus on the developing world and on the health of the poor. (Same as SOC 350). *One semester; three credits*

**ANTH 380-387. SELECTED TOPICS IN ANTHROPOLOGY**

Directed work on a special topic or project in anthropology. *One semester; one to three credits*

**ANTH 390-396. HONORS SPECIAL TOPICS IN ANTHROPOLOGY**

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

**■ ARMY ROTC COURSES**

Army ROTC courses are offered through The University of Memphis under the instruction of The University of Memphis faculty.

**■ ART COURSES**

*Requirements for the major are found on Page 37.*

**ART 101. ART APPRECIATION**

The student will be exposed to different areas of the visual arts which will include the study of the visual elements and the principles of design. The course will also cover a brief survey of the highlights of art from the Paleolithic period to modern times. *One semester; three credits*

**ART 102. 2-D DESIGN**

Elements and principles of design will be the primary focus through the use of mixed media and collage techniques. How line, form, shape, and color influence composition will be the primary learning outcome of this course. *One semester; three credits*

**ART 106. PHOTOSHOP ESSENTIALS**

This course is an introduction to the user interface, tools, and features of Adobe Photoshop CS4. Students begin working with the industry standard for creating raster/bitmap graphics. This incredibly deep program is used for graphic design, web design, image manipulation, photo restoration, digital illustration, lighting effects, and animation. By the end students will have progressed from a beginning to intermediate skill level able to command many of the powerful tools Photoshop has to offer. Payment of expendable materials fee is required. *One semester; three credits.*

**ART 107. ILLUSTRATOR ESSENTIALS**

This course is an introduction to the user interface, tools, and features of Adobe Photoshop CS4. Students get hands-on practice working with a sophisticated graphics application that has the capabilities to create complex designs. Students will explore digital drawing basics, combine text and graphics, and design and print packaging for mock products. Payment of expendable materials fee is required. *One semester; three credits.*

**ART 108. INDESIGN ESSENTIALS**

This course is an introduction to the user interface, tools, and features of Adobe InDesign CS4, a powerful but intuitive page layout application. Students work through basic toward advanced techniques ranging from: type controls; graphics file management, layers and document setup. Students will explore designing a range of documents from simple and attractive to complex and spectacular. Payment of expendable materials fee is required. *One semester; three credits.*

**ART 109. FLASH ESSENTIALS**

This course is an introduction to the user interface, tools, and features of Adobe Flash CS4. Students learn how to create basic Flash animations and movies using the timeline; discovering how the timeline in Flash can be used to create basic frame-by-frame animations and motion tweened animations. Confidence builds throughout the semester while novice animators learn to navigate the Flash interface, create new Flash files, set stage properties, import images into Flash, create and work with text, create and format drawing objects and add layers. Payment of expendable materials fee is required. *One semester; three credits.*

**ART 111. DRAWING I**

The student will learn the basics of composition, visual elements, and principles of design. *One semester; three credits*

**ART 200. OIL PAINTING I**

The student will learn the basics of design along with techniques of oil painting, using paint from tubes as well as oilbars. *One semester; three credits*

**ART 201. CONCEPTS AND CREATION IN THE VISUAL ARTS**

The intended audience for the course is art majors, minors, and students interested in an art related career. Art 201 is an introduction to the concepts

underpinning artistic creation. Through lectures and studio work students will explore relationships between artistic processes and everyday life. The objective of the course is to foster the development of student's appreciation and understanding of contemporary art through an examination of art and contemporary social, cultural, and political issues surrounding artistic practice. *One semester; three credits.*

#### **ART 203. PAINTING WATER-BASED MEDIA**

A study of painting methods in a variety of traditional and non-traditional water-based material and techniques. Students will begin to combine their understanding of drawing and design in the form of problem-solving exercises focusing on composition, value, color, and surface for both abstract and realistic work. *One semester; three credits*

#### **ART 204. 3-D DESIGN**

An introduction to three-dimensional design concepts through traditional and non-traditional methods. Emphasis will be placed on the elements and principles of design as applied to the sculptural form. *One semester; three credits*

#### **ART 205. BEGINNING DIGITAL PHOTOGRAPHY**

An introduction to the fundamentals of digital photography. The course emphasis is on understanding photography as a tool for visual expression. Payment of expendable materials fee is required. *One semester; three credits*

#### **ART 210. INTRODUCTION TO ART THERAPY**

This course will cover the creative arts approach to counseling. The theoretical basis for using art in counseling will be identified as well as evidence-based practice guidelines for assisting individuals, families, and groups across the lifespan. Biological, psychological, and social perspectives will be integrated into the student's knowledge of counseling methods. *One semester; three credits*

#### **ART 211. WORLD ART HISTORY I**

A survey of major visual art forms from prehistoric times to the Renaissance. *One semester; three credits*

#### **ART 212. WORLD ART HISTORY II**

A survey of major visual art forms from the Renaissance period to the present. *One semester; three credits*

#### **ART 215. ART OF THE AMERICAS**

A study of the art of ancient America from the pre-Columbian art of Mexico to the art and crafts of native Americans. *One semester; three credits*

#### **ART 233. FIGURE DRAWING**

A drawing class using live models as subjects. Drawing materials will include brush and ink, charcoal, pastel and various other media. *One semester; three credits*

#### **ART 290-299. HONORS SPECIAL TOPICS.**

Open to members of the Honors Program or by permission of instructor and Honors Director. *One semester; three credits*

#### **ART 301. ADVANCED DESIGN: MIXED MEDIA**

An emphasis on cultivating individual creativity through combining the elements of two-dimensional and three-dimensional design using collage techniques. At this level, students will have a wide knowledge base of a variety of materials and techniques in order to make creative choices, with the guidance of the instructor, when meeting the goals for project assignments. *One semester; three credits*

#### **ART 302. CONTEMPORARY ART HISTORY**

A survey of contemporary developments in art from 1945- present. This course emphasizes student discussion, critical thinking, and writing. *One semester; three credits*

#### **ART 304-305. INTERNSHIP FOR VISUAL ARTS: GALLERY AND MUSEUM STUDIES**

Major related work experience through which students apply skills to professional activity. Prerequisites: Permission of arts faculty and good academic standing. One hour in class is required. *One semester; three credits.*

#### **ART 305-306. INTERNSHIP FOR VISUAL ARTS**

Graphic design major related work experience through which students apply skills to professional activity. Prerequisites: Permission of arts faculty and good academic standing. One hour in class is required. *One semester; three credits.*

#### **ART 308. OIL PAINTING II**

An extension of the techniques learned in Basic Oil Painting (ART 200) with an emphasis on personal growth and creativity. *One semester; three credits*

#### **ART 309. DRAWING II**

A continuation of Drawing I and Figure Drawing with the introduction of advanced techniques. *One semester; three credits*

#### **ART 310. INTRODUCTION TO PRINTMAKING**

The student will be instructed in the basics of printmaking using the techniques of woodcut, linocutting, screen printing, and monoprinting. *One semester; three credits*

#### **ART 311. PRINTMAKING II**

Students will build on printmaking techniques learned in ART 310. An emphasis will be placed on personal growth through projects directed by the instructor. *One semester; three credits*

#### **ART 312. PAINTING III**

At this level the student will have mastered basic oil painting techniques and have the ability to apply a more creative approach to the work. *One semester; three credits*

**ART 314. BEGINNING DIGITAL IMAGING**

This course will cover the basic tools used in digital imaging software. A variety of different software may be offered, including Adobe InDesign, Illustrator, and Photoshop. Students will be introduced to developing a design language and vocabulary. Corequisite: ART 314L. *One semester; two credits*

**ART 314L. BEGINNING DIGITAL IMAGING LAB**

Introduction to methodological and research practices for designers. Corequisite: ART 314. *One semester; one credit*

**ART 315. ADVANCED DIGITAL IMAGING**

This course will be a build on information, vocabulary and visual language learned in ART 314. Prerequisites: ART 314 and 314L. Corequisite: ART 315L. *One semester; two credits*

**ART 315L. ADVANCED DIGITAL IMAGING LAB**

Advanced research practices for designers. Corequisite: ART 315. *One semester; one credit*

**ART 316. TYPOGRAPHY**

An introduction to the history of typography for the graphic design students. This course emphasizes type identification, type faces and families, type compiling, letter and word spacing, copy-fitting, designing with type, and type as a communication tool. These topics will be introduced through lectures and practiced in project-based assignments. *One semester; three credits*

**ART 316L. TYPOGRAPHY LAB**

Lab to accompany ART 316. Corequisite: ART 316. *One semester; one credit*

**ART 330. SCULPTURE II**

Students will apply design principles learned in ART 104 to three dimensional projects using various materials. *One semester; three credits*

**ART 331. INTRODUCTION TO HANDMADE PAPER**

Using a variety of fibers students will learn the basics of papermaking. This course will also encourage the use of handmade paper in book arts and other art projects for sustainability purposes. *One semester; three credits*

**ART 390-399. HONORS SPECIAL TOPICS IN ART**

Special topics in art open to members of the Honors Program or by permission of the instructor and Honors Program Director. *One semester; three credits*

**ART 400-405. SPECIAL TOPICS IN ART**

Content and credit are variable with interest and instructor. Prerequisite: Approval of Department Chair. *One semester; one to three credits*

**ART 411. DRAWING: EXPERIMENTAL**

An advanced drawing course that allows students to experiment with techniques, materials and subject matter learned in previous courses. At this level the student will be expected to apply contemporary art historical references to their work along with creative choices when fulfilling assignments. *One semester; three credits*

**ART 412-414. PAINTING: EXPERIMENTAL**

An advanced painting course that builds on the techniques, materials and subjects learned in other painting and art history courses. Students will fulfill assignments through the painting medium of their choice. *One semester; three credits*

**ART 415. GRAPHIC DESIGN I**

Continuing development of design language, vocabulary, methodological and research practices for graphic designers. Multifaceted projects explore continuity of design in two-dimensional space, each one focusing on a specific set of relationships. Prerequisite: Art 314 & Art 315. Corequisite: ART 415L. *One semester; two credits*

**ART 415L. GRAPHIC DESIGN I LAB**

Required time in lab used to complete research and projects. Corequisite: ART 415. *One semester; one credit*

**ART 418. GRAPHIC DESIGN II**

Comprehensive problem solving with emphasis on design uniformity in more than one medium or format. Simulated client-based projects focus on typography, communication, legibility/readability, language sequence and information hierarchy. Course concludes with portfolio review for admission into Graphic Design III. Payment of expendable materials fee is required. Prerequisite: Art 314, Art 315, & Art 415. Corequisite: ART 418L. *One semester; two credits*

**ART 418L. GRAPHIC DESIGN II LAB**

Hours required to complete all research and projects using the computer lab. Corequisite: ART 418. *One semester; one credit*

**ART 419. GRAPHIC DESIGN III**

This course merges prior knowledge and skills, and sets the stage for independent design projects. The course requires students to research and analyze all components of the design process. New, practical and conceptual skills will be discussed in order to develop meaningful, interactive user experiences. Payment of expendable materials fees is required. Prerequisite: Art 314, Art 314L, Art 315, Art 315L, Art 418, Art 418L. *One semester; three credits*

**ART 419. GRAPHIC DESIGN III LAB**

Required time in lab used to complete research and projects. Corequisite: ART 419. *One semester; one credit*

**ART 420. GRAPHIC DESIGN IV**

This course combines lectures with studio work to facilitate a goal directed environment. Students will learn to integrate theory and practical applications while sharpening conceptual, computer, and research skills. All projects are required to meet capable standards stressing the highest quality. Payment of expendable materials fee is required. Prerequisite: Art 314, Art 314L, Art 315, Art 315L, Art 418, Art 418L, Art 419, Art 419L. *One semester; three credits*

**ART 420. GRAPHIC DESIGN IV LAB**

Required time in lab used to complete research and projects. Corequisite: ART 420. *One semester; one credit*

**ART 470. ADVANCED STUDIO**

Students will work on thesis paper and concept building related to their senior exhibition. Projects will be decided through careful advising from instructor. This course must be taken before Art 475. *One semester; three credits.*

**ART 475. SENIOR SEMINAR**

The student will be required to produce a large body of work which would be indicative of the level the student has achieved. The theme of the works will be decided by the student and instructor. The student will be required to have an exhibition of these works to be viewed by the public. Prerequisite: Approval of the instructor. *One semester; three credits*

**ART 480-485. SPECIAL STUDIES IN ART**

Content and credit are variable with interest and instructor. Prerequisite: Approval of Department Chair. *One semester; one to three credits*

**■ BIOLOGY COURSES**

*Requirements for the degree are found on Pages 88 and 89.*

**BIOL 101. PUBLIC HEALTH**

An introductory course that will give the theoretical and historical foundations of public health. Current health delivery systems will be examined as well as the dynamics that affect community health. Other topics like health and fitness, modern health trends and beliefs that influence health care will be discussed. Prerequisite: MATH 105 or higher. *One semester; three credits*

**BIOL 102. PRINCIPLES OF EPIDEMIOLOGY**

An introduction to the basic principles of epidemiology and how they related to public health. Topics discussed will include the definition of infectious and non-infectious diseases, the causes of diseases, importance of the environmental, host-parasite relationship, prevention of disease, risks, and influence of demographics. This course does not fulfill the general education requirements. Credits not applicable to the BS in Biology and Biomedical Sciences biology elective requirement. Offered as needed. Prerequisite: MATH 105 or higher. *One semester; three credits*

**BIOL 103. BIOLOGY OF ADDICTION**

In this course, we will cover the biological effects of alcohol and drugs on human organ systems, particularly the nervous, digestive, excretory and reproductive systems. We will discuss the psychological and sociological consequences of these effects. The use of drugs in both therapeutic and pathologic situations will be explored, and modalities of recovery will be discussed. Offered in the Spring semester. Prerequisite: MATH 105 or higher. Credits not applicable to the BS in Biology and Biomedical Sciences biology elective requirement. *One semester; three credits*

**BIOL 103L. BIOLOGY OF ADDICTION LAB**

In this course, we will examine the anatomy and physiology of organ systems affected by alcohol and other psychoactive drugs of abuse. We will use fruit flies as a model to determine the effects of alcohol on their physiology and reproductive success. We will conduct two experiments on human volunteers: effects of caffeine on the cardiovascular system and the effects of ethanol on balance, equilibrium, and judgment. With the laboratory component, this course fulfills University graduation requirements. Offered in the Spring semester. Credit not applicable to the BS in Biology and Biomedical Sciences biology elective requirement. *One semester; one credit*

**BIOL 105. FUNDAMENTALS OF ENVIRONMENTAL BIOLOGY**

A study of the basic scientific principles required for an understanding of how ecosystems work. Emphasis will be given to nutrient cycling, soil structure, and composition, basic meteorology, air and water pollution and conservation, structure and energy flow in ecosystems, food production and hunger in the world, demographics, epidemics and emergent diseases, and consequences of the disruption of natural systems. This course does not fulfill the general education requirements. Credits not applicable to the BS in Biology and Biomedical Sciences biology elective requirement. Offered as needed. *One semester; three credits.*

**BIOL 106. FUNDAMENTALS OF BIOLOGY**

An introduction to the fundamental concepts of biology with emphasis on cellular structure and physiology, including cellular respiration, photosynthesis, and transmission of hereditary information. A broad overview of biological diversity, interaction between organisms and their physical environment, as well as the structure and function of the major human organ systems is included. This course is designed for education majors enrolled in the Graduate and Professional Studies Program. Day students may not register for this course. There is no laboratory associated with this course. General education requirements are not fulfilled by this course. Prerequisite: MATH 105 or higher. Enrolled in Graduate and Professional Studies. Liberal Studies majors only. Offered as needed. *One semester; three credits*

**BIOL 107. ENVIRONMENTAL BIOLOGY**

An interdisciplinary approach to the study of the environment, the course provides the scientific basis for understanding how environmental systems work. Topics include discussion of the economic impact and consequences of the disruptions of natural systems, the importance of public policy, and how environmental issues are linked to our everyday life. Designed for non-majors. Corequisite: BIOL 107L. Offered as needed. Prerequisite: MATH 105 or higher. Credits not applicable to the BS in Biology and Biomedical Sciences biology elective requirement. *One semester; three credits*

**BIOL 107L. ENVIRONMENTAL BIOLOGY LABORATORY**

A combination of laboratory experiences and field trips to illustrate the principles covered in BIOL 107. Visits to sewage treatment plant, pest control center, land fill and forests will be scheduled when possible. Prerequisite or corequisite: BIOL 107. Offered as needed. Credit not applicable to the BS in Biology and Biomedical Sciences biology elective requirement. *One semester; one credit*

**BIOL 109. HUMAN BIOLOGY**

A systematic study of the developmental structure and function of the human organism, including the anatomy and physiology of each organ system and common problems that may occur in each. Genetics, evolution, and ecology, as they apply to the human organism, are also studied. Designed for non-majors. Prerequisite: MATH 105 or higher. Corequisite: BIOL 109L. Offered as needed. Credits not applicable to the BS in Biology and Biomedical Sciences biology elective requirement. *One semester; three credits*

**BIOL 109L. HUMAN BIOLOGY LABORATORY**

Laboratory experience to illustrate and explain the principles covered in BIOL 109. Offered in the Fall semester. Prerequisite or corequisite: BIOL 109. Credit not applicable to the BS in Biology and Biomedical Sciences biology elective requirement. *One semester; one credit*

**BIOL 111. PRINCIPLES OF BIOLOGY I**

The first half of a comprehensive study of contemporary biology, this semester covers biochemistry, cytology, energy metabolism, photosynthesis, cell division, genetics, evolution, systematics and taxonomy of viruses, prokaryotes, protists, and fungi. This course includes three lectures and one discussion section per week. Prerequisite: ACT of 22 or higher, or a grade of C or better in CHEM 101. Corequisites: BIOL 111L and CHEM 101 or higher. Offered in both Fall and Spring semesters. *One semester; three credits.*

**BIOL 111L. PRINCIPLES OF BIOLOGY I LABORATORY**

Laboratory experience to illustrate and explain the principles covered in BIOL 111. Prerequisite or corequisite: BIOL 111. *One semester; one credit*

**BIOL 112. PRINCIPLES OF BIOLOGY II**

Continuation of BIOL 111, this semester covers systematics and taxonomy of plants and animals, anatomy and physiology of eukaryotic organisms, embryology and development, and ecology. This course includes three lectures and one discussion per week. Offered in the Fall and Spring semesters and usually in Summer Term II. Prerequisite: BIOL 111 and CHEM 101 or higher. Corequisite BIOL 112L. *One semester; three credits.*

**BIOL 112L. PRINCIPLES OF BIOLOGY II LABORATORY**

Laboratory experience to illustrate and explain the principles covered in BIOL 112. Prerequisite: BIOL 111L. Corequisite: BIOL 112. *One semester; one credit*

**BIOL 211. VERTEBRATE EMBRYOLOGY**

A study of human embryology with emphasis on the fundamental development processes common to vertebrate embryos. Topics include gametogenesis, fertilization, and development of the embryo from zygote through the differentiation of the neural tube. The second half of the course is devoted to the development of selected human organ systems including the nervous system, sense organs, and the cardiovascular, digestive, respiratory, and urogenital systems. Prerequisite: BIOL 111 and 112 and CHEM 113 or higher. Corequisite: BIOL 211L. Offered in the Fall semester. *One semester; three credits.*

**BIOL 211L. VERTEBRATE EMBRYOLOGY LABORATORY**

Laboratory experience to illustrate and explain the principles covered in BIOL 211. Histological, preserved, and selected living materials are studied to illustrate gametogenesis, fertilization, and development of the vertebrate embryo from zygote through the differentiation of organ systems in amphibian, avian, and mammalian embryos. Prerequisite or corequisite: BIOL 211. Offered in the Fall semester. *One semester; one credit*

**BIOL 212. COMPARATIVE VERTEBRATE ANATOMY**

A study of the structural and functional evolution of selected organ systems in representative vertebrates, the first part of the course reviews the phylogenetic relationships among the vertebrates. In the remainder of the course, structures and their organizations are interpreted in terms of their embryological development, phylogeny, and functional adaptations. Prerequisite: BIOL 111 and 112 and CHEM 113 or higher. Corequisite: BIOL 212L. Offered in the Spring semester. *One semester; three credits.*

**BIOL 212L. COMPARATIVE VERTEBRATE ANATOMY LABORATORY**

Laboratory experience to illustrate and explain the principles covered in BIOL 212. Dissection of preserved representative specimens including shark, amphibian, and cat is required. Prerequisite or corequisite: BIOL 212. Offered in the Spring semester. *One semester; one credit.*

**BIOL 213. MEDICAL AND SCIENTIFIC TERMINOLOGY**

This course examines the Latin and Greek origins of words used in the scientific and medical community. In addition to learning the basic meaning of these words, their prefixes, suffixes and combining forms will also be studied. Emphasis will be given to terms applicable to the systems, structure, function and diseases of the human body as well as zoological and botanical terms. Attention will also be given to pronunciation, spelling and common abbreviations used in scientific writings. An understanding of etymology will give students in any area of specialization a better comprehension of the fundamental meaning of many English words. Prerequisite: BIOL 112 and CHEM 113 or higher. Offered as needed. *One semester; one credit*

**BIOL 216. BOTANY**

A comprehensive study of the principles of botany. Topics include a survey of the major groups of plants, algae, and fungi, their life cycles, anatomy, metabolism, biogeography, ecology and evolution. Prerequisites: BIOL 112 and CHEM 113 or higher. Corequisite: BIOL 216L. Offered in odd numbered Fall semesters. *One semester; three credits*

**BIOL 216L. BOTANY LABORATORY**

Laboratory experience to illustrate the principles of plant physiology, anatomy, and ecology presented in BIOL 216 lecture. The course includes field trips and data-gathering at a variety of biological communities. Prerequisite: BIOL 112L and CHEM 113 or higher. Corequisite: BIOL 216. Offered in odd numbered Fall semesters. *One semester; one credit*

**BIOL 217. HUMAN ANATOMY AND PHYSIOLOGY I**

The first half of a study of the various levels of organization of the human body. The first semester covers cells, cell metabolism, tissues and the integumentary, skeletal, muscular, nervous, sensory, and endocrine systems. Prerequisite: BIOL 111 and 112 BIOL 112L and CHEM 113 or higher; Corequisite: BIOL 217L. Offered in the Fall semester. *One semester; three credits.*

**BIOL 217L. HUMAN ANATOMY AND PHYSIOLOGY I LABORATORY**

Laboratory experience to illustrate and explain the principles covered in BIOL 217. Dissection of a preserved mammalian specimen is required. Prerequisite or corequisite: BIOL 217. Offered in the Fall semester. *One semester; one credit*

**BIOL 218. HUMAN ANATOMY AND PHYSIOLOGY II**

A continuation of BIOL 217, this semester covers the cardiovascular, immune, digestive, respiratory, urinary and reproductive systems. Students will be responsible for a nominal fee to cover the required CPR course. Prerequisites: BIOL 217, 217L and CHEM 113. Corequisite: BIOL 218L. Offered in the Spring semester. *One semester; three credits.*

**BIOL 218L. HUMAN ANATOMY AND PHYSIOLOGY II LABORATORY**

Laboratory experience to illustrate and explain the principles covered in BIOL 218. Dissection of a preserved mammalian specimen is required. Prerequisite BIOL 217, BIOL 217L, and CHEM 113. Prerequisite or corequisite: BIOL 218. Offered in the Spring semester. *One semester; one credit*

**BIOL 236. NUTRITION**

The basic principles of nutrition are studied with particular emphasis on their applications to human health and development. This course includes a study of the essential nutrients; current and past dietary trends, including ethnic considerations; relationship of RDAs and diets to health, disease, and causes of death; changes in individual nutrient requirements based on factors such as age, gender, heredity, environment, etc.; governmental legislation regarding food labels, processing additives, contaminants, preservatives, and dietary guidelines; and a personal assessment of one's own eating habits, requirements, and potential health problems. Outside reading materials related to current nutritional "trends" will be assigned. Prerequisite: BIOL 112 and CHEM 113 or higher. Offered as needed. *One semester; three credits*

**BIOL 240. INTRODUCTION TO BIOINFORMATICS**

The course considers introductory topics in bioinformatics. Topics include the structure of DNA, string representation in PERL, data searches, pairwise alignments, substitution patterns, protein structure prediction and modeling, proteomics and the use of web-based tools for topics in bioinformatics. Offered in even-numbered Spring semesters. (Same as CS 240). Prerequisite: BIOL 111. *One semester; three credits*

**BIOL 290-299. SPECIAL TOPICS IN BIOLOGY**

Selected topics of interest. Prerequisites: BIOL 112 and CHEM 113 or higher; permission of the Instructor. Corequisite: The laboratory course if offered. *One semester; one to four credits*

**BIOL 290L-299L. SPECIAL TOPICS IN BIOLOGY LABORATORY**

Laboratory experience to illustrate and explain the principles covered in BIOL 290-299L. Prerequisites: BIOL 112 and CHEM 113 or higher; permission of the Instructor. Corequisite: The lecture course. *One semester; one credit*

**BIOL 311. ADVANCED GENETICS**

A study of the structure and function of nucleic acids in viruses, prokaryotes, and eukaryotes along with basic concepts, principles and applications of classical, molecular and population genetics. Topics include recombinant technology, genetics and cancer, developmental and behavioral genetics, genetic engineering. Prerequisites: Grade of "C" or better in BIOL 112 and CHEM 212. Corequisite: BIOL 311L. Offered in the Fall semester. *One semester; three credits*

**BIOL 311L. ADVANCED GENETICS LABORATORY**

Laboratory experience to illustrate and explain the principles covered in BIOL 311. Prerequisite or corequisite: BIOL 311. Offered in the Fall semester. *One semester; one credit*

**BIOL 312. HUMAN PHYSIOLOGY**

A study of the biochemical and biophysical mechanism underlying human physiology and pathophysiology at a system level. Emphasis is placed on the role of membranes, nerves, and hormones in maintaining homeostasis. Prerequisite: BIOL 112, BIOL 112L. Recommended: CHEM 211 and 211L, 315 and PHYS 201. Corequisite BIOL 315L. Offered in the Fall semester. *One semester; three credits*

**BIOL 312L. HUMAN PHYSIOLOGY LABORATORY**

Laboratory experience to illustrate and explain the principles covered in BIOL 312. Prerequisite or corequisite: BIOL 312. Offered in the Fall semester. *One semester; one credit*

**BIOL 321. ADVANCED MICROBIOLOGY**

A study of microbial biochemistry, molecular biology, morphology, physiology, metabolism, growth and growth control, taxonomy, diversity, genetics, evolution, ecology, and immunology with emphasis on bacteria and viruses. Topics in medical, food, industrial, microbiology, and public health. Prerequisites: Grade of "C" or better in BIOL 112 and CHEM 211 and Junior or Senior standing. Corequisite: BIOL 321L. Offered in the Spring semester. *One semester; three credits*

**BIOL 321L. ADVANCED MICROBIOLOGY LABORATORY**

Laboratory experience to illustrate and explain the principles covered in BIOL 321. Corequisite: BIOL 321. Offered in the Spring semester. *One semester; one credit*

**BIOL 335. INVERTEBRATE ZOOLOGY**

Taxonomy, ecology, evolution, morphology, and physiology of invertebrate phyla. Prerequisites: BIOL 112 and CHEM 113 or higher, 7 additional credits in Biology at the 200 level or higher, and junior or senior status. Corequisite: BIOL 335L. Offered in odd numbered Fall semesters. *One semester; three credits*

**BIOL 335L. INVERTEBRATE ZOOLOGY LABORATORY**

Laboratory experience to illustrate and explain the principles in BIOL 335. Students are required to participate in the Gulf Coast Field trip. Offered in odd numbered Fall semesters. Prerequisite or corequisite: BIOL 335. *One semester; one credit*

**BIOL 346. EVOLUTION**

Investigation of the evidence, proponents, and theories of organic evolution with emphasis on modern contributions to the understanding of speciation. Topics covered in this course includes macroevolution, phylogenetics and evolutionary history of major groups of organisms, genetic drift, evolution of genomes, variation, genetical theory of natural selection, and phenotypic evolution. Prerequisite: BIOL 112 and CHEM 113 or higher. Offered in odd numbered Spring semesters. *One semester; three credits*

**BIOL 350. RESEARCH METHODS**

This course is designed for students who are involved in research projects that will not be considered for their senior research thesis. Students should either be in a research program or working with a researched off campus. Students should participate in a minimum of 200 hours on the research project. The students will be required to be familiar with several techniques within their research and describe how they are used in research. In addition to the description of the techniques the students will summarize their research experience and data in a short narrative. Prerequisites: BIOL 112, BIOL 112L, CHEM 114, CHEM 114L, permission of the instructor or Chair of the Department. Offered as needed. *One semester; three credits*

**BIOL 362. BIOLOGY SEMINAR**

Seminar series in which research scientists are invited to discuss their current research. Students are expected to submit a research proposal which they will use as the basis for their mandatory senior research project. Prerequisites or corequisites: Junior standing, BIOL 112, BIOL 112L, and a minimum of two upper division biology courses (300 or 400 level); CHEM 212, Science GPA of 2.5 or higher or permission of the instructor or Chair of the Department. Offered in the Spring semester. *One semester; one credit*

**BIOL 366. RESEARCH METHODS**

This course is designed for students who are involved in research projects that will not be considered for their senior research thesis. Students should be either in a research program or working with a researcher off campus. Students should participate in a minimum of 200 hours on their research project. Students will be required to be familiar with several techniques with their research and describe how they are used in research. In addition to the description of the techniques the students will summarize their research experience and data in a short narrative. Prerequisites: BIOL 112, BIOL 112L, CHEM 114 and CHEM 114L. Permission of the Instructor or Chair of the Department. Offered as needed. *One semester; three credits*

**BIOL 367. PHARMACOLOGY**

An introduction to the structure, mechanisms, pharmacokinetics, pharmacodynamics, therapeutic uses, and adverse reactions of prototypic agents from the major categories of drugs. Prerequisites: CHEM 212, and either BIOL 217 and 218 or BIOL 312. Offered in odd numbered Fall semesters. *One semester; three credits*

**BIOL 369. HERPETOLOGY**

Herpetology is the study of amphibians and reptiles. In this course we will examine the major taxonomic groups of amphibia and reptilia in depth, focusing on local groups and surveying the more interesting exotic members of these taxa to gain an understanding of their diversity. Life history, anatomy, physiology, ecology, and conservation issues are among the topics that will be discussed. Prerequisites BIOL 111, 112, CHEM 113 or higher, seven additional credits of biology at the 200 level or higher, and Junior or Senior standing. Corequisite: BIOL 369L. Offered in even numbered Spring semesters. *One semester; three credits.*

**BIOL 369L. HERPETOLOGY LAB**

The student will learn to visually identify (to species level) the amphibians and reptiles naturally found in Western Tennessee. Additionally, the student will learn to identify amphibians by vocalization (frog calls). Initial identification will take place in the lab using preserved specimens and also digital images and sounds. Identification skills will continue to be developed in the field while on field trips to nearby sites. Field techniques for performing natural history surveys will be discussed, followed by implementation in the field. Prerequisites BIOL 111, 112, CHEM 113 or higher, seven additional credits of biology at the 200 level or higher, and Junior or Senior standing. Corequisite: BIOL 369L. Offered in even numbered Spring semesters. *One semester; one credit.*

**BIOL 370. TOXICOLOGY**

An introduction to the basic principles of toxicology including investigation of the sites and modes of action of toxic agents and the factors affecting their toxicity, this course will also examine sources, fate, and effects of environmental pollutants. Prerequisites: BIOL 112 and CHEM 212. Offered in Spring semester of even numbered years. *One semester; three credits*

**BIOL 381. ANIMAL BEHAVIOR**

The study of the mechanisms and evolution of animal behavior. Topics include methods for the observation and quantification of behavior, natural selection and evolution of behavior, behavior genetics, neural and physiological mechanisms of behavior, communication, aggression, sexual reproduction, mating systems, and interspecific behavioral interactions. Prerequisites: Junior or senior standing, BIOL 111, 112, CHEM 113 or higher, and seven additional credits of Biology at the 200 level or higher, and Junior or Senior standing. Offered in even numbered Spring semesters. Group III Biology elective. *One semester; three credits.*

**BIOL 390-398. SPECIAL TOPICS IN BIOLOGY**

Selected topics of interest. Prerequisite: BIOL 112, CHEM 113 or higher, and 4 credits in Biology at the 200 level or higher; permission of the instructor. *One semester; one to four credits*

**BIOL 390-398. SPECIAL TOPICS IN BIOLOGY LAB**

Selected topics of interest. Prerequisite: BIOL 112, CHEM 113 or higher, and 4 credits in Biology at the 200 level or higher; permission of the instructor. Corequisite: the lecture course. *One semester; one credit*

**BIOL 412. ECOLOGY**

Study of the principles of ecology. Topics to be investigated include population organization, demographics and regulation, community and ecosystem structure, coactions, abiotic factors, cycles of matter, energy flow, and characteristics of biomes. Prerequisites: BIOL 112, CHEM 113 or higher, and Junior or Senior standing. Corequisite: BIOL 412L. Offered even numbered Fall semesters. *One semester; three credits*

**BIOL 412L. ECOLOGY LABORATORY**

Laboratory experience to illustrate and explain the principles covered in BIOL 412. The course includes data-gathering in both terrestrial and aquatic ecosystems and field trips to ecologically important sites. Students are required to participate in the Gulf Coast Field trip. Prerequisite or corequisite: BIOL 412. Offered in even numbered Fall semesters. *One semester; one credit*

**BIOL 413. PARASITOLOGY**

A study of the morphology, taxonomy, life cycle, distribution, pathology, and control of parasites of man and other animals. Alternates with Invertebrate Zoology. Prerequisites: BIOL 112, CHEM 113 or higher, seven additional credits in biology at the 200 level or higher, and Junior or Senior standing. Corequisite: BIOL 413L. Offered in the Fall semester. *One semester; three credits*

**BIOL 413L. PARASITOLOGY LABORATORY**

Laboratory experience to illustrate and explain the principles covered in BIOL 413. Students conduct surveys to study the distribution of parasites and conduct long-term studies on the pathology of parasitic infection. Students are required to participate in the Gulf Coast Field trip. Prerequisite: BIOL 112L. Corequisite: BIOL 413. Offered in the Fall semester. *One semester; one credit*

**BIOL 414. ANIMAL HISTOLOGY**

A study of the microscopic and ultramicroscopic structure of vertebrate (primarily mammalian) tissues and organs, i.e., microscopic anatomy. Special emphasis is placed on the relationship of structure to function. Group I Biology elective. Prerequisites: BIOL 112, CHEM 113 or higher, seven additional hours of Biology at the 200 level or higher, and Junior or Senior standing. Corequisite: BIOL 414L. Offered in odd numbered Spring semesters. *One semester; three credits*

**BIOL 414L. ANIMAL HISTOLOGY LABORATORY**

Laboratory experience to illustrate and explain the principles covered in BIOL 414. Prerequisite or corequisite: BIOL 414. Offered in odd numbered Spring semesters. *One semester; one credit*

**BIOL 415. IMMUNOLOGY**

The study of antigens, antibodies, organs and cells involved in humoral and cell-mediated immunity; immunologic techniques are discussed, as well as immune problems such as autoimmunity and AIDS. Prerequisites: BIOL 112 and CHEM 212. Recommended: BIOL 311. Corequisite: BIOL 415L. Offered in the Fall semester. *One semester; three credits*

**BIOL 415L. IMMUNOLOGY LABORATORY**

Laboratory experience to illustrate and explain the principles covered in BIOL 415. Prerequisite or corequisite: BIOL 415. Offered in the Fall semester. *One semester; one credit*

**BIOL 421. CELL/MOLECULAR BIOLOGY**

A study of eukaryotic cell structures and function. Special emphasis is placed on the role that biomolecules play in cell surface interactions that lead to intracellular signaling. The clinical and molecular nature of cancer is also discussed. Prerequisites: BIOL 112 and CHEM 212. Recommended: BIOL 311. Offered in the Spring semester. *One semester; three credits*

**BIOL 421L. CELL/MOLECULAR BIOLOGY LABORATORY**

Laboratory experiences will demonstrate the concepts covered in BIOL 421. Experiments will employ techniques such as PCR, bacterial transformation, amplification and restriction mapping of plasmid DNA, western blotting and affinity chromatography. Corequisite: BIOL 421. Offered in the Spring semester. *One semester; one credit*

**BIOL 430. BIOLOGY OF ZOO ANIMALS**

The student will develop a broad understanding of the Phylum Chordata with emphasis on the subphylum Vertebrata. The focus will be on exotic animals and conservation methods associated with them. Lecture topics will include but are not limited to: vertebrate taxonomy and phylogeny, zoological biodiversity, thermoregulation, water balance, amphibian gas exchange, reproductive systems, nutritional requirements, and US laws and regulations. The course is geared to students who are interested in zoological park careers, animal care and protection, animal management, wildlife management, veterinary medicine, science teaching, or environmental management and protection. Prerequisite: Seven additional credits of biology at the 200 level or higher. *One semester; three credits*

**BIOL 430L. BIOLOGY OF ZOO ANIMALS LABORATORY**

The laboratory experience integrates knowledge and application by emphasizing the practical aspects of the care of exotic and domestic vertebrates. Students will conduct library research in aspects of vertebrate families and prepare a species profile. Work at the Memphis Zoo under the guidance

of a zoologist and field trips are integral components of the laboratory experience. *One semester; one credit*

### **BIOL 451. NEUROSCIENCE**

This course will investigate the field of neuroscience with emphasis on neuroanatomy of the mammalian brain. Also contained within this course will be the study of neurophysiology and neuropharmacology using both vertebrate and invertebrate central and peripheral nervous systems. Offered in the Spring semester. Prerequisite: Junior or Senior standing or permission of the instructor; BIOL 218 and CHEM 211 or higher. Recommended: CHEM 315. Corequisite: BIOL 451L. *One semester; three credits*

### **BIOL 451L. NEUROSCIENCE LABORATORY**

This laboratory is designed to complement the Neuroscience lecture course. Neuroanatomy will be taught at both the gross and microscopic level. Experiments and demonstrations will be used to study neurophysiology and neuropharmacology concepts. Corequisite: BIOL 451. Offered in the Spring semester. *One semester; one credit*

### **BIOL 461. INDEPENDENT RESEARCH I**

Under the guidance of a faculty member, senior students design and conduct an organized research project usually requiring 100-150 in-lab hours. Course emphases include experimental design, controls, analysis of results, use of professional literature, and the writing of a draft of a journal-quality paper. Prerequisites: BIOL 362, Permission of the Chair or Course Director, and Senior standing. *One semester; one credit*

### **BIOL 462. INDEPENDENT RESEARCH II**

A continuation of BIOL 461, the students prepare to present their results in three forms - a final paper, an oral presentation at a public forum, and a poster session on campus. Prerequisites: BIOL 461 and Senior standing. *One semester; one credit*

### **BIOL 463. MENTORED RESEARCH I**

Research projects are conducted under the guidance of a practicing researcher, generally off campus, but under some circumstances mentored research may be conducted at CBU. Research is performed in the summer preceding the senior year. Mentored Research I usually requires 200-300 in-lab hours. Students are required to attend group discussions and participate in tutorial meetings or correspondence with the course director. Students normally register for Mentored Research I during the summer. Students unable to begin their research during the summer will need permission of the course director to register for Mentored Research I concurrently during the Fall semester. Students are required to take the ETS Biology II exam (BIOL 499) which will be administered in exam week of the Fall semester. Prerequisites: BIOL 362, Senior standing or permission of the instructor. Offered in the Summer and Fall semesters. *One semester; one credit*

### **BIOL 464. MENTORED RESEARCH II**

This course is a continuation of Mentored Research I. During this course the students will meet weekly to discuss their research results and analyze their data. Project results will be presented in a formal paper by the end of the Fall semester. Prerequisite or corequisite: CHEM 315, CHEM 315L, BIOL 463 and BIOL 499. *One semester; two credits*

### **BIOL 465. MENTORED RESEARCH III**

During this course, the students will present the results of their work in a public forum as an oral paper and in a poster session on campus. Prerequisite: BIOL 464. Offered in the Spring semester. *One semester; two credits.*

### **BIOL 490-498. SPECIAL TOPICS IN BIOLOGY**

Selected topics of interest. Prerequisite: BIOL 112 and CHEM 113 or higher, seven additional credits of biology at the 200 level or higher; permission of instructor. *One semester; one to four credits*

### **BIOL 490-498. SPECIAL TOPICS IN BIOLOGY LAB**

Laboratory to accompany BIOL 490-498. Prerequisite: BIOL 112 and CHEM 113 or higher, seven additional credits of biology at the 200 level or higher; permission of instructor. *One semester; one to four credits*

### **BIOL 499. SENIOR COMPREHENSIVE**

First semester seniors are required to take a comprehensive examination (ETS) on selected fields of biology. A passing score is required for graduation. Offered in the Fall semester. *One semester; zero credit*

### **TENTATIVE SUMMER COURSES** in affiliation with the Gulf Coast Research Laboratory (GCRL), Ocean Springs, MS:

Barrier Island Ecology, Coastal Ornithology

Marine Biology, Marine Mammals, Marine Ecology, Marine Conservation, Shark Biology, Oceanography.

Marine Ichthyology, Marine Invertebrate Zoology, Marine Aquaculture, Marine Biology, Marine Microbiology.

Oceans and Human Health, Marine Fungi, Marine Toxicology

*For additional information about the course offerings at the GCRL, see the Chair of the Biology Department.*

## **■ BUSINESS ADMINISTRATION COURSES**

### **BUS 103. FUNDAMENTALS OF BUSINESS**

This course covers the basic business concepts, disciplines, and practices. It surveys major types of business institutions, functional areas of business organizations, and business processes. It provides an orientation into the modern business world for both future business majors and also for other majors. NOTE: if taken by students with 24 hours or more, credit will not count for B.S. degree with a major in Accounting or Business Administration. Offered in both Fall and Spring semesters. *One semester; three credits*

### **BUS 160-164. SPECIAL TOPICS IN BUSINESS ADMINISTRATION**

Each course is designed to permit intensive study into topics of special interest and timeliness in one or more areas of business administration. Offered as needed. *One semester; one to three credits*

**BUS 205. BUSINESS PROBABILITY AND STATISTICS**

This course covers basic concepts and methods of probability and statistics for use in the business disciplines. Topics include: quantitative analysis, measurement scales, analysis and description of data, types and methods for probability estimation, probability distributions, and measures of central tendency, skewness, and dispersion. Use of computer spreadsheet models for probability and statistics is covered. Prerequisites: MIS 153, MATH 105 or higher, and admission to the Professional Studies program. *One semester; three credits*

**BUS 206. BUSINESS RESEARCH METHODS**

This course covers the basic concepts and methods for business research. Topics covered include both primary research (observations, experiments, surveys, focus groups, etc.) and secondary research (library and internet literature searching). Research proposal and research report writing is also included. Sampling, data analysis, regression, and hypothesis testing is covered using computer spreadsheet models. Prerequisites: BUS 205, MIS 153, MATH 105, and admission to the Professional Studies program. *One semester; three credits.*

**BUS 260-264. SPECIAL TOPICS IN BUSINESS ADMINISTRATION**

Each course is designed to permit intensive study into topics of special interest and timeliness in one or more areas of business administration. Offered as needed. *One semester; one to three credits*

**BUS 360-364. SPECIAL TOPICS IN BUSINESS ADMINISTRATION**

Each course is designed to permit intensive study into topics of special interest and timeliness in one or more areas of business administration. Offered as needed. *One semester; one to three credits*

**BUS 499. BUSINESS ADMINISTRATION COMPREHENSIVE EXAMINATION**

Seniors will be required to take a comprehensive examination in the student's field(s) of concentration. The examination date will be announced. A passing score is required for graduation. Prerequisite: Dean of the School of Business. Pass/Fail Grading. *One semester; zero credits.*

**■ BUSINESS LAW COURSES****BLAW 301. BUSINESS LAW I** (Formerly BUS 301)

The origins and general survey of contract law along with the nature, formation, execution, and interpretation of contracts in the common law system. Emphasis is on instruction in legal principles that govern typical business situations and on the rules of law and procedure applied by the courts in the United States. Offered in both Fall and Spring semesters. *One semester; three credits*

**BLAW 302. BUSINESS LAW II** (Formerly BUS 302)

Continuation of BLAW 301. In-depth study of the Uniform Commercial Code and its far reaching effects on modern business transactions; the laws of agency, partnerships and corporations, and the legal concept of property. Offered in both Fall and Spring semesters. *One semester; three credits*

**BLAW 345. LEGAL ENVIRONMENT OF BUSINESS** (Formerly BUS 345)

The course deals with administrative law. Primary areas of concentration include anti-trust law, consumer protection, securities regulation, labor law, and environmental law. Offered in the Spring semester. *One semester; three credits*

**■ CHEMICAL ENGINEERING COURSES**

*Requirements for the degree are found on Pages 72 and 73.*

**CH E 101, 201. CHEMICAL ENGINEERING PROJECT**

Chemical Engineering Project is a four-semester sequence of courses where all of the students participate in technical team projects and learn about written and oral presentations, use of the library, and other sources to retrieve technical data, prepare for and make effective job searches. Participate in the local Student AIChE chapter meetings, participate in discussions with panels of practicing engineers from local industry, and visit chemical plants. Industrial safety, ethics, environmental responsibility, and other suitable topics are covered. *Two semesters; one credit each*

**CH E 111. INTRODUCTION TO CHEMICAL ENGINEERING I**

This introductory course provides an understanding of the chemical engineer's role in industry. Students will be introduced to the system of measurement units, the concepts of mass and energy balances, and the basic approaches for simple unit operations. Corequisite: MATH 117. Offered in Fall semester. *One semester; one credit*

**CH E 112. INTRODUCTION TO CHEMICAL ENGINEERING II**

Continuation of CH E 111. Process variables and mass and energy balances. Graphical analysis of engineering problems using spreadsheets and other software. Simple statistics. Prerequisite: CH E 111 or permission of the department. Offered in the Spring semester. *One semester; one credit.*

**CH E 231. ELEMENTARY THERMODYNAMICS**

Study of the fundamental principles and concepts of thermodynamics of pure materials. Fundamental laws and concepts of the macroscopic approach to the thermodynamics of pure materials. Properties of pure materials from tables, charts and ideal-gas equation. Heat and work. Energy balances on open and closed systems. First and second law analysis of open and closed systems. Introduction to heat engines and heat pumps. (Same as ME 305). Prerequisites: MATH 132 and CHEM 113 or 115 Corequisite: PHYS 150. Offered in the Fall semester. *One semester; three credits*

**CH E 232. MATERIAL AND ENERGY BALANCES**

Multi-component material and energy balances in chemical reactions and processes. Compressibility of real-gases. Single and multi-phase material balances of multiple component chemical processes. Energy balances of reactive and non-reactive systems. Properties of ideal mixtures. Prerequisite: CH E 231. Offered in the Spring semester. *One semester; four credits*

**CH E 314. ENGINEERING ECONOMY** (Formerly CH E 414)

Fundamentals of engineering economy. Cost concepts. Time value of money and equivalence. Economic analysis of alternatives. Depreciation and after-tax analysis. Effects of inflation on economic analysis. Currency exchange rates. Effects of global economic issues on engineering decision making. Prerequisite: MATH 132. (Same as CE 314, ECE 314, ME 314) *One semester; three credits*

**CH E 319. PRINCIPLES OF PACKAGING**

Overview of the historical development of packaging, the system of packaging science, along with information about economic importance, social implications and packaging as a profession. Study of the functions of packaging and materials, container types, processes, technology and equipment employed to protect goods during handling, shipping and storage. Introduction of package development process, packaging testing and evaluation methods, standards, and equipment. Brief review of governmental regulations affecting packaging. (Same as ME, PKG 319) Prerequisites: MATH 131 and CHEM 113 or 115. *One semester; three credits.*

**CH E 320. DISTRIBUTION/MEDICAL DEVICE PACKAGING**

Overview of physical distribution systems, various distribution hazards imposed to products/packages in transit, rules and regulations governing distribution packaging, and common industry guidelines and practices on distribution packaging. Study of the package design process, protective packaging theories and applications, selection and design, other distribution packaging related materials and applications. Introduction to package testing and evaluation methods, standards, and equipment/systems. Introduction to basics of packaging materials, packaging design and development, and sterilization methods used in biomedical industry. (Same as ME, PKG 320) Prerequisites: MATH 131 and CHEM 113 or 115. *One semester; three credits.*

**CH E 323. FLUID MECHANICS**

A study of the principles of fluid mechanics and applications to Chemical Processing. Prerequisites: CH E 232 and MATH 231. Corequisite: CH E 325. Offered in the Fall semester. *One semester; three credits*

**CH E 324. HEAT TRANSFER**

Study of the principles of heat transfer and applications to Chemical Processes. Design of heat exchangers and evaporators. Prerequisite: CH E 323. Corequisite: CH E 326. Offered in the Spring semester. *One semester; three credits.*

**CH E 325. JUNIOR LABORATORY I**

Experimental study of flow of fluids. Flow measurements. Packed and fluidized bed hydraulics. Corequisite: CH E 323. Offered in the Fall semester. *One semester, one credit*

**CH E 326. JUNIOR LABORATORY II**

Experimental study of heat transfer. Includes double pipe heat exchanger, plate heat exchanger, temperature sensor response, air cooled exchanger. Corequisite: CH E 324. Offered in the Spring semester. *One semester; one credit*

**CH E 327. CHEMICAL ENGINEERING THERMODYNAMICS**

Thermodynamic analysis of multi-component, multiphase, and reacting systems. Calculation of properties for real materials. Application of First and Second Laws. Free-energy, activity, fugacity and activity coefficients. Phase equilibrium. Chemical reaction equilibrium and reaction rate kinetics. Prerequisite: CH E 231 or ME 305. Offered in the Fall Semester. *One semester; three credits*

**CH E 328. MATERIALS SCIENCE (Formerly CH E 245)**

Material classification, behavior, properties and selection. The internal structures of metals, ceramics, polymers and electronic materials are examined to develop understanding of their mechanical, physical, chemical, electrical properties. Develop some insight to controlling of properties and behavior of materials by manipulating internal structures. (Same as ME 428) Prerequisites: CHEM 113 or CHEM 115. *One semester; three credits*

**CH E 330. MASS TRANSFER & SEPARATIONS**

Study of mass transfer and integration of heat, mass, and momentum transfer into analysis of process operations of gas absorption, distillation, adsorption, ion exchange and liquid extraction. Prerequisites: CH E 323, 327. Corequisite: CH E 324. Offered in Spring semester. *One semester; three credits*

**CH E 400. THE COMPLETE ENGINEER**

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. (Same as ECE 400, CE 400, and ME 400) Prerequisite: Permission of the department and MATH 232. *One semester; three credits*

**CH E 401, 402. CHEMICAL ENGINEERING SENIOR PROJECT**

These courses introduce students to real world problems in chemical engineering and related fields. Senior project must be approved by the course instructor, and the work supervisor when conducted outside of CBU. Credit for CH E 402 is granted upon approval of periodic and final review of the report submitted by the student. Prerequisite: Senior standing in Chemical Engineering. Offered in the Fall and Spring semesters. *One semester each; two credits each*

**CH E 410. AIR POLLUTION CONTROL**

Causes and consequences of air pollution, regulatory concerns, and methods for controlling and mediating the consequences of air contaminants. Pre-requisite: CHEM 113 or 115 and junior standing or permission from the instructor. Offered in the Spring semester. *One semester; three credits*

**CH E 412. INDUSTRIAL AND PROCESS SAFETY**

Basic principles of industrial safety. Focus is on the hazards and risks of industrial processes (particularly those in the chemical process industries) and how these hazards can be controlled. CHEM 113 or 115 and junior standing or permission from the instructor. Offered in the Spring semester. *One semester, three credits*

**CH E 425. PROCESS DESIGN I**

Application of principles and concepts of prior course work with safety, economic and practical considerations to design equipment to meet a processing need. The emphasis is placed upon a particular unit or subsystem rather than a complete process which is the subject of CH E 426, Process Design II. Prerequisite: CH E 330. Corequisite: CH E 443. Offered in the Fall semester. *One semester; three credits*

**CH E 426. PROCESS DESIGN II**

Application of principles of process and plant design utilizing knowledge from earlier course material to solve comprehensive industrial problems. Includes flowsheet development, equipment sizing and determination of operating parameters, startup and safety considerations, cost estimation and economic analysis. Prerequisite: CH E 425 and CH E 443. Offered in the Spring semester. *One semester; three credits*

**CH E 437. MODELING AND CONTROL IN CHEMICAL ENGINEERING**

Development of mathematical models for Chemical Engineering systems in terms of ordinary differential equations. Design of feedback control systems. Controller stability and tuning. A laboratory project demonstrating control principles may be included. Prerequisite: CH E 330. Offered in the Fall semester. *One semester; three credits*

**CH E 441. SENIOR LABORATORY I**

Experimental study of applications of heat, mass and momentum transfer. Studies include filtration, ion exchange, distillation, etc. Both written and oral reports required on results of experiments. Prerequisites: CH E 330. Offered in the Fall semester. *One semester; one credit*

**CH E 442. SENIOR LABORATORY II**

Topics include, experimental study of Reaction Kinetics and behavior of various reactors, polymerization and characterization of polymers. Both written and oral reports are required on experimental results. Prerequisite: CH E 443. Offered in the Spring semester. *One semester; one credit*

**CH E 443. REACTOR DESIGN**

A study of the terminology and theory of chemical kinetics of homogeneous and heterogeneous isothermal systems and homogeneous non-isothermal systems. Application of kinetics to analysis and design of batch and flow reactors and their combinations to achieve specified production. Prerequisites: CH E 324, 327. Corequisite: CH E 441. Offered in the Fall semester. *One semester; three credits*

**CH E 444. POLYMERIC MATERIALS**

Introduction to chemistry, physics, technology and uses of common high polymers currently being produced. Prerequisite: CH E 443. Offered in the Spring semester. *One semester; three credits*

**CH E 446. BIOCHEMICAL ENGINEERING**

Extension of chemical engineering fundamentals to biological systems. The topics will include principles of bioreaction engineering and bioseparation. Laboratory experiments will support the concepts introduced in the lecture. Prerequisites: CHEM 312 or 315 and CH E 443. Offered in the Spring semester. *One semester; three credits*

**CH E 490-494. SPECIAL TOPICS**

Elective courses of special or current interest. Taught by faculty with special or unique qualifications. Prerequisites are announced with course offerings. *One semester; one to four credits*

**CH E 495. INTERNSHIP IN CHEMICAL ENGINEERING**

Students majoring in chemical 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; one to three credits*

**■ CHEMISTRY COURSES**

*Requirements for the degrees are found on Pages 91-94.*

**CHEM 101. INTRODUCTION TO COLLEGE CHEMISTRY**

This course is designed for students who are unprepared to begin the study of chemical principles. Emphasis is on elements and their symbols, names and formulas of compounds, valences, balancing equations, stoichiometry, and the algebra required for proficiency in chemistry. Prerequisite or corequisite: MATH 103 or 117 or placement in a higher numbered MATH course. This course does not supply any portion of the science credits required in any CBU degree program. Offered in the Fall semester. *One semester; three credits*

**CHEM 113. PRINCIPLES OF CHEMISTRY I**

This is the first-semester chemistry course for all students of science and chemical engineering. Topics include matter, measurements, atoms, molecules, ions, use of formulas and equations, thermochemistry, gases, electronic structure, the periodic table, covalent bonding, molecular structure, liquids and solids, and solutions. Prerequisite: CHEM 101 at Christian Brothers University or high school chemistry and satisfactory performance on departmental placement examination. Prerequisite or corequisite: MATH 117 or MATH 129 or MATH 131; CHEM 113L. Offered in the Fall and Spring semesters. *One semester; three credits*

**CHEM 113L. CHEMICAL PRINCIPLES I LABORATORY**

This course is designed to illustrate and explain the principles covered in CHEM 113. Prerequisite or corequisite: CHEM 113. Offered in the Fall and Spring. *One semester; one credit*

**CHEM 114. PRINCIPLES OF CHEMISTRY II**

This is the second-semester chemistry course for students of science and chemical engineering. Topics include chemical equilibrium, precipitations, acids and bases, chemical thermodynamics and kinetics, oxidation and reduction, electrochemistry, and nuclear reactions. Prerequisites: CHEM 113, 113L. Prerequisite or corequisite: CHEM 114L. Offered in the Spring semester. *One semester; three credit*

**CHEM 114L. CHEMICAL PRINCIPLES II LABORATORY**

This course is designed to illustrate and explain the principles covered in CHEM 114. Prerequisite or corequisite: CHEM 114. Prerequisite: CHEM 113, 113L. Offered in the Spring semester. *One semester; one credit*

**CHEM 115. GENERAL CHEMISTRY**

A one-semester survey course in chemistry. Topics include matter, formulas and equations, thermochemistry, gases, electronic structure of the atom, the periodic table, bonding, molecular structure, liquids and solids, chemical kinetics, equilibrium, and electrochemistry. Prerequisite: MATH 117 or equivalent. Prerequisite or corequisite: CHEM 115L. Offered in the Fall semester. *One semester; three credits*

**CHEM 115L. GENERAL CHEMISTRY LABORATORY**

A one-semester laboratory course in chemistry designed to illustrate and explain the concepts covered in CHEM 115. Prerequisite or corequisite: CHEM 115. *One semester; one credit*

**CHEM 205. FORENSIC CHEMISTRY**

This course is an introduction to the basic principles of forensic chemistry. The course begins with a basic overview of forensic science, including crime scene investigation and collection and handling of physical evidence. Sample preparation, chromatography, drug analysis and toxicology, PCR and DNA fingerprinting, and chemical analysis of physical evidence will be discussed. Prerequisite: CHEM 114, 114L and MATH 117. Offered in the Fall semester. *One semester; one credit.*

**CHEM 211. ORGANIC CHEMISTRY I**

This course uses both a mechanistic and functional-group approach to introduce organic concepts. Topics include bonding, functional groups, stereochemistry, acids and bases, and conformations. Mechanisms covered include electrophilic addition,  $SN_2$ ,  $SN_1$ ,  $E_1$ ,  $E_2$  and radical reactions. This course deals with compounds from the aliphatic series. Prerequisites: CHEM 113, CHEM 113L, CHEM 114, and CHEM 114L with a minimum grade of "C" in each course. Prerequisite or corequisite: CHEM 211L. Offered in the Fall semester. *One semester; three credits*

**CHEM 211L. ORGANIC CHEMISTRY I LABORATORY**

This course is designed to teach the student the techniques of organic chemistry as well as to carry out reactions discussed in class. Some of the techniques presented are distillation, recrystallization, and extraction. The experiments will teach the proper methods of carrying out reactions. Prerequisites: CHEM 113, CHEM 113L, CHEM 114, and CHEM 114L with a minimum grade of "C" in each course. Prerequisite or corequisite: CHEM 211. Offered in the Fall semester. *One semester; one credit*

**CHEM 212. ORGANIC CHEMISTRY II**

This is the second in a two-semester sequence which builds on CHEM 211. This course will use a mechanistic and functional-group approach to introduce organic concepts. Topics include NMR, IR, and UV spectroscopy, aromaticity, enolates, and polymers. Mechanisms include EAS, NAS, nucleophilic addition, and nucleophilic acyl substitution. This course deals with compounds from both the aliphatic and aromatic series. Prerequisites: CHEM 211, 211L. Prerequisite or corequisite: CHEM 212L. Offered in the Spring semester. *One semester; three credits*

**CHEM 212L. ORGANIC CHEMISTRY II LABORATORY**

This class is a continuation of CHEM 211L. The lab will be a combination of spectroscopy, reactions and identification of unknowns. The experiments carried out in lab will correspond to ones discussed in class. The identities of the organic unknowns will be determined by chemical and spectroscopic means. The skills learned in the first semester are used extensively in this class. Prerequisites: CHEM 211, 211L. Prerequisite or corequisite: CHEM 212. Offered in the Spring semester. *One semester; one credit*

**CHEM 214. QUANTITATIVE ANALYSIS**

A course which covers analytical principles and sources of error, principles of volumetric and gravimetric analysis, electrogravimetry, potentiometric titrations, and spectrophotometric analysis. Prerequisites: CHEM 114, 114L. Prerequisite or corequisite: CHEM 214L. Offered in the Spring semester. *One semester; two credits*

**CHEM 214L. QUANTITATIVE ANALYSIS LABORATORY**

Laboratory to accompany CHEM 214. Prerequisite or corequisite: CHEM 214. Offered in the Spring semester. *One semester; two credits*

**CHEM 311. ORGANIC QUALITATIVE ANALYSIS**

This course covers the identification of pure organic compounds and mixtures. The course includes use of spectroscopy and chromatography as well as classical techniques. Prerequisites: CHEM 212, 212L. One hour of lecture and six hours of laboratory work per week. Offered in the Spring semester of odd-numbered years. *One semester; three credits*

**CHEM 312. BIOCHEMISTRY**

Introduction to the chemistry and metabolism of biologically important amino acids, proteins, carbohydrates and lipids, including enzyme systems, vitamins, hormones and nucleic acids. Prerequisites: CHEM 212, 212L. Prerequisite or corequisite: CHEM 312L. Offered in the Fall semester. *One semester; three credits*

**CHEM 312L. BIOCHEMISTRY LABORATORY**

This course is a study of the various compounds and reactions considered in CHEM 312. Typical biochemical analytical methods such as spectrophotometry, chromatography and centrifugation are utilized. A rigorous study of enzyme kinetics is included. Prerequisite or corequisite: CHEM

312. Offered in the Fall semester. *One semester; one credit*

**CHEM 315. BIOCHEMISTRY I** (Introduction to Biochemistry)

This course is a detailed introduction to the chemistry of the major classes of biologically important molecules including amino acids, proteins, carbohydrates, lipids, and nucleic acids. A discussion of the role of water in biological systems, techniques for isolation and characterization of biomolecules, enzyme kinetics, regulation of enzyme activity, membrane structure and function, bioenergetics, general characteristics of metabolic pathways, glycolysis, gluconeogenesis, the Krebs cycle, and glycogen metabolism will be included. The course will conclude with an introduction to signal transduction pathways. Prerequisites: CHEM 212, 212L. Prerequisite or Corequisite: CHEM 315L. Offered in the Fall semester. *One semester; three credits*

**CHEM 315L BIOCHEMISTRY I LABORATORY**

This course is designed to accompany Biochemistry I. It will provide an introduction to laboratory techniques used in the isolation and characterization of the major classes of biological molecules. Emphasis will be placed on techniques for protein purification and assay including chromatography, electrophoretic methods, centrifugation, spectroscopy, and enzyme kinetics. Prerequisites: CHEM 212, 212L. Prerequisite or corequisite: CHEM 315. Offered in the Fall semester. *One semester; one credit*

**CHEM 316. BIOCHEMISTRY II** (Metabolic Regulation and Signal Transduction)

This course is a continuation of Biochemistry I, providing a comprehensive introduction to the study of metabolic pathways with emphasis on basic principles of regulation. The mechanism of hormone action and interrelationships between signal transduction and metabolic regulation will be discussed. An introduction to drug design and the mechanism of action of drugs in the human body will be included. The course will conclude with an introduction to molecular biology. Prerequisites: BIOL 112, 112L and CHEM 315, 315L. Offered in the Spring semester. *One semester; three credits*

**CHEM 330. RESEARCH SEMINAR I** (formerly CHEM 430)

A study of the chemical literature and ethical conduct in science. Students will be required to prepare a journal club presentation and to write a research proposal. Attendance of departmental seminars is also required. Prerequisites: CHEM 212, 212L. Offered in the Fall semester. *One semester; zero credit*

**CHEM 331. RESEARCH SEMINAR II**

Students will be required to attend departmental seminars and to submit summaries of these presentations. Students will select a research project and advisor. Prerequisite: CHEM 330. Offered in the spring semester. *One semester; zero credit*

**CHEM 342 PHYSICAL BIOCHEMISTRY**

Studies of the physical properties of biological molecules. Prerequisites: MATH 131, CHEM 315 & 315L, or permission of instructor. Offered in the Fall semester. *One semester; three credits*

**CHEM 351. PHYSICAL CHEMISTRY I**

Studies of the kinetic theory and properties of gases, the laws of thermodynamics, molecular energies, free energy and equilibrium, phase equilibria, ideal and real solutions, colligative properties, electrochemistry, rates and mechanisms of chemical reactions, catalysis, photochemistry, and collision theory. Prerequisites: CHEM 114, 114L; MATH 231; and PHYS 251, 251L. Prerequisite or corequisite: CHEM 351L. Offered in the Fall semester. *One semester; three credits*

**CHEM 351L. PHYSICAL CHEMISTRY I LABORATORY**

Laboratory work corresponding to CHEM 351. Prerequisite or corequisite: CHEM 351. Offered in the Fall semester. *One semester; one credit*

**CHEM 352. PHYSICAL CHEMISTRY II**

Studies of quantum mechanics and atomic structure, chemical bonding, spectroscopy and term symbols, molecular statistics, partition functions, diffraction and crystallography, intermolecular forces, liquids, surface chemistry, colloids, viscosity and diffusion, and macromolecules. Prerequisites: CHEM 351, 351L; PHYS 252, 252L; and MATH 232. Prerequisite or corequisite: CHEM 352L. Offered in the Spring semester. *One semester; three credits*

**CHEM 352L. PHYSICAL CHEMISTRY II LABORATORY**

Laboratory work corresponding to CHEM 352. Prerequisite or corequisite: CHEM 352. Offered in the Spring semester. *One semester; one credit*

**CHEM 410 ADVANCED BIOCHEMISTRY**

A student of the cellular aspects of biochemistry including membrane transport, membrane and organelle chemistry, photosynthesis, and a discussion of the chemistry of DNA replication, transcription, and translation. The course will include a detailed discussion of selected metabolic pathways from lipid and amino acid metabolism. Mechanisms of enzyme action will also be discussed. Prerequisites: BIOL 112, 112L, CHEM 315, and 315L. Prerequisite or corequisite: CHEM 410L. Offered in the Spring semester of even numbered years. *One semester; three credits.*

**CHEM 410L ADVANCED BIOCHEMISTRY LABORATORY**

Laboratory work illustrating concepts discussed in CHEM 410. Prerequisite or corequisite: CHEM 410. Offered in the Spring semester of even numbered years. *One semester; one credit.*

**CHEM 415. ANALYTICAL CHEMISTRY**

This course is oriented toward the study and use of instruments in chemical analysis and research. Theory and its application to instrumental methods of analysis are covered, including basic electronics, spectrophotometry, electrochemical analysis, and chromatography. Three one-hour lectures per week. Prerequisites: MATH 131, CHEM 212, 212L, 214, 214L. Prerequisite or corequisite: CHEM 415L. Offered in the Spring semester of

even-numbered years. *One semester; three credits*

#### **CHEM 415L. ANALYTICAL CHEMISTRY LABORATORY**

Experiments dealing with basic electronics, optical spectrophotometry, non-optical spectrometry, electrochemical analysis, and chromatography are performed. Prerequisite or corequisite: CHEM 415. Offered in the Spring semester of even-numbered years. *One semester; one credit*

#### **CHEM 422. INORGANIC CHEMISTRY**

This course is an in-depth study of the elements (metals and non-metals) and their compounds. Emphasis is on periodic relationships, theory of solutions, coordination compounds, and the kinetics of inorganic reactions in solution. Three one-hour lectures per week. Prerequisites: CHEM 351, 351L. Prerequisites or corequisites: CHEM 212, 212L, 352, 352L, 422L. Offered in the Spring semester of odd-numbered years. *One semester; three credits*

#### **CHEM 422L. INORGANIC CHEMISTRY LABORATORY**

Advanced laboratory techniques are used in the synthesis, analysis, and purification of inorganic coordination compounds. Prerequisite or corequisite: CHEM 422. Offered in the Spring semester of odd-numbered years. *One semester; one credit*

#### **CHEM 428. RESEARCH SEMINAR III**

Students will be required to attend departmental seminars and to submit summaries of these presentations. Students will begin writing their senior research paper. Prerequisite: CHEM 331. Offered in the spring semester. *One semester; zero credit.*

#### **CHEM 429. RESEARCH SEMINAR IV (formerly CHEM 431)**

Completion of research project. Oral presentation of research at a meeting of a learned society. Completion of a written research paper in a format suitable for publication in a refereed journal. In addition, each student will prepare a poster and present it at a poster session on campus. Students will be required to attend departmental seminars and to submit summaries of these presentations. Prerequisite: CHEM 428. Offered in the Spring semester. *One semester; two credits*

#### **CHEM 432-437, 440-441. SPECIAL TOPICS**

An advanced study in one of the following fields: Inorganic, Organic, Analytical, Polymer, Physical, or Biochemistry. Prerequisites and corequisites as described in the syllabus for each Special Topics course. *One semester; one to four credits each*

#### **CHEM 438. LIPIDS**

A second semester of Biochemistry, designed to assist students in the application of biochemical concepts to all areas of future study in the health sciences and biotechnology. Special emphasis will be given to current research and topics of special interest to students. Topics will include lipids, membranes, and cellular transport; lipid metabolism; steroids, isoprenoids, and eicosanoids; metabolic coordination, control, and signal transduction; cholesterol, hormones, and vitamins; and current journal articles. Prerequisites: CHEM 312 and 312L or CHEM 315 and 315L. Offered in the Spring semester. *One semester; three credits*

#### **CHEM 439. ASTROPHYSICAL CHEMISTRY**

This is an interdisciplinary capstone course for Science and Engineering majors. Astronomy is used as the framework upon which to hang many other topics; the student's previous knowledge of chemistry, physics, mathematics, and biology will be reviewed and expanded upon, along with history, philosophy, music, and religion. Topics include an overview of the Universe, the sky and the Earth, the history of astronomy, light and telescopes, origin and evolution of the Solar System, the nature and evolution of stars, including supernovae, neutron stars, pulsars, and black holes, the Milky Way and other galaxies, interstellar molecules, life in the Universe, quasars, and cosmology, including the Big Bang and the expanding Universe. Optional observing sessions included. Prerequisites: CHEM 114, PHYS 150 or 201, MATH 131. Junior standing recommended. Offered in the Spring semester of even-numbered years. *One semester; three credits*

#### **CHEM 490. INTERNSHIP IN CHEMISTRY**

Students majoring in Chemistry or Biochemistry may be placed in an area company or research facility under approved supervision. Students submit progress reports and a final paper describing the experience. Prerequisites: Junior standing and permission of department chair. *One semester; one credit*

#### **CHEM 498. SENIOR COMPREHENSIVE/BIOCHEMISTRY**

Students must pass either an external examination in biochemistry chosen by the department (such as the GRE) or pass a comprehensive examination administered by the faculty of the department. A passing score is required for graduation. Offered in the spring semester. Offered pass/fail. *One semester, zero credit.*

#### **CHEM 499. SENIOR COMPREHENSIVE/CHEMISTRY**

Students must pass either an external examination covering all of the major fields of chemistry that is chosen by the department (such as the Major Field Assessment in Chemistry) or pass a comprehensive examination administered by the faculty of the department. A passing score is required for graduation. Offered in the spring semester. Offered pass/fail. *One semester, zero credit.*

### **■ CHINESE COURSES**

*The following foreign language courses will be offered on the campus of Rhodes College under the instruction of Rhodes faculty. See Dean of the School of Arts concerning these courses.*

#### **CHIN 101-102. ELEMENTARY CHINESE**

This two-semester course introduces Chinese to students with no knowledge of the language. Equal emphasis will be given to acquiring the rudiments of spoken and written Chinese. Students who complete the year-long course will master approximately 700 characters and a vocabulary of a little more than 1,000 words. It also intends to acquaint students with some basic aspects of Chinese culture and society as a necessary part of

their education in this language. Offered in sequence in the Fall and Spring. *Two semesters; eight credits*

#### **CHIN 201-202. INTERMEDIATE CHINESE**

In addition to the same objectives for the first year, this course aims at improving students' aural-oral skills to achieve fluency and comprehension, further developing their proficiency in reading for understanding, and enhancing their ability to write in Chinese and to translate from Chinese into English and vice versa. Prerequisite: Chinese 102 or the equivalent. Offered in sequence in the Fall and Spring. *Two semesters; eight credits*

#### **CHIN 205. MODERN CHINESE LITERATURE IN ENGLISH TRANSLATION**

An introductory course of modern Chinese literature (1918-1989) designed to acquaint students with major phases of modern Chinese literature and some masterpieces of representative writers in relation to political and social changes. The course provides opportunities to learn about modern Chinese culture, society, and politics through readings of chosen works and trains students to read thoughtfully and critically. No prior knowledge of Chinese language and culture is required. *One semester; four credits.*

#### **CHIN 210. CHINESE LITERARY HERITAGE**

This course introduces one of the world's richest literary heritages: traditional Chinese literature. It conducts a general survey of Chinese literature from high antiquity up to modern times with the focus on some representative writers and their works. It consists of three major sections: poetry and prose, drama, and fiction. All readings are in English. No prior knowledge of Chinese language and culture is required. *One semester; four credits.*

#### **CHIN 214. INTRODUCTION TO CHINESE CULTURE**

This course introduces students to Chinese civilization and culture from the multiple perspectives of geography, history, philosophy, language, literature, religion, art, people, society, and general ways of life. Major concerns will include, but are not restricted to, forms of material and spiritual culture that have developed and changed through China's continuous traditions; individual and collective values that underlie social life, political organization, economics systems, family structure, human relationships, and individual behavior; and the rationales that have made Chinese culture what it is. *One semester; four credits.*

#### **CHIN 215. IMAGES OF WOMEN IN CHINESE LITERATURE AND FILM**

This course offers a critical survey of women's images in Chinese literature and films. It seeks to examine the images of traditional Chinese women as well as how these images have changed throughout history. It also seeks to understand the social, cultural and institutional norms of women's behaviors in traditional Chinese society as well as how the fictional imagination conforms to, deviates from and subverts these normative gender behaviors. Offered in the Fall semester. *One semester; four credits.*

#### **CHIN 220. CONTEMPORARY CHINESE CINEMA**

An introductory course on contemporary Chinese cinema that combines film viewing with readings of film theory and criticism. The aim is to provide a window for students to glimpse the complexity of contemporary Chinese culture. Students will view selected Chinese films produced in mainland China, Taiwan, and Hong Kong from the 1980's to the present and be required to read essays of critical studies which explore the interrelations of various issues in Chinese society. *One semester; four credits.*

#### **CHIN 301-302. ADVANCED CHINESE**

This course lays greater emphasis on further developing students' proficiency in reading for understanding and enhancing their ability to write in Chinese and to translate from Chinese into English and vice versa. At the end of the year-long course students should be able to read Chinese materials in everyday life, to write compositions in Chinese characters for daily communication, and to translate non-technical materials from Chinese into English and vice versa with the help of dictionaries. Prerequisite: Chinese 202 or the equivalent. Offered in sequence in the Fall and Spring. *Two semesters; four credits*

#### **409. SPECIAL TOPICS**

Intensive study of some aspect or theme of Chinese literature, culture or society in China. May be taken more than once for credit with new topics. Prerequisites: Chinese 301 and 302 or permission of instructor. *One semester; four credits.*

### **■ CIVIL AND ENVIRONMENTAL ENGINEERING COURSES**

*Requirements for the degree are found on Page 74.*

#### **CE 100. INTRODUCTION TO CIVIL AND ENVIRONMENTAL ENGINEERING**

New students are introduced to different areas of civil and environmental engineering, professional registration, ethics, and professional responsibilities. The course is team-taught by the faculty and practitioners. Offered in the Fall semester. *One semester; zero credit.*

#### **CE 105. INTRODUCTION TO CIVIL AND ENVIRONMENTAL ENGINEERING DESIGN**

Interdisciplinary team design projects are assigned by the faculty. Student teams are introduced to elementary design concepts and are involved in hands-on experiences in typical civil and environmental engineering projects. Reports are presented in both oral and written form. Offered in the Fall semester. *One semester; one credits*

#### **CE 111. ENGINEERING DESIGN GRAPHICS**

Emphasis on visual aspects of engineering communications, expression of ideas, developing spatial concepts as related to design. Graphical design is taught using orthographic projection, technical sketching, and 3-D modeling. CAD applications in Civil and Environmental Engineering. Offered in the Fall semester. *One semester; three credits*

#### **CE 112. COMPUTER APPLICATIONS IN CIVIL AND ENVIRONMENTAL ENGINEERING**

Introduction to the use of computers in civil engineering problem solving. Topics include PowerPoint presentations, Excel applications in civil and environmental engineering, and a general overview of computer programming. Offered in Spring semester. *One semester; three credits*

**CE 115. FIELD MEASUREMENTS**

Theory of measurements and errors. Measurement of line, direction and angles. Principles of leveling, traversing and topographic surveys. Horizontal and vertical route alignments. Computer applications. Two lectures and three laboratory hours each week. Report writing skills are required. Offered in the Fall semester. Corequisites: CE 111 and ENG 111. *One semester; three credits*

**CE 201. STATICS**

Principles of statics; coplanar and non-coplanar force systems. Equilibrium of force systems, analysis of structures, friction, centroids, moment of inertia. Prerequisite: PHYS 150. *One semester; three credits*

**CE 202. INTRODUCTION TO MECHANICS OF MATERIALS**

Axial load, shear and moment diagram. Differential equations of beams. Study of stresses due to axial bending, and torsional loading. Mohr's circle of stress. Hands-on lab projects. Co-requisite or Prerequisite: CE 201. *One semester; one credit*

**CE 203. STRUCTURAL ENGINEERING I**

Approximate structural analysis. Computer analysis. Design of timber beams, columns, trusses, floor/roof/wall sheathing, and connections. Concrete mix design and wood formwork design. Concrete slab-on-grade. Wood and masonry bearing walls. Hands-on lab projects. Prerequisites: CE 201 and CE 202. Offered in the Spring semester. *One semester; three credits*

**CE 299. HYDRAULICS**

Study of hydrostatics includes pressure heads, pressure centers, buoyancy and flotation, stability of gravity dams, flow of fluids in pipes and open channels, nozzles, weirs, compound and branching pipe networks. Fundamentals of conveyance system design. Oral and written communication skills are required. Corequisite CE 299L. Offered in the Spring semester. *One semester; three credits*

**CE 299L. HYDRAULICS LABORATORY**

Laboratory experimental work to support theory covered in CE 299. Corequisite: CE 299. Offered in the Spring semester. *One semester; one credit*

**CE 301. STRUCTURAL ENGINEERING II**

Design of concrete beams, one-way slabs, columns, and spread footings. Wind load calculation. Design of wood, masonry, and concrete shear walls. Introduction to pre-stressed concrete. Hands-on lab projects. Prerequisites: CE 203. Offered in the Fall semester. *One semester; three credits*

**CE 302. STRUCTURAL ENGINEERING III**

Design of steel beams, columns, trusses, connections, and base plates. Design of open-web floor/roof joists. Design of composite floor systems using steel beams/decks and concrete slabs. Seismic force calculations. Introduction to bridge design. Prerequisites: CE 301. Offered in the Spring semester. *One semester; three credits*

**CE 305. ENVIRONMENTAL SITE ASSESSMENT**

Environmental assessment; environmental laws and regulations; planning and conducting; title search, site walk-through, water and soil sampling; laboratory and field testing of soil and groundwater; fundamentals of site remediation. Written and oral communication skills are required. Prerequisite: Junior standing. Offered depending on enrollment. *One semester; three credits*

**CE 313. HYDROLOGY**

The aspects of hydrology which are of concern to an engineer: water balance, probability and statistics in hydrologic design and analysis, basin modeling, hydrographs, stream flow routing, flood control, groundwater hydrology, and computer applications. Oral and written communication skills are required. Prerequisites: CE 299. Offered in the Fall semester. *One semester; three credits*

**CE 314. ENGINEERING ECONOMY** (Formerly CE 314 Economic Factors in Design)

Fundamentals of engineering economy. Cost concepts. Time value of money and equivalence. Economic analysis of alternatives. Depreciation and after-tax analysis. Effects of inflation on economic analysis. Currency exchange rates. Effects of global economic issues on engineering decision making. Prerequisite: MATH 132. (Same as CH E 314, ECE 314, ME 314) *One semester; three credits*

**CE 315. JUNIOR PROJECT**

Interdisciplinary team design projects are initiated by the student (or suggested by the faculty) and approved by the faculty, investigated and developed throughout three semesters preceding the student's graduation. Students submit proposals for CE 315, CE 431, and CE 432. Students attend senior presentations and other professional lectures. Report writing and oral presentation. Prerequisite Junior Standing; to be taken three semesters preceding the student's graduation. Offered in the Fall and Spring semesters. *One semester; zero credit*

**CE 317. INTRODUCTION TO ENVIRONMENTAL ENGINEERING**

Introduction of pollution in Environmental Engineering, mass balance, environmental regulations, water/wastewater characteristics, water/wastewater treatment, solid and hazardous waste management, and air pollution and control. Written communication skills are required. Prerequisites: CHEM 115,115L and junior standing. Offered in the Spring semester. *One semester; three credits*

**CE 318. HIGHWAY ENGINEERING**

Study of driver and vehicle characteristics as they relate to the geometric design of highways. Highway capacity and safety. Design of drainage structures. Highway materials and the structural design of flexible and rigid pavements. Students are required to develop plans for a design project assigned by the instructor. Discussion of transportation planning, land use/transportation relationships, economy, mass transit facilities and inter-modal systems. Computer applications. Oral and written communication skills are required. Prerequisite: CE 115. Offered in the Spring semester. *One semester; three credits*

**CE 319. TRAFFIC ENGINEERING**

Travel time, delay, speed and volume studies. Capacity of freeways, expressways, urban streets, arterials and intersections. Pedestrian, parking and accident studies. Traffic markings, signs, signals both pretimed and actuated, and progression. Geometric design of urban arterials and intersections. Students are required to submit functional plans for design projects assigned by the instructor. Emphasis on intersection, interchange, and expressway design. Computer applications. Written communication skills are required. Offered depending on enrollment. Prerequisite: CE 115. *One semester; three credits.*

**CE 320. TRANSPORTATION AND URBAN PLANNING**

Urban transportation planning, data collection and analysis, growth of cities, study of transportation systems, highway, railroad, air, water, pipeline, conveyor belt, and systems for the future. Public transportation. Offered depending on enrollment. Prerequisite: Junior standing. *One semester; three credits*

**CE 322. GEOTECHNICAL ENGINEERING**

A study of the origin and composition of soils; character and properties; gradation and permeability; seepage phenomena and frost action. Introduction to mechanics of earth masses including consideration of stresses, strains, consolidation theory, rate of consolidation, total and differential settlements, and shearing resistance. Prerequisites: CE 299; Corequisite: CE 322L. Offered in the Fall semester. *One semester; three credits*

**CE 322L. GEOTECHNICAL ENGINEERING LABORATORY**

Standard laboratory tests to determine soil properties. Written communication skills are required. Corequisite: CE 322. Offered in the Fall semester. *One semester; one credit*

**CE 340. DESIGN OF FOUNDATIONS**

Sub-surface investigations and geotechnical reports; bearing capacity of soils, theory and design of shallow and deep foundations; settlement analysis; lateral earth pressure and cantilever retaining walls; slope stability analysis. Computer applications. Emphasis on design throughout. Written communication skills are required. Prerequisite: CE 322. Offered in the Spring semester. *One semester; three credits*

**CE 345. PLANNING AND SCHEDULING**

Various methods of scheduling will be presented including CPM, PPM, PERT, and LSM. Discussion of issues relating to activity duration, contractual considerations, time cost trade-off, schedule monitoring/updating and integration of schedule and cost. Computer applications. Offered depending on enrollment. Prerequisite: Junior standing. *One semester; three credits*

**CE 350. CONSTRUCTION ESTIMATING AND COST CONTROL**

Methods of making quantity surveys, estimating construction cost, construction scheduling and methods of cost control. The study of labor relations as they affect construction cost, scheduling and job control. Prerequisite: Junior standing. *One semester; three credits*

**CE 400. THE COMPLETE ENGINEER**

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. (Same as CH E 400, ECE 400, and ME 400) Prerequisite: Permission of the department and MATH 232. *One semester; three credits*

**CE 401. ADVANCED ENVIRONMENTAL ENGINEERING ANALYSIS AND DESIGN**

Advanced concepts in environmental engineering. Industrial waste treatment, toxic material disposal, physical, biological, and chemical treatment schemes. Oral and written communication skills are required. Prerequisite: CE 317. *One semester; three credits*

**CE 402. OPEN CHANNEL HYDRAULICS**

Study of open channel fluid conveyance systems. Special emphasis on the design and analysis of natural and artificial channels. Characteristics of flow systems. Prerequisite: CE 299 or equivalent. *One semester; three credits*

**CE 403. COMPUTER ANALYSIS OF STRUCTURES**

Theory of matrix algebra and solution of linear algebraic equations. Basic energy principles and virtual work. Analysis of frame and truss structures using the direct stiffness method. Computer applications. Prerequisites: CE 112, 203. *One semester; three credits*

**CE 404. SOLID AND HAZARDOUS WASTE MANAGEMENT**

Introduction to solid and hazardous waste management, legislation and social impact. Engineering design, planning and analysis associated with waste sources, handling, storage, collection, transport, and disposal of solid and hazardous wastes. Written communication skills are required. Offered depending on enrollment. Prerequisite: Junior standing. *One semester; three credits*

**CE 405. REMEDIATION OF ORGANICALLY CONTAMINATED SOIL AND WATER**

Soil Remediation: soil venting, air sparging, vapor extraction, bioremediation, soil washing, land farming, and thermal desorption; groundwater remediation; pump and treat and carbon adsorption; cost estimates; case histories. Written communication skills are required. Prerequisite: Senior standing. Offered depending on enrollment. *One semester; three credits*

**CE 407. GEOTECHNOLOGY OF WASTE MANAGEMENT**

Site selection; ground modification and compaction; liners; leachate generation and collection; caps; gas management; properties of wastes. Prerequisite: CE 322. Offered depending on enrollment. *One semester; three credits*

**CE 408. ADVANCED STRUCTURAL ENGINEERING**

Design of wood horizontal diaphragms. Design of two-way concrete slabs, long-slender concrete columns. Design of moment-resisting steel

connections. Bridge composite beams and plate girders. Prerequisites: CE 302. *One semester; three credits*

#### **CE 409. SPECIAL TOPICS IN STRUCTURAL ENGINEERING**

Topics vary depending on senior projects. Prerequisites: CE 302. *One semester; three credits*

#### **CE 417. ENVIRONMENTAL ENGINEERING LABORATORY**

Laboratory work to support treatment concepts presented in CE 317. Written communication skills are required. Prerequisites: CE 317. Offered in the Fall semester. *One semester; one credit*

#### **CE 418. ADVANCED DESIGN OF FOUNDATIONS**

Counterfort retaining walls; construction of earth dams; seepage; sheet piles; foundations on swelling soils; soil improvement. Oral and written communication skills are required. Offered depending on enrollment. Prerequisite: CE 340. *One semester; three credits*

#### **CE 420. CONTRACTS AND SPECIFICATIONS**

Consideration of fundamental principles of contract law with particular reference and application to engineering contracts. Study of specification documents. Preparation of typical documents for public and private construction projects. Prerequisite: Junior standing. Offered depending on enrollment. *One semester; three credits*

#### **CE 421. DESIGN OF PAVEMENTS**

Factors affecting design of pavements: loads, climate, and environment; stresses in flexible and rigid pavements; properties of pavement components; materials characterization; soil stabilization; theory and design of flexible and rigid pavements for highways and airports; pavement evaluation and rehabilitation. Oral and written communication skills are required. Prerequisite: CE 322. *One semester; three credits*

#### **CE 425. HEAVY CONSTRUCTION EQUIPMENT AND METHODS**

Study of the equipment, methods and materials used in "horizontal" construction. Methods of estimating the production and costs of heavy construction equipment will be presented. Prerequisite: Junior standing. *One semester; three credits*

#### **CE 431-432. SENIOR DESIGN PROJECT**

Interdisciplinary team design projects are initiated by students (or suggested by the faculty) and approved by the faculty. Investigated and developed throughout the senior year by the students. Reports are presented in both oral and written form. Practitioner involvement is required in each project. Professional registration, responsibility, and ethics. Prerequisite: CE 315. Taken in sequence during the last two semesters before graduation. *Two semesters; four credits*

#### **CE 490-494. SPECIAL TOPICS**

Elective courses of special or current interest. Taught by faculty with special or unique qualifications. Taken by Juniors and Seniors. Prerequisites are announced with course offerings. *One semester; one to four credits*.

#### **CE 495. INTERNSHIP IN CIVIL AND/OR ENVIRONMENTAL ENGINEERING** (Formerly CE 499)

Students majoring in civil/environmental 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, a final report, and a final oral presentation to the faculty. Minimum time 200 hours. Prerequisites: Junior Standing and Permission of department. *One semester; three credits*

#### **CE 496-498. TOPICS IN CIVIL ENGINEERING**

Directed work on a special problem. Problems of an inter-disciplinary nature are encouraged. A written report is required. A contract outlining the scope of the project is required prior to the initiation of work. Prerequisites: Senior standing and a duly executed contract. *One semester; one, two, and three credits respectively*

### **■ COMPUTER SCIENCE COURSES**

*The requirements for the degree are found on Page 95. Requirements for the dual degree in Computer Science and Mathematics are found on Page 96. Requirements for the dual degree in Computer Science and Electrical Engineering are found on Page 77.*

#### **CS 171. INTRODUCTION TO COMPUTER SCIENCE** (Formerly CS 109)

This course concerns elementary algorithms and programming. Topics include an overview of computer hardware and software, system architecture, data representation, basic data structures, Boolean logic, digital circuit design, discovery and expression of algorithms, implementation and efficiency of algorithms, programming and control structures and basic UNIX commands. It uses a Java based language for programming exercises. Offered in the Fall semester. *One semester; three credits*

#### **CS 172. FUNDAMENTALS OF COMPUTER SCIENCE** (Formerly CS 122)

This course concerns more topics in algorithms and program development using object-oriented programming concepts. Topics include methods, arrays, classes, objects, encapsulation, inheritance, composition, abstraction and graphical user interfaces. It uses the Java language for programming exercises and projects. Prerequisite: CS 171, ECE 101 or MATH 117, 129, or 131. Corequisite: CS 172L Offered in the Spring semester. *One semester; three credits*

#### **CS 172L. FUNDAMENTALS OF COMPUTER SCIENCE LAB** (Formerly CS 122L)

Lab to accompany CS 172. Corequisite: CS 172L. *One semester; one credit*

#### **CS 234. DATA STRUCTURES**

The course teaches the student important data structures, such as lists, stacks, queues, trees and tables. The student designs and implements correct

readable and efficient software systems with interacting components. Prerequisite: CS 172. Corequisite: CS 234L. Offered in the Fall semester. *One semester; three credits*

#### **CS 234L. DATA STRUCTURES LAB**

Lab to accompany CS 234. Corequisite: CS 234. *One semester; one credit*

#### **CS 240. INTRODUCTION TO BIOINFORMATICS** (Same as BIOL 240)

Prerequisite: CS 172.

#### **CS 360. OBJECT ORIENTED DESIGN**

The course uses object oriented analysis and design techniques and tools to develop and implement solutions to problems in business, engineering and science. Prerequisite: CS 234. Offered in the Spring semester *One semester; three credits*

#### **CS 370. OPERATING SYSTEMS** (Formerly CS 380)

The course presents the topics that govern the behavior of operating systems. Topics include processor scheduling, memory management, input, output, file storage allocation, protection and security. Prerequisite: CS 234. Offered in the Spring semester. *One semester; three credits.*

#### **CS 400. INTERNSHIP IN COMPUTER SCIENCE**

Computer science majors receive on-the-job training in the offices of cooperating firms. To receive credit, the student must submit periodic reports and a detailed final report of the work done. The authorized supervisor at the firm must verify these reports. Prerequisites: Junior standing and approval of the Computer Science faculty. *Pass/Fail Grading. One semester; one to three credits*

#### **CS 440. ALGORITHMS**

The course studies standard methods and examples in the design and analysis of algorithms. Topics include some basic paradigms in algorithm design and analysis of the efficiency and optimality of representative algorithms selected from some of graph, pattern matching, numerical, randomized and approximation algorithms. Offered in the Spring semester of even numbered years. Prerequisites: MATH 141 or 405 and CS 234. *One semester; three credits*

#### **CS 460-469. TOPICS IN COMPUTER SCIENCE**

Courses are designed each semester to meet the current needs of the students and to express the particular interests of the instructor. Prerequisite: CS/ECE 360. Offered in the Spring semester of odd numbered years. *One semester; one to three credits*

#### **CS 471. DATABASE DESIGN**

The course stresses the design of databases and their implementation using a relational database management system. Topics include entity-relationship and relational data models and database design. Abstract query languages (relational algebra) and SQL (language for creating, querying, and modifying relational and object-relational databases). Views, integrity, constraints, triggers, transactions and security. Data warehouses, data mining, temporal databases, XML. Prerequisite: CS 234. Offered in the Fall semester. *One semester; three credits*

#### **CS 481. COMPUTER SCIENCE PROJECT I**

The course requires that the student design, develop and implement a major project that solves a real problem in either business or engineering in the field of computer science. The project requires the presentation of oral and written reports. Prerequisites: CS/ECE 360 and Senior standing. Offered in the Fall semester. *One semester; one credit*

#### **CS 482. COMPUTER SCIENCE PROJECT II**

The course is a continuation of CS 481. The student completes the project begun in CS 481 and must pass a departmental assessment test. The student may have to take an external assessment examination approved by the department. Prerequisite or corequisite: CS 481. Offered in the Spring semester. *One semester; three credits*

### **■ COUNSELING COURSES**

#### **COUN 300, 301. COUNSELOR TRAINING**

This is a special preparatory program for students selected as Peer Counselors for CBU. The program provides extensive training for the Peer Counselors in preparation for their role as group leaders in new student orientation (see ORIN 100). The training covers a wide range of topics presented to new students and identifies issues and solutions that may arise as new students adapt to university life at CBU. Prerequisite: Approval of instructor. Offered in the Fall semester. *Two semesters; three credits each*

#### **COUN 310, 311. CAREER COUNSELOR TRAINING**

This special program is designed to train selected Career Peer counselors to assist fellow students in various stages of their career development and to assist with various projects associated with the Career Center. Students will learn to clarify their own career objectives and develop job search skills, learn the dynamics of counseling others, and gain valuable leadership experience. Prerequisite: Approval of instructor. Offered in the Spring semester. *Two semesters; three credits each*

### **■ CRIMINAL JUSTICE COURSES**

#### **CJ 150. PUBLIC ADMINISTRATION**

A history and overview of the field of Public Administration as a profession and an academic discipline. It is designed to give the student a solid and in-depth understanding of past, present, and future problems of administrators in managing government organizations in the political environment. Interrelationships between chief executives, legislators, the judiciary, interest groups, and bureaucracies are considered. *One semester; three credits*

#### **CJ 200. CRIMINAL JUSTICE**

An analysis of the structure, functions, and decision process of social agencies that deal with the management and control of crime and criminal

offenders. Includes study of the nature, causes, and role of criminal behavior in society. *One semester; three credits*

#### **CJ 205. CRIMINOLOGY**

This course will offer an introduction to theoretical explanations for the causes of crime. We will take a psychosocial approach to understanding crime causation and prediction through the use of data and specific theories. *One semester; three credits*

#### **CJ 210. CRIMINAL LAW**

Criminal Law is an examination of some of the substantive aspects of criminal law, including principles of criminal liability, specific analysis of elements of crimes, and substantive defenses to crimes. Throughout the course, there is an ongoing examination of Constitutional safeguards that control the substantive and procedural aspects in the criminal justice system. Course instruction consists of lecture, use of hypothetical case studies and reading and analysis of selected laws and court decisions. *One semester; three credits*

#### **CJ 215. CORRECTIONS**

This course will offer a comprehensive look at the components that make up the corrections system in the United States. The history and future of the corrections system will be analyzed through an examination of the political and social climate in our country. *One semester; three credits*

#### **CJ 220. POLICING**

This course is an in-depth study of law enforcement in the United States, the largest and most visible part of the criminal justice system. Students will focus on the differences and functions of federal, state, local, county and private policing in this country. *One semester; three credits*

#### **CJ 225. JUVENILE JUSTICE**

The focus of this course is to examine the juvenile delinquency phenomenon through the historical context of delinquency, the changing legal environment (including major court decisions which have transformed the juvenile system), exploring the theories of the causes of juvenile delinquency, and discussion of juvenile delinquency prevention and control programs. *One semester; three credits*

#### **CJ 245. CHILD SEXUAL ABUSE**

This class will acquaint the student with the various players involved in the crime of child sexual abuse, dispel many of the popular myths associated with this crime and introduce the physical and behavioral indicators of abuse. The most recent research on forensic interviewing and repressed memory will be reviewed. Guest speakers will include prosecutors and police investigators with the Child Protection Investigation Team. *One semester; three credits*

#### **CJ 250. SERIAL KILLERS**

This class will present a brief history of the more famous serial killers in both the United States and abroad and the increasing phenomenon of serial killings will be discussed. Students will be introduced to the science of profiling and other techniques used in the investigation of serial killings and psychological profiles of two contemporary serial killers will be compared. *One semester; three credits*

#### **CJ 280-287. SELECTED TOPICS IN CRIMINAL JUSTICE**

Directed work on a special topic or project in criminal justice. *One semester; one to three credits*

#### **CJ 290-299. HONORS SPECIAL TOPICS.**

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

#### **CJ 315. CROSS-CULTURAL CRIMINAL JUSTICE**

Crime, justice, and retribution vary tremendously around the globe. Some cultures have meetings with parties rather than courts, and, in some, suspects merely vanish never to be seen again. This course will look at varieties of concepts of crime, wrongdoing, punishment (or lack of), and systems for dealing with these in other parts of the world, and compare some of these systems to the criminal justice system and its ideology in the United States. *One semester; three credits*

#### **CJ 362. SOCIOLOGY OF ADDICTION**

(Same as SOC 362) Prerequisite: SOC 101. *One semester; three credits*

#### **CJ 365. DEVIANT BEHAVIOR**

An exploration of theoretical perspectives on deviance, problems in defining deviance and specific categories of deviance. Deviant behaviors discussed may include but are not limited to prostitution, gambling, transgenderedness, pornography, mental illness, sexualities, and physical disability. (Same as PSYC 365 and SOC 365) *One semester; three credits*

#### **CJ 370. APPLICATIONS OF MEMORY**

An examination of the application of memory in such diverse areas as courtroom testimony (e.g., factors influencing witnesses, hypnosis, repressed memory, false memory), memory for everyday events, memory aids, and advertising. The relevant theories and research in each area are examined. Prerequisite: PSYC 105. (Same as PSYC 370) *One semester; three credits*

#### **CJ 380-387. SELECTED TOPICS IN CRIMINAL JUSTICE**

Directed work on a special topic or project in criminal justice. *One semester; one to three credits*

#### **CJ 390-399. HONORS SPECIAL TOPICS IN CRIMINAL JUSTICE**

Special topics in criminal justice open to members of the Honors Program or by permission of the instructor and Honors Director. *One semester; three credits.*

#### **CJ 401. CONSTITUTIONAL LAW**

(Same as POLS 471) Prerequisite: POLS 112 or HIST 151 or Permissions of the department chair. *One semester; three credits*

**CJ 455. CORRECTIONAL COUNSELING**

This course is designed to present some of the counseling and treatment techniques that are available to assist correctional workers toward assisting the offender to establish a satisfying lifestyle that conforms to the regulations as well as protecting the community from harmful activity by offenders placed under the correctional workers' supervision. (Same as PSYC 455) *One semester; three credits*

**CJ 480-487. ADVANCED TOPICS IN CRIMINAL JUSTICE**

Directed work on a special topic or project in criminal justice. *One semester; one to three credits*

**■ ECONOMICS COURSES****ECON 214. PRINCIPLES OF MICROECONOMICS** (Formerly ECON 212)

Attention is focused on the micro concept of economic analysis, and primary attention given to the theory of the firm and partial equilibrium problems arising within any enterprise economy. Attention is also given to government regulation of business, the theory of income distribution as it pertains to the determination of wages, rents and profits, and international trade. Offered in both Fall and Spring semesters. *One semester; three credits*

**ECON 215. PRINCIPLES OF MACROECONOMICS** (Formerly ECON 211)

This course focuses attention on the aggregate or macroeconomic relationships and gives attention to the central problems of economic organization, the functioning of the price system, the economic role of government, the determination of national income, employment, the rate of inflation, and fiscal and monetary policy. Further, the student is introduced to the interactions between aggregate markets such as the product market, the factor/labor market, and the money market. Prerequisite: ECON 214. Offered in both Fall and Spring semesters. *One semester; three credits*

**ECON 323. THE ECONOMICS OF HEALTH AND HEALTHCARE**

The course uses the tools of economic thinking and economic analysis to examine the current state of health and healthcare in the United States. Economic concepts to be discussed include scarcity, rationing, the roles of the free market and government, sensitivity to price, determinants of the demand for, and the supply of, healthcare, and production possibilities. These and other tools will be used to examine such topics as changing demographics, alternative production and delivery systems, health insurance, regulation of the health sector, and the legal environment. Prerequisite: ECON 214 or consent of instructor. Offered as needed. *One semester; three credits*

**ECON 343. INTERMEDIATE MACROECONOMICS**

The theory of national income and employment, analysis of aggregate demand, the general degree of utilization of productive resources and the general level of prices as well as related questions of policy. Prerequisites: ECON 214, 215. Offered in the Fall semester. *One semester; three credits*

**ECON 344. INTERMEDIATE MICROECONOMICS**

A study of basic economic theory as it pertains to the individual economic units of a society, a study of the tools which are used in analyzing these units. Price determination, market analysis, and resource allocation are stressed. Prerequisites: ECON 214, 215. Offered in the Spring semester. *One semester; three credits*

**ECON 346. CURRENT ECONOMIC TOPICS**

Analysis and discussion of current issues from an economic perspective. Possible subject areas include the environment, health care, comparative economic systems, welfare, growth and development, crime, religion and economics, and other current topics. The course may examine several current issues or may focus on just one or two. Offered as needed. *One semester; three credits*

**ECON 347. SUSTAINABILITY, CULTURE, AND ECONOMICS**

This course will examine the relationship between these three topics by choosing one area of the world, such as Asia, Europe, and Latin America, and selecting specific countries in one of these areas for a micro and macro comparison. This course will include optional travel to one of these areas during fall, winter, spring or summer break. *One semester; three credits*

**ECON 348. ENVIRONMENTAL ECONOMICS**

This course will examine the emerging field of environmental economics - that is, the connections between economics and the environment. Topics will include the sources of environmental problems, the concept of natural capital, sustainable development, and how to balance environmental policy, economic growth and the constraints of a market based economic system. *One semester; three credits*

**ECON 400. ECONOMICS INTERNSHIP**

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*

**ECON 420. MANAGERIAL ECONOMICS**

This course focuses on the application of economics theory to the problems and decisions faced by business managers in a market-oriented economy. The economic aspects of business departments such as marketing, finance, accounting, and law are explored and integrated into the applicable economic theories and models. Thus, in a very general sense, this course attempts to provide the student with a method of looking at the world of microeconomics through the eyes of an economist and from the perspective of a business person. Prerequisites: ECON 214, 215. Offered in both Fall and Spring semester. *One semester; three credits*

**ECON 422. INTERNATIONAL TRADE AND ECONOMICS**

This course is designed to provide the student with a basic understanding of the principles of international trade, marketing, and finance. Specific topics which will be introduced include but are not limited to: tariffs, subsidies, import restrictions, foreign exchange, methods, agencies, and