transformation in living organisms, and the synthesis and properties of macromolecules. Prerequisites: Biochemistry Lecture and Lab. 3 hours Lecture and 3 hours Lab — 4 credits

CH 4241
Advanced Physical Chemistry
This course will cover one of several sub-disciplines of physical chemistry as selected by the instructor. Areas of study may include, but are not restricted to: biophysical, green or physical organic chemistry, materials and material characterization, nanotechnology, optical and electronic devices, polymers, statistical mechanics. Prerequisite: Physical Chemistry II or Permission of Instructor. 3 hours Lecture — 3 credits

**COMPUTER AND BUSINESS INFORMATION SYSTEMS**

IT 1011
Information Technology Concepts
This course introduces many fundamental concepts of computers and information technology. Lectures and discussions include computer hardware and software, Internet and Wide Area Networks, data file and database, telecommunications and networks, and future technology trends. 1.5 hours Lecture and Discussion — 1.5 credits. Prerequisites: None. It is strongly recommended that it be taken with Computer Applications.

IT 1012
Computer Applications
This course introduces the basics of popular and useful computer applications. Emphasis is placed on a working knowledge of Microsoft Windows operating system, word processing, spreadsheet, and presentation software at the introductory level. MS Windows and Office software are used for hands-on exercises. 1.5 hours Lecture and Hands-on — 1.5 credits. Prerequisites: None. It is strongly recommended that it be taken with Information Technology Concepts.

IT 1031
Intermediate Computer Applications
This course extends computer applications into real world projects. Emphasis is placed on a working knowledge of word processing, spreadsheet, and database management software at the intermediate level. MS Office software is used for hands-on exercises. Prerequisites: Information Technology Concepts and Computer Applications for non-CBIS students; successful performance on CBIS departmental diagnostic exam for CBIS students. 3 hours Lecture and Hands-on — 3 credits.

IT 2118
Web Design
This course introduces the generally accepted web design principles that underlie the construction of web pages and applets. Students will create a variety of web pages using HTML, JavaScript, and web design application software. Students will also learn the fundamentals of XML data and integration. Prerequisites: Information Technology Concepts and Computer Applications for non-CBIS students; Intermediate Computer Applications for CBIS students. 3 hours Lecture and Hands-on — 3 credits.

IT 2216
Introductory Programming
This course teaches the programming logic and the process of writing a computer program using C/C++ programming language. Students will obtain an understanding of sequence, selection, and repetition statements, files, arrays, functions, and subprograms. Prerequisites: Information Technology Concepts and Computer Applications for non-CBIS students; Intermediate Computer Applications for CBIS students. 3 hours Lecture and Hands-on — 3 credits.

IT 2218
Advanced Programming
This course is a continuation of the Web Design and Introductory Programming courses. Object-oriented program design with emphasis on the Java programming language will be taught. Additional topics include GUI controls, exceptions, threads, and applets. Prerequisites: Introductory Programming and Web Design. 3 hours Lecture and Hands-on — 3 credits.

IT 2370
Employment Program
Each student in Computer and Business Information Systems is required to spend 500 hours in approved jobs related to the major. Each employment experience that will be used toward the Employment Program must be registered with the Office of Career and Life Education before employment commences — 4 credits.

IT 3000, 4000
Selected Topics in IT
These courses are designed to permit the timely introduction of new topics in areas of information...
technology. Prerequisite: Permission of the CBIS Department Chairperson. 1 to 3 hours Lecture and Discussion — 1 to 3 credits.

**IT 3103**  
*Information Systems*  
This course studies the characteristics and features of the major types of information systems, major components of information systems, and their applications in business. Prerequisites: Information Technology Concepts and Computer Applications for non-CBIS students; Intermediate Computer Applications for CBIS students. 3 hours Lecture and Discussion — 3 credits.

**IT 3104**  
*Database Management Concepts*  
(Formerly IT 3104 Database Management)  
This course examines the purposes, advantages, issues, and problems associated with the use of a data base. The process of data base design from information modeling to physical design is discussed with emphasis on conceptual and implementation design. Prerequisites: Intermediate Computer Applications and Data Structures and File Organization. 3 hours Lecture and Hands-on — 3 credits.

**IT 3117**  
*Data Structures and File Organization*  
This course introduces the concept of data types and data structures and discusses their importance in information technology. Several data structures such as arrays, lists, trees, and graphs and their implementations are discussed. Prerequisites: None. 3 hours Lecture and Discussion — 3 credits.

**IT 3202**  
*Office Automation*  
This course studies the impact of current technology on productivity in the modern office. Elements of office automation are reviewed with specific emphasis on document processing. Students will apply this emphasis to Educational Business applications. Prerequisites: Information Technology Concepts and Computer Applications for non-CBIS students; Intermediate Computer Applications for CBIS students. 3 hours Lecture and Hands-on — 3 credits.

**IT 3203**  
*Hardware and Software*  
This course presents a detailed view of computer hardware structure and function, and discusses the principles governing operating systems. Topics include operating systems, computer repair, construction, and maintenance. Students will have hands-on exercises in building and maintaining a personal computer system. Prerequisites: Information Technology Concepts and Computer Applications for non-CBIS students; Intermediate Computer Applications for CBIS students. 3 hours Lecture and Hands-on — 3 credits.

**IT 3205**  
*Geographic Information Systems*  
This course introduces the principles of a geographic information system with emphasis on the analysis of land use, population studies, and demographic distributions. Many applications in Environmental Science will be discussed. Prerequisites: Information Technology Concepts and Computer Applications for non-CBIS students; Intermediate Computer Applications for CBIS students. 3 hours Lecture and Hands-on — 3 credits.

**IT 3220**  
*Computer-Aided Design*  
This course teaches how to use CAD (computer aided design) software to do landscape and draft designs. Students will apply CAD software to Ornamental Horticulture applications. Prerequisites: Information Technology Concepts and Computer Applications for non-CBIS students; 1031 Intermediate Computer Applications for CBIS students. 3 hours Lecture and Hands-on — 3 credits.

**IT 3222**  
*Database Design*  
This course covers various aspects of physical design in the database development process. Topics include, but are not limited to: denormalization, development and utilization of data base tables, queries, forms, and reports, with emphasis on the support of a Web site. Prerequisite: Database Management Concepts. 3 hours Lecture and Hands-on — 3 credits.

**IT 4028**  
*Visual Basic Programming*  
This course teaches the use of Visual Basic to create programs in Windows environment. Students learn how to produce graphical user interfaces in the object-oriented programming paradigm. Prerequisites: Information Technology Concepts and Computer Applications for non-CBIS students; Intermediate Computer Applications for CBIS students. 3 hours Lecture and Hands-on — 3 credits.
IT 4041
Senior Research in IT
Selected seniors engage in supervised investigations of certain topics in information technology. Prerequisite: Permission of CBIS Department Chairperson. 1-3 hours of student/instructor interaction — 1 to 3 credits.

IT 4042
UNIX Based Operating System
This course teaches commands in UNIX based operating systems, shell programming tools for effective completion of system related tasks, and customization of a local environment or a whole system. UNIX and/or LINUX operating systems are explored through hands on exercises and comparison to the DOS and Windows operating systems. Prerequisites: Information Technology Concepts and Computer Applications for non-CBIS students; Intermediate Computer Applications for CBIS students. 3 hours Lecture and Hands-on — 3 credits.

IT 4109
Network Concepts
(Formerly IT 4109 Data Communications)
This course introduces concepts of telecommunication and computer networks. Topics include network history, communication mediums, network hardware and software, network standards (OSI model and Internet model), and various network topologies and structures. This course lays the groundwork for network design and administration (IT 4235). Prerequisite: Hardware and Software. 3 hours Lecture and Hands-on — 3 credits.

IT 4110
Computer Graphics
This course presents fundamental concepts in computer graphics. Emphasis is placed on current methods and techniques, such as presentation graphics, photo editors, and animators, to create graphical displays for print and the Web. Prerequisites: Information Technology Concepts and Computer Applications for non-CBIS students; Intermediate Computer Applications for CBIS students. 3 hours Lecture and Hands-on — 3 credits.

IT 4119
Network Security (Formerly IT 3119 Internet Security)
This course discusses the principles, techniques, and tools that are used to provide security for a local area network and/or Web site. Students will be able to recognize security risks, choose techniques that will minimize those risks, and use tools that will implement these techniques. Prerequisites: Information Technology Concepts and Computer Applications for non-CBIS students; Intermediate Computer Applications for CBIS students. 3 hours Lecture and Hands-on — 3 credits.

IT 4131
Auto CAD
This course teaches how to use CAD (computer aided design) software to do landscape and draft designs. Students will apply CAD software to Environmental Science applications. Prerequisites: Information Technology Concepts and Computer Applications for non-CBIS students; Intermediate Computer Applications for CBIS students. 3 hours Lecture and Hands-on — 3 credits.

IT 4146
Systems Analysis and Design
This course introduces the systems life cycle approach to solving business problems. Students gain a working knowledge of problem analysis, requirements discovery, entity-relationship diagram, data flow diagram, and physical design in the development of information systems. Prerequisite: Intermediate Computer Applications. 3 hours Lecture and Hands-on — 3 credits.

IT 4208
Senior Projects in IT
This course allows students to demonstrate their ability to gain and communicate new knowledge and techniques. Students explore contemporary topics of their interest in information technology that result in a research paper and a project involving an application in information technology. Prerequisite: Senior status and Permission of CBIS Department Chairperson. 3 hours Lecture and Hands-on — 3 credits.

IT 4235
Network Design and Administration
(Formerly IT 4235 Computer Networks)
This course builds on the foundation established in IT 4109. Network design, configurations, administration, and applications are discussed. Students gain a working knowledge of the analysis, design, installation, and administration of computer networks. Prerequisite: Network Concepts. 3 hours Lecture and Hands-on — 3 credits.