Information Technology

The Information Technology (IT) curriculum prepares graduates for employment in a variety of technology fields, including software development, networking, cybersecurity, data analysis, virtualization, and web design.

Course work includes the development of a student's ability to create, store, communicate, exchange, and use the information to solve technical issues related to information support and services, network systems, programming and software development, information security, and other emerging technologies based on the selected area of study.

Graduates should qualify for employment in entry-level positions with businesses, educational systems, and governmental agencies that rely on computer systems to design and manage information. The program incorporates the competencies of many industry-recognized certifications.

For specific information about potential positions and wages in information technology employment, visit the Central Piedmont Career Coach website.

CTS 060. Essential Computer Usage. 2.0 Credits. Class-1.0. Clinical-0.0. Lab-2.0. Work-0.0
This course covers the basic functions and operations of the computer. Topics include identification of components, overview of operating systems, and other basic computer operations. Upon completion, students should be able to perform basic computer commands, access files, print documents and complete fundamental application operations.

CTS 112. Windows (TM). 2.0 Credits. Class-1.0. Clinical-0.0. Lab-2.0. Work-0.0
This course includes the fundamentals of the Windows(TM) software. Topics include graphical user interface, icons, directories, file management, accessories, and other applications. Upon completion, students should be able to use Windows(TM) software in an office environment.

CTS 115. Information Systems Business Concepts. 3.0 Credits. Class-3.0. Clinical-0.0. Lab-0.0. Work-0.0
The course introduces the role of IT in managing business processes and the need for business process and IT alignment. Emphasis is placed on industry need for understanding business challenges and developing/managing information systems to contribute to the decision making process based on these challenges. Upon completion, students should be able to demonstrate knowledge of the 'hybrid business manager' and the potential offered by new technology and systems.
Prerequisites: Take 1 group: Take DMA 010 DMA 020 DMA 030 DMA 040 DMA 050; Take MAT 003. Take 1 group: Take DRE 097 DRE 098; Take ENG 002

CTS 118. Is Professional Communications. 2.0 Credits. Class-2.0. Clinical-0.0. Lab-0.0. Work-0.0
This course prepares the information systems professional to communicate with corporate personnel from management to end-users. Topics include information systems cost justification tools, awareness of personal hierarchy of needs, addressing these needs, and discussing technical issues with non-technical personnel. Upon completion, students should be able to communicate information systems issues to technical and non-technical personnel.
Prerequisites: Take EFL 112 ENG 111 ENG 112 ENG 113 or ENG 114; Minimum; grade C. Take CTS 115, minimum grade of C

CTS 130. Spreadsheet. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This course introduces basic spreadsheet design and development. Topics include writing formulas, using functions, enhancing spreadsheets, creating charts, and printing. Upon completion, students should be able to design and print basic spreadsheets and charts.

CTS 225. Spreadsheet Data Analysis. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This course presents basic and advanced techniques for data analysis and management using electronic spreadsheets. Topics include an overview of spreadsheet analytics, terminology, model preparation, and analytical techniques. Upon completion, students should be able to develop reliable and effective quantitative data models and reports to support analysis and decision-making for common business systems.
Prerequisites: Take CTS 130, minimum grade of C

CTS 230. Advanced Spreadsheet. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This course covers advanced spreadsheet design and development. Topics include advanced functions and statistics, charting, macros, databases, and linking. Upon completion, students should be able to demonstrate competence in designing complex spreadsheets.
Prerequisites: Take CTS 130, minimum grade of C

CTS 240. Project Management. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This course introduces computerized project management software. Topics include identifying critical paths, cost management, and problem solving. Upon completion, students should be able to plan a complete project and project time and costs accurately.
Prerequisites: Take CTS 115, minimum grade of C

CSC 118. Swift Programming I. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course introduces the development of iOS applications and Apple applications using Swift programming language. Emphasis is placed on syntax, object-oriented principles, memory management, and functional concepts of Swift programming. Upon completion, students should be able to develop fully functional iOS and Apple applications using Swift programming language.

CSC 119. Programming Orientation. 2.0 Credits. Class-1.0. Clinical-0.0. Lab-2.0. Work-0.0
This course provides students with an opportunity to develop the knowledge and skills required to succeed in the programming program. Emphasis is placed on introducing students to the tools and resources available to them in programming. Upon completion, students should be able to demonstrate knowledge of programming tools, resources, and services available.
Prerequisites: Take CTI 110, minimum grade of C

CSC 120. Computing Fundamentals I. 4.0 Credits. Class-3.0. Clinical-0.0. Lab-2.0. Work-0.0
This course provides the essential foundation for the discipline of computing and a program of study in computer science, including the role of the professional. Topics include algorithm design, data abstraction, searching and sorting algorithms, and procedural programming techniques. Upon completion, students should be able to solve problems, develop algorithms, specify data types, perform sorts and searches, and use an operating system.
Prerequisites: Take 1 group: Take DMA 010 DMA 020 DMA 030 DMA 040; DMA 050; Take MAT 121, minimum grade of C; Take MAT 171, minimum grade of C; Take MAT 003; from rule RMINP2. Take EFL 112 ENG 111 ENG 112 ENG 113 or ENG 114; Minimum; grade C

CSC 121. Python Programming. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course introduces computer programming using the Python programming language. Emphasis is placed on common algorithms and programming principles utilizing the standard library distributed with Python. Upon completion, students should be able to design, code, test, and debug Python language programs.
Prerequisites: Take CIS 115 or CTI 110, minimum grade of B. Take EFL 112 or ENG 111, minimum grade of C

CSC 122. Python Application Development. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This course introduces the use of frameworks to build web-enabled applications. Emphasis is placed on URL routing, output format templating, database manipulation and security. Upon completion, students should be able to create simple web-enabled applications with a graphical user interface using the Python language.
Prerequisites: Take CSC 121, minimum grade of C

CSC 124. Introduction to Data Science Programming. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course covers the key technologies used to manipulate, store and analyze big data. Topics include scripting languages, noSQL databases, database scalability, performance metrics and tuning. Upon completion, students should be able to use programming techniques to investigate data sets and algorithms.
Prerequisites: Take CIS 115 DBA 120, minimum grade of C

CSC 130. Computing Fundamentals II. 4.0 Credits. Class-3.0. Clinical-0.0. Lab-2.0. Work-0.0
This course provides in-depth coverage of the discipline of computing and the role of the professional. Topics include software design methodologies, analysis of algorithm and data structures, searching and sorting algorithms, and file organization methods. Upon completion, students should be able to use software design methodologies and choice of data structures and understand social/ethical responsibilities of the computing professional.
Prerequisites: Take CSC 120

CSC 133. C Programming. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course introduces computer programming using the C programming language with structured programming principles. Topics include input/output operations, iteration, arithmetic operations, arrays, pointers, filters, and other related topics. Upon completion, students should be able to design, code, test and debug at a beginning level.

CSC 134. C++ Programming. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course introduces computer programming using the C++ programming language with object-oriented programming principles. Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using object-oriented tools such as the class debugger. Upon completion, students should be able to design, code, test and debug at a beginning level.
Prerequisites: Take EFL 112 ENG 111 ENG 112 ENG 113 or ENG 114; Minimum; grade C. Take 1 group: Take DMA 010 DMA 020 DMA 030 DMA 040 DMA 050; Take MAT 121, minimum grade of of C; Take MAT 171, minimum grade of of C; Take DMA 025 DMA 040 DMA 050; Take DMA 025 DMA 045; Take DMA 010 DMA 020 DMA 030 DMA 045; Take MAT 003; Take BSP 4003

CSC 139. Visual BASIC Programming. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course introduces computer programming using the Visual BASIC programming language with object-oriented programming principles. Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using object-oriented tools such as the class debugger. Upon completion, students should be able to design, code, test and debug at a beginning level.

CSC 141. Visual C++ Programming. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course introduces computer programming using the Visual C++ programming language with object-oriented programming principles. Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using object-oriented tools such as the class debugger. Upon completion, students should be able to design, code, test, debug, and implement objects using the appropriate environment at a beginning level.

CSC 143. Object-Oriented Programming. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course introduces the concepts of object-oriented programming. Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using object-oriented tools such as the class debugger. Upon completion, students should be able to design, test, debug, and implement objects at the application level using the appropriate environment.
Prerequisites: Take CIS 115, minimum grade of C. Take EFL 112 or ENG 111, minimum grade of C

CSC 151. JAVA Programming. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course introduces computer programming using the JAVA programming language with object-oriented programming principles. Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using object-oriented tools such as the class debugger. Upon completion students should be able to design, code, test, debug JAVA language programs.
Prerequisites: Take CSC 120 or CIS 115, minimum grade of B

CSC 152. SAS. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course introduces the fundamentals of SAS programming. Emphasis is placed on learning basic SAS commands and statements for solving a variety of data processing applications. Upon completion, students should be able to use SAS data and procedure steps to create SAS data sets, do statistical analysis, and general customized reports.
Prerequisites: Take CIS 115, minimum grade of C

CSC 153. C# Programming. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course introduces computer programming using the C# programming language with object-oriented programming principles. Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using object-oriented tools such as the class debugger. Upon completion, students should be able to design, code, test, debug, and implement objects using the appropriate environment at the beginning level.
Prerequisites: Take 1 group: Take DRE 097 or DRE 098; Take ENG 111, minimum grade of C; Take ENG 002. Take CSC 143, minimum grade of C

CSC 154. Software Development. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This course covers the fundamentals of software development. Emphasis is placed on the full spectrum of team software development methodologies, software development project management, version control, issue tracking, regression testing, automated build and deployment. Upon completion, students should be able to work in a team environment and apply software development methodologies and software quality assurance principles.
Prerequisites: Take CTI 110, minimum grade of C

CSC 174. Server-Side Javascript. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This course introduces the use of JavaScript in the server environment to build server-side applications. Topics include asynchronous programming, connecting to other machines, testing, and connecting to different databases. Upon completion, students should be able to create server-side applications using JavaScript applications.
Prerequisites: Take CIS 115 WEB 110, minimum grade of C

CSC 218. Swift Programming II. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course introduces advanced iOS application development using the Swift programming language. Emphasis is placed on navigation, data manipulation, web services, prototyping, debugging, and project planning. Upon completion, students should be able to develop advanced multifunctional iOS and Apple applications using the Swift programming language.
Prerequisites: Take CSC 118

CSC 221. Advanced Python Programming. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course introduces advanced computer programming using the Python programming language. Emphasis is placed on the advanced programming concepts including advanced algorithms and programming principles utilizing standard and third party library tools. Upon completion, students should be able to design, code, test, and debug advanced Python language programs.
Prerequisites: Take CSC 121, minimum grade of C

CSC 234. Advanced C++ Programming. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course is a continuation of CSC 134 using the C++ programming language with standard programming principles. Emphasis is placed on advanced arrays/tables, file management/processing techniques, data structures, sub-programs, interactive processing, sort/merge routines, and libraries. Upon completion, students should be able to design, code, test, debug and document programming solutions.
Prerequisites: Take CSC 134

CSC 241. Advanced Visual C++ Programming. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course is a continuation of CSC 141 using the Visual C++ programming language with object-oriented programming principles. Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using object-oriented tools such as the class debugger. Upon completion, students should be able to design, code, test, debug, and implement objects using the appropriate environment.
Prerequisites: Take CSC 141

CSC 249. Data Structure & Algorithms. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course introduces the data structures and algorithms frequently used in programming applications. Topics include lists, stacks, queues, dequeues, heaps, sorting, searching, mathematical operations, recursion, encryption, random numbers, algorithm testing, and standards. Upon completion, students should be able to design data structures and implement algorithms to solve various problems.
Prerequisites: Take CSC 151, minimum grade of C

CSC 251. Advanced JAVA Programming. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course is a continuation of CSC 151 using the JAVA programming language with object-oriented programming principles. Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using object-oriented tools such as the class debugger. Upon completion, students should be able to design, code, test, debug, and implement objects using the appropriate environment.
Prerequisites: Take CSC 151, minimum grade of C

CSC 253. Advanced C# Programming. 3.0 Credits. Class-2.0.
Clinical-0.0. Lab-3.0. Work-0.0
This course is a continuation of CSC 153 using the C# programming language with object-oriented programming principles. Emphasis is placed on event-driven programming methods, including creating and manipulating objects, classes, and using object-oriented tools such as the class debugger. Upon completion, students should be able to design, code, test, debug, and implement objects using the appropriate environment.
Prerequisites: Take CSC 153

CSC 256. Software Quality Assurance. 3.0 Credits. Class-2.0.
Clinical-0.0. Lab-2.0. Work-0.0
This course covers the principles, concepts and processes of software testing. Topics include testing technologies, static techniques, test design techniques, and test management. Upon completion, students should be able to design and implement software testing plans and procedures throughout the software life cycle.
Prerequisites: Take CSC 151, minimum grade of B

CSC 258. JAVA Enterprise Programs. 3.0 Credits. Class-2.0.
Clinical-0.0. Lab-3.0. Work-0.0
This course provides a continuation to CSC 151 using the Java Enterprise Edition (JEE) programming architecture. Topics include distributed network applications, database connectivity, Enterprise Java Beans, servlets, collection frameworks, JNDI, RMI, JSP, multithreading XML and multimedia development. Upon completion, students should be able to program a client/server enterprise application using the JEE framework.
Prerequisites: Take CSC 151, minimum grade of C

CSC 284. Emerging Computer Prog Technologies. 3.0 Credits.
Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course provides students with the latest technologies and strategies in the field of Computer Programming. Emphasis is placed on the evaluation of developing Computer Programming Technologies and presenting those findings to the class. Upon completion, students should be able to critically analyze emerging Computer Programming Technologies and establish informed opinions.
Prerequisites: Take CSC 151, minimum grade of C

CSC 289. Programming Capstone Project. 3.0 Credits. Class-1.0.
Clinical-0.0. Lab-4.0. Work-0.0
This course provides an opportunity to complete a significant programming project from the design phase through implementation with minimal instructor support. Emphasis is placed on project definition, testing, presentation, and implementation. Upon completion, students should be able to complete a project from the definition phase through implementation.
Prerequisites: Take CSC 121 DBA 120 WEB 115, minimum grade of C

CTI 110. Web, Programming, and Database Foundation. 3.0 Credits.
Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This course covers the introduction of the tools and resources available to students in programming, mark-up language and services on the Internet. Topics include standard mark-up language Internet services, creating web pages, using search engines, file transfer programs; and database design and creation with DBMS products. Upon completion students should be able to demonstrate knowledge of programming tools, deploy a web-site with mark-up tools, and create a simple database table.
Prerequisites: Take 1 group: Take DMA 010 DMA 020 DMA 030 DMA 040 DMA 050; Take MAT 003. Take 1 group: Take DRE 097 DRE 098; Take ENG 002

CTI 120. Network and Security Foundation. 3.0 Credits. Class-2.0.
Clinical-0.0. Lab-2.0. Work-0.0
This course introduces students to the Network concepts, including networking terminology and protocols, local and wide area networks, and network standards. Emphasis is placed on securing information systems and the various implementation policies. Upon completion, students should be able to perform basic tasks related to networking mathematics, terminology, media and protocols.
Prerequisites: Take 1 group: Take DMA 010 DMA 020 DMA 030 DMA 040 DMA 050; Take MAT 003. Take 1 group: Take DRE 097 DRE 098; Take ENG 002

CTI 130. Operating Systems and Device Foundation. 6.0 Credits.
Class-4.0. Clinical-0.0. Lab-4.0. Work-0.0
This course covers the basic hardware and software of a personal computer, including installation, operations and interaction with popular microcomputer operating systems. Topics include components identification, memory-system, peripheral installation and configuration, preventive maintenance, hardware diagnostics/repair, installation and optimization of system software, commercial programs, system configuration, and device-drivers. Upon completion, students should be able to select appropriate computer equipment and software, upgrade/maintain existing equipment and software, and troubleshoot/repair non-functioning personal computers.
Prerequisites: Take 1 group: Take DMA 010 DMA 020 DMA 030 DMA 040 DMA 050; Take MAT 003. Take 1 group: Take DRE 097 DRE 098; Take ENG 002

CTI 140. Virtualization Concepts. 3.0 Credits. Class-1.0. Clinical-0.0.
Lab-4.0. Work-0.0
This course introduces operating system virtualization. Emphasis is placed on virtualization terminology, virtual machine storage, virtual networking and access control. Upon completion, students should be able to perform tasks related to installation, configuration and management of virtual machines.

CTI 141. Cloud and Storage Concepts. 3.0 Credits. Class-1.0.
Clinical-0.0. Lab-4.0. Work-0.0
This course introduces cloud computing and storage concepts. Emphasis is placed on cloud terminology, virtualization, storage networking and access control. Upon completion, students should be able to perform tasks related to installation, configuration and management of cloud storage systems.
Prerequisites: Take CTI 140, minimum grade of C

CTI 240. Virtualization Administration I. 3.0 Credits. Class-1.0. Clinical-0.0. Lab-4.0. Work-0.0
This course covers datacenter virtualization concepts. Topics include data storage, virtual network configuration, virtual machine and virtual application deployment. Upon completion, students should be able to perform tasks related to virtual machine and hypervisor installation and configuration.
Prerequisites: Take CTI 141, minimum grade of C

CTI 241. Virtualization Administration II. 3.0 Credits. Class-1.0. Clinical-0.0. Lab-4.0. Work-0.0
This course covers administration of datacenter virtualization infrastructure. Topics include access control, fault tolerance, scalability, resource management, virtual machine migration and troubleshooting. Upon completion, students should be able to perform tasks related to virtualization security, data protection and resource monitoring.

CTI 260. Data Center Troubleshooting. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This course covers troubleshooting in a highly available, high performance, storage and computing system. Topics include provisioning, monitoring, diagnosing, and taking corrective actions in storage environments relating to Storage Area Network (SAN), Network Attached Storage (NAS), data protection and recovery. Upon completion, students should be able to demonstrate an understanding of SAN and NAS technologies, topologies, configuration, data protection, and fault triage and remediation.
Prerequisites: Take CTI 241, minimum grade of C

CTI 270. Data Center Design and Problem Resolution. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This course provides students an opportunity to complete a significant data center hardware and software design and configuration project, including disaster recovery planning. Emphasis is placed on adhering to optimal practices that can provide a highly available, stable, manageable, secure and scalable environment and maintaining it using a variety of utilities and system tools. Upon completion, students should be able to design, deploy and administer the hardware and software components of a highly available data center.
Prerequisites: Take CTI 260, minimum grade of C

CTI 289. Computer Technology Integration Capstone Project. 3.0 Credits. Class-1.0. Clinical-0.0. Lab-6.0. Work-0.0
This course provides students an opportunity to complete a significant integrated technology project from the design phase through implementation with minimal instructor support. Emphasis is placed on technology policy, process planning, procedure definition, systems architecture, and security issues to create projects for the many areas in which computer technology is integrated. Upon completion, students should be able to create, implement, and support a comprehensive technology integration project from the planning and design phase through implementation.
Prerequisites: Take CTI 110 CTI 120 CTS 115 DBA 120 WEB 115 WEB 210, minimum grade of C

CCT 110. Introduction to Cyber Crime. 3.0 Credits. Class-3.0. Clinical-0.0. Lab-0.0. Work-0.0
This course introduces and explains the various types of offenses that qualify as cyber crime activity. Emphasis is placed on identifying cyber crime activity and the response to these problems from both the private and public domains. Upon completion, students should be able to accurately describe and define cyber crime activities and select an appropriate response to deal with the problem.

CCT 121. Computer Crime Investigation. 4.0 Credits. Class-3.0. Clinical-0.0. Lab-2.0. Work-0.0
This course introduces the fundamental principles of computer crime investigation processes. Topics include crime scene/incident processing, information gathering techniques, data retrieval, collection and preservation of evidence, preparation of reports and court presentations. Upon completion, students should be able to identify cyber crime activity and demonstrate proper investigative techniques to process the scene and assist in case prosecution.
Prerequisites: Take CTI 130, minimum grade of C

CCT 231. Technology Crimes & Law. 3.0 Credits. Class-3.0. Clinical-0.0. Lab-0.0. Work-0.0
This course covers the applicable technological laws dealing with the regulation of cyber security and criminal activity. Topics include an examination of state, federal and international laws regarding cyber crime with an emphasis on both general and North Carolina statutes. Upon completion, students should be able to identify the elements of cyber crime activity and discuss the trends of evolving laws.

CCT 240. Data Recovery Techniques. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course introduces the unique skills and methodologies necessary to assist in the investigation and prosecution of cyber crimes. Topics include hardware and software issues, recovering erased files, overcoming encryption, advanced imaging, transient data, Internet issues and testimony considerations. Upon completion, students should be able to recover digital evidence, extract information for criminal investigation and legally seize criminal evidence.
Prerequisites: Take CCT 121, minimum grade of C

CCT 241. Advanced Data Recovery. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course further explores the methodologies necessary to assist in the investigation and analysis of cyber crimes. Topics include commercial and open-source software tools for working with evidence acquisition, data recovery, and encryption. Upon completion, students should be able to perform the data recovery and analysis for a complete criminal or corporate investigation.
Prerequisites: Take CCT 240, minimum grade of C

CCT 260. Mobile Phone Examination. 3.0 Credits. Class-1.0. Clinical-0.0. Lab-4.0. Work-0.0
This course introduces the unique skills and methodologies necessary to assist in the investigation and prosecution of cyber crimes involving mobile phones. Topics include the basics of the cellular networks as well as data extraction from GSM, iDEN and CDMA handsets. Upon completion, students should be able to use the course processes and methodologies to obtain forensic evidence from GSM, iDEN and CDMA handsets.

CCT 289. Capstone Project. 3.0 Credits. Class-1.0. Clinical-0.0. Lab-6.0. Work-0.0

This course provides experience in cyber crime investigations or technology security audits in either the public or private domain. Emphasis is placed on student involvement with businesses or agencies dealing with technology security issues or computer crime activities. Upon completion, students should be able to successfully analyze, retrieve erased evidence and testify in mock proceedings against these criminal entrepreneurs.

Prerequisites: Take 1 group: Take CCT 231 CCT 241, minimum grade of C; Take CCT 220 CCT 241, minimum grade of C

DBA 110. Database Concepts. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0

This course introduces database design and creation using a DBMS product. Emphasis is placed on data dictionaries, normalization, data integrity, data modeling, and creation of simple tables, queries, reports, and forms. Upon completion, students should be able to design and implement normalized database structures by creating simple database tables, queries, reports, and forms.

Prerequisites: Take CIS 110 or CTI 110, minimum grade of C

DBA 112. Database Utilization. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course introduces basic database functions and uses. Emphasis is placed on database manipulation with queries, reports, forms, and some table creation. Upon completion, students should be able to enter and manipulate data from the end user mode.

Prerequisites: Take CIS 110 or CTI 110 , minimum grade of C

DBA 115. Database Applications. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course applies concepts learned in DBA 110 to a specific DBMS. Topics include manipulating multiple tables, advanced queries, screens and reports, linking, and command files. Upon completion, students should be able to create multiple table systems that demonstrate updates, screens, and reports representative of industry requirements.

Prerequisites: Take DBA 110

DBA 120. Database Programming I. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course is designed to develop SQL programming proficiency. Emphasis is placed on data definition, data manipulation, and data control statements as well as on report generation. Upon completion, students should be able to write programs which create, update, and produce reports.

Prerequisites: Take CTI 110, minimum grade of C

DBA 125. Database Reporting. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course provides a survey of the tools used in designing, creating and publishing database reports. Topics include both relational and XML datasets. Upon completion, students should be able to demonstrate an understanding of the different tools and frameworks used for database reporting.

Prerequisites: Take DBA 112 or CTS 130, minimum grade of C

DBA 210. Database Administration. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0

This course covers database administration issues and distributed database concepts. Topics include database administrator (DBA) goals and functions, backup and recovery, standards and procedures, training, and database security and performance evaluations. Upon completion, students should be able to produce functional DBA documentation and administer a database.

Prerequisites: Take DBA 110, minimum grade of C

DBA 220. Oracle Database Programming II. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course is designed to enhance programming skills developed in DBA 120. Topics include application development with GUI front-ends and embedded programming. Upon completion, students should be able to develop an Oracle DBMS application which includes a GUI front-end and report generation.

Prerequisites: Take DBA 120, minimum grade of C

DBA 221. SQL Server Database Programming II. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course is designed to enhance programming skills developed in DBA 120. Topics include application development with GUI front-ends and embedded programming. Upon completion, students should be able to develop a SQL Server DBMS application which includes a GUI front-end and report generation.

Prerequisites: Take DBA 120

DBA 285. Data Warehousing and Mining. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0

This course introduces data warehousing and data mining techniques. Emphasis is placed on data warehouse design, data transference, data cleansing, retrieval algorithms, and mining techniques. Upon completion, students should be able to create, populate, and mine a data warehouse.

Prerequisites: Take DBA 120, minimum grade of C

SEC 110. Security Concepts. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course introduces the concepts and issues related to securing information systems and the development of policies to implement information security controls. Topics include the historical view of networking and security, security issues, trends, security resources, and the role of policy, people, and processes in information security. Upon completion, students should be able to identify information security risks, create an information security policy, and identify processes to implement and enforce policy.

SEC 150. Secure Communications. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course provides an overview of current technologies used to provide secure transport of information across networks. Topics include data integrity through encryption, Virtual Private Networks, SSL, SSH, and IPSec. Upon completion, students should be able to implement secure data transmission technologies.

SEC 151. Introduction to Protocol Analysis. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0

This course introduces protocol analysis. Topics include protocol analysis tools, TCP/IP concepts, Internet protocols, network traffic analysis, monitoring network traffic, network security protocol analysis, and understanding data flow through protocol analysis. Upon completion, students should be able to perform simple protocol analysis to determine baseline network performance and identify anomalies.

Prerequisites: Take CTI 120 SEC 110 AND NOS 120; MINIMUM GRADE C.

SEC 160. Security Administration I. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course provides an overview of security administration and fundamentals of designing security architectures. Topics include networking technologies, TCP/IP concepts, protocols, network traffic analysis, monitoring, and security best practices. Upon completion, students should be able to identify normal network traffic using network analysis tools and design basic security defenses.

SEC 251. Advanced Protocol Analysis. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0

This course is designed to provide advanced understanding of protocol analysis. Topics include advanced network protocol security analysis, data parsing, monitoring scanning logs, and network intrusion identification. Upon completion, students should be able to apply best practices in protocol analysis and apply the results to IT security frameworks.

Prerequisites: TAKE SEC 151 NET 125 AND CSC 121; MINIMUM GRADE C

SEC 258. Security Compliance. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0

This course introduces information security compliance and standards along with how they apply to corporate IT environments. Topics include ISO standards, government NIST frameworks, federal and state compliance requirements, security policies, incident response and business continuity planning. Upon completion, students should be able to apply compliance and availability requirements to corporate data enterprise scenarios.

Prerequisites: Take SEC 110, minimum grade of C

SEC 285. Systems Security Project. 3.0 Credits. Class-1.0. Clinical-0.0. Lab-4.0. Work-0.0

This course provides the student the opportunity to apply the skills and competencies acquired in the program that focus on systems security. Emphasis is placed on security policy, process planning, procedure definition, business continuity, compliance, auditing, testing procedures and systems security architecture. Upon completion, students should be able to design and implement comprehensive information security architecture from the planning and design phase through implementation.

Prerequisites: Take all: CTI 110, CTI 120, and CTS 115

CIS 070. Fundamentals of Computing. 1.0 Credit. Class-0.0. Clinical-0.0. Lab-2.0. Work-0.0

This course covers fundamental functions and operations of the computer. Topics include identification of components, overview of operating systems, and other basic computer operations. Upon completion, students should be able to operate computers, access files, print documents and perform basic applications operations.

CIS 110. Introduction to Computers. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course introduces computer concepts, including fundamental functions and operations of the computer. Topics include identification of hardware components, basic computer operations, security issues, and use of software applications. Upon completion, students should be able to demonstrate an understanding of the role and function of computers and use the computer to solve problems.

CIS 111. Basic PC Literacy. 2.0 Credits. Class-1.0. Clinical-0.0. Lab-2.0. Work-0.0

This course provides an overview of computer concepts. Emphasis is placed on the use of personal computers and software applications for personal and fundamental workplace use. Upon completion, students should be able to demonstrate basic personal computer skills.

CIS 115. Introduction to Programming and Logic. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0

This course introduces computer programming and problem solving in a structured program logic environment. Topics include language syntax, data types, program organization, problem solving methods, algorithm design, and logic control structures. Upon completion, students should be able to use top-down algorithm design and implement algorithmic solutions in a programming language.

Prerequisites: Take One Set: Set 1: DMA 010, DMA 020, DMA 030, and DMA 040; Set 2: DMA 025 and DMA 040; Set 3: MAT 121; Set 4: MAT 171; Set 5: MAT 003; Set 6: BSP 4003

NOS 120. Linux/UNIX Single User. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course develops the necessary skills for students to develop both GUI and command line skills for using and customizing a Linux workstation. Topics include Linux file system and access permissions, GNOME Interface, VI editor, X Window System expression pattern matching, I/O redirection, network and printing utilities. Upon completion, students should be able to customize and use Linux systems for command line requirements and desktop productivity roles.

NOS 130. Windows Single User. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course introduces operating system concepts for single-user systems. Topics include hardware management, file and memory management, system configuration/optimization, and utilities. Upon completion, students should be able to perform operating systems functions at the support level in a single-user environment.

NOS 221. Linux/UNIX Administration II. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course includes skill building in configuring common network services and security administration using Linux. Topics include server-side setup, configuration, basic administration of common networking services, and security administration using Linux. Upon completion, students should be able to setup a Linux server and configure common network services including security requirements.

Prerequisites: Take NOS 220

NOS 230. Windows Administration I. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This course covers the installation and configuration of a Windows Server operating system. Emphasis is placed on the basic configuration of core network services, Active Directory and group policies. Upon completion, students should be able to install and configure a Windows Server operating system.
Prerequisites: Take NOS 130, minimum grade of C

NOS 231. Windows Administration II. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This course covers the management of a Windows Server operating system. Emphasis is placed on the deployment of print services, network services, Active Directory, group policies and access controls. Upon completion, students should be able to deploy and manage services on a Windows Server operating system.
Prerequisites: Take NOS 230, minimum grade of C

NOS 232. Windows Administration III. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This course covers management and configuration of a highly available Windows Server operating system. Emphasis is placed on the implementation of business continuity and disaster recovery procedures for network services and access controls. Upon completion, students should be able to manage and configure a highly available Windows Server operating system.
Prerequisites: Take NOS 231, minimum grade of C

NET 110. Networking Concepts. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This course introduces students to the networking field. Topics include network terminology and protocols, local-area networks, wide-area networks, OSI model, cabling, router programming, Ethernet, IP addressing, and network standards. Upon completion, students should be able to perform tasks related to networking mathematics, terminology, and models, media, Ethernet, subnetting, and TCP/IP Protocols.

NET 125. Introduction to Networks. 3.0 Credits. Class-1.0. Clinical-0.0. Lab-4.0. Work-0.0
This course introduces the architecture, structure, functions, components, and models of the Internet and computer networks. Topics include introduction to the principles of IP addressing and fundamentals of Ethernet concepts, media, and operations. Upon completion, students should be able to build simple LANs, perform basic configurations for routers and switches, and implement IP addressing schemes.

NET 126. Switching and Routing. 3.0 Credits. Class-1.0. Clinical-0.0. Lab-4.0. Work-0.0
This course covers the architecture, components, and operations of routers and switches in small networks and introduces wireless local area networks (WLAN) and security concepts. Emphasis is placed on configuring and troubleshooting routers and switches for advanced functionality using security best practices and resolving common network issues utilizing both IPv4 and IPv6 protocols. Upon completion, students should be able to configure VLANs and Inter-VLAN routing applying security best practices, troubleshoot inter-VLAN routing on Layer 3 devices, configure redundancy on a switched network using STP and EtherChannel, configure WLANs using a WLC and L2 security best practices and configure IPv4 and IPv6 static routing on routers.
Prerequisites: Take NET 125, minimum grade of C

NET 175. Wireless Technology. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This course introduces the student to wireless technology and interoperability with different communication protocols. Topics include Wireless Application Protocol (WAP), Wireless Mark-up language (WML), link manager, service discovery protocol, transport layer and frequency band. Upon completion, students should be able to discuss in written and oral form protocols and procedures required for different wireless applications.

NET 225. Enterprise Networking. 3.0 Credits. Class-1.0. Clinical-0.0. Lab-4.0. Work-0.0
This course is designed to cover the architecture, components, operations, and security to scale for large, complex networks, including wide area network (WAN) technologies. Emphasis is placed on configuring, troubleshooting, and securing enterprise network devices and understanding how application programming interfaces (API) and configuration management tools enable network automation. Upon completion, students should be able to configure link state routing protocols, implement ACLs to filter traffic and secure administrative access, configure NAT services on the router to provide address scalability, explain techniques to provide address scalability and secure remote access for WAN, and explain how automation affects evolving networks.
Prerequisites: Take NET 126, minimum grade of C

NET 226. Network Programmability. 3.0 Credits. Class-1.0. Clinical-0.0. Lab-4.0. Work-0.0
This course covers the methodologies and tools of modern software development, applied to IT and Network operations. Emphasis is placed on network programming in current network scripting languages, using GIT and common data formats, deploying applications as containers, using Continuous Integration/Continuous Deployment (CI/CD) pipelines and automating infrastructure using code. Upon completion, students should be able to use basic Python programming and Linux skills, implement a development environment, use software development and design best practices, create a secure API, use current technologies to deploy and secure applications and compare software testing and deployment methods in automation and simulation environments.
Prerequisites: Take NET 225 , minimum grade of C

NET 289. Networking Project. 3.0 Credits. Class-1.0. Clinical-0.0. Lab-4.0. Work-0.0
This course provides an opportunity to complete a significant networking project from the design phase through implementation with minimal instructor support. Emphasis is placed on project definition, documentation, installation, testing, presentation, and training. Upon completion, students should be able to complete a project from the definition phase through implementation.
Prerequisites: Take CTI 110, CTI 120, CTS 115, NET 226, and NOS 231, minimum grade of C

WEB 110. Web Development Fundamentals. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course introduces World Wide Web Consortium (W3C) standard markup language. Topics include creating web pages, responsive design, file transfer, deployment, accessibility, and other related W3C topics. Upon completion, students should be able to deploy a hand-coded website created using the HyperText Markup Language (HTML) and Cascading Style Sheet (CSS) standards.
Prerequisites: Take CTI 110, minimum grade of C

WEB 115. Web Markup and Scripting. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course introduces Worldwide Web Consortium (W3C) Internet programming using JavaScript. Topics include basic syntax, object-oriented programming, functions, variables, events, arrays, validation, accessibility, and web standards. Upon completion, students should be able to write, debug, maintain well-formed and well documented interactive web content using JavaScript code.
Prerequisites: Take WEB 110, minimum grade of C

WEB 120. Introduction to Internet Multimedia. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This course introduces the creation of rich media for the Internet. Topics include the design, production and delivery of interactive content, rich media, digital video, and digital audio. Upon completion, students should be able to create multimedia projects incorporating graphics, text, video, and audio using industry standard authoring software or web standards.

WEB 125. Mobile Web Design. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This course introduces students to web design for mobile devices. Topics include planning an effective mobile Web site, industry standard Mobile Markup Language, CSS3, multimedia, m-commerce, social media, testing and publishing. Upon completion, students should be able to plan, develop, test, and publish Web content designed for mobile devices.
Prerequisites: Take WEB 110, minimum grade of C

WEB 140. Web Development Tools. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course provides an introduction to web development tools.Topics include creating websites using web development tools and web standards. Upon completion, students should be able to create small web sites and upload files to a web server.
Prerequisites: Take WEB 110, minimum grade of C

WEB 141. Mobile Interface Design. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This course covers current design standards and emerging approaches related to the design and development of user interfaces for mobile devices. Emphasis is placed on research and evaluation of standard and emerging practices for effective interface and user experience design. Upon completion, students should be able to design effective and usable interfaces for mobile devices.

WEB 151. Mobile Application Development I. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This course introduces students to programming technologies, design and development related to mobile applications. Topics include accessing device capabilities, industry standards, operating systems, and programming for mobile applications using an OS Software Development Kit (SDK). Upon completion, students should be able to create basic applications for mobile devices.

WEB 210. Web Design. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This course introduces intermediate to advanced web design techniques. Topics include customer expectations, advanced markup language, multimedia technologies, usability and accessibility practices, and techniques for the evaluation of web design. Upon completion, students should be able to employ advanced design techniques to create high impact and highly functional web sites.
Prerequisites: Take WEB 110, minimum grade of C

WEB 214. Social Media. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course introduces students to social media for organizations. Topics include social media, marketing strategy, brand presence, blogging, social media analytics and technical writing. Upon completion, students should be able to utilize popular social media platforms as part of a marketing strategy, and work with social media analytics tools.

WEB 215. Advanced Markup and Scripting. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0
This course covers the advanced programming skills required to design Internet applications and interactive web content.Emphasis is placed on the programming techniques required to develop Internet applications, interactive web content, frameworks, and using libraries. Upon completion, students should be able to design, code, debug, and document Internet-based programming solutions to various real-world problems.
Prerequisites: Take WEB 115, minimum grade of C

WEB 220. Advanced Multimedia. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This is the second of two courses covering internet multimedia. Topics include use of advanced internet multimedia applications. Upon completion, students should be able to create interactive Internet multimedia presentations.
Prerequisites: Take WEB 120

WEB 250. Database Driven Websites. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0
This course introduces dynamic (database-driven) website development. Topics include the use of basic database CRUD statements (create, read, update and delete) incorporated into web applications, as well as in software architecture principles. Upon completion, students should be able to design and develop database driven web applications according to industry standards.
Prerequisites: Take DBA 120, minimum grade of C

WEB 251. Mobile Application Development II. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-2.0. Work-0.0

This course covers advanced applications and custom programming to develop applications for mobile devices. Topics include device capabilities, OS specific Software Development Kits (SDK), scripting for functionality and designing interactivity. Upon completion, students should be able to demonstrate effective programming techniques to develop advanced mobile applications.

Prerequisites: Take WEB 151, minimum grade of C

WEB 260. E-Commerce Programming. 3.0 Credits. Class-2.0. Clinical-0.0. Lab-3.0. Work-0.0

This course introduces the concepts and tools to implement electronic commerce via the Internet. Topics include application and server software selection, securing transactions, use and verification of credit cards, publishing of catalogs, documentation, and site administration. Upon completion, students should be able to setup a working e-commerce Internet web site.

Prerequisites: Take WEB 140 and CTS 115, minimum grade of C

WEB 289. Internet Technologies Project. 3.0 Credits. Class-1.0. Clinical-0.0. Lab-4.0. Work-0.0

This course provides an opportunity to complete a significant Web technologies project from the design phase through implementation with minimal instructor support. Emphasis is placed on project definition, documentation, installation, testing, presentation, and training. Upon completion, students should be able to complete an Internet project from the definition phase through implementation.

Prerequisites: Take CTI 110 CTI 120 CTS 115, minimum grade of C