

COMPUTER INFORMATION TECHNLGY (CIT)

CIT 110 Introduction to Information Technology (3 credits)

This course will provide foundational knowledge for the modern knowledge worker. Innovation within a wide range of disciplines has been sparked by the diffusion of information technology into a variety of settings. Scientific, engineering, and organizational careers depend upon the heavy use of information technology. This course will provide an introduction to systems and development concepts and information technology (IT). It explains the fundamental role of information within organizations and how IT enables improvement in communication, quality, efficiency, effectiveness, and overall competitive advantage of the firm or non-profit organization. For the modern firm, information is of primary significance in stating and attaining organizational goals. Information systems will be introduced as a means to process and communicate information. The dynamic nature of organizations and the necessity for growth and re-design of the organization as well as its information systems will be presented and used as the motivator for understanding information systems development methodologies.

Course Rotation: NY and PL: Fall

Prerequisites: This course does not have a prerequisite.

CIT 196G Topic: Introduction to Mapping and Web GIS (2 credits)

Mapping and Geographic information systems have become a necessary tool in decision making, visualization, and spatial analytics across a variety of disciplines and application domains including the sciences, humanities, business, social sciences and healthcare. Going beyond Google Maps, this introductory course introduces web and mobile-based mapping solutions. Through hands on projects, students will use web-based data to build web mapping GIS applications, build mobile applications for field collection, and analyze results using the latest industry tools, such as Google Maps, Social Explorer, and the ESRI web mapping platform, ArcGIS Online.

Course Rotation: NYC & PLV: Fall, Spring, Summer 1, and Summer 2

Prerequisites: This course does not have a prerequisite.

CIT 196L Topic: Introduction to Location Intelligence and GIS (2 credits)

This course introduces Web-based tools for GIS, location intelligence, business analytics, and visualization. These tools can be leveraged in research in multiple business fields including retail, marketing, and decision support. Doing hands-on projects, students will use web-based data for mapping and analyze the data for market planning, site selection, customer segmentation, and risk assessment. Students will use the latest industry tools, such as ESRI's ArcGIS Business Analyst Online (BAO) as well as ArcGIS Online, which is a cloud mapping platform that gives users the ability to build, visualize and analyze geospatial models across multiple disciplines. ArcGIS Business Analyst Online (BAO) provides location-based intelligence to enhance prediction and decision-making with map-based analytics for accurate reports and dynamic presentations by using tools and data, such as demographic, lifestyle, spending data, health, and education data.

Course Rotation: NYC & PLV: Spring & Summer 2

Prerequisites: This course does not have a prerequisite.

CIT 211 Platform Technologies and Architecture (4 credits)

This course introduces the basic components of a computer, how they are organized, and how they work together under the control of an operating system. Course activities include hands-on hardware labs, online research of hardware topics, and discussion of hardware design. This course will introduce the student to basic microcomputer hardware components and will familiarize the student with methods of troubleshooting strategies and maintaining computers. Students will examine theoretical concepts underlying hardware functions, preventative maintenance techniques, safety precautions, system procurement, and upgrades. There will also be some discussion of networking and software as it pertains to hardware functionality.

Course Rotation: NYC & PLV: Fall

Prerequisites: CIS 101 or CIT 110 with minimum grade of D.

CIT 221 Global Networking Technology (4 credits)

This course explores fundamentals of business telecommunications including, transmission media, synchronous and asynchronous communication, and packet transmission concepts. Data communications protocols are introduced and local area and wide area network technology is explored. The role of telecommunications in organizations and the global impact of networking are emphasized in case studies throughout the course. Hardware topics and hands-on labs will provide a foundation for network certification.

Course Rotation: NY:PLV;Fall

Prerequisites: CIS 101 or CIT 110 with minimum grade of D.

CIT 223 Introduction to Software Defined Networking and Virtualization (4 credits)

This course provides the student with an overview of the theory and concepts surrounding the use of Software Defined Networking (SDN) and Virtualization. SDN is the ability of software applications to program individual network devices dynamically and control the behavior of the entire network. Companies are devoting much of their development resources to having a large percentage of their networks running on virtualized platforms by moving many services from dedicated hardware from traditional vendors to software-based VNF (Virtualized Network Functions). This course will provide students with an exposure to the concepts of SDN using a variety of tools within hands-on labs.

Prerequisites: CIT 221 with minimum grade of C.

CIT 231 Web Authoring and Digital Media (4 credits)

This course is designed to provide an introduction to the internet, Web Page design and authoring, Web site management, and multimedia for the Web. Topics include XHTML, CSS, HTML editors, Web graphics, multimedia, basic Web page design concepts, Web 2.0 design, standards-based Web design, and accessibility issues. Students will prepare Web pages incorporating text, digitized images, animations, JavaScript, and sound, using a graphics program, and HTML editor, and XHTML.

Course Rotation: NY and PL: Fall

Prerequisites: CIS 101 or CIT 110 with minimum grade of D.

CIT 241 Database Management (4 credits)

This course deals with the logical and physical organization of databases within and across organizations. Areas to be included are database management, Database management systems, security and integrity controls, ethics and privacy concerns, data description languages, conceptual data modeling and database implementation methods.

Course Rotation: NY, PL, and WP: Fall, Spring, and Summer.

Prerequisites: AIT 107 or CIS 101 or CIT 110 with minimum grade of D.

CIT 251 Computer Security Overview (4 credits)

This course gives a broad overview of Information Assurance. The course has two parts: Lecture/discussion related to information security basics and a laboratory component in which students learn technology related security. Course materials include topics such as types of attacks, hacker techniques, legal and privacy issues, security policy, information security best practices and so on. Students also learn security technologies related to three areas: operating systems, Networks and Web, and e-commerce. The course has a strong laboratory component in which students experiment with various practical computer security tools. Restrictions/Requirements: Prereq or permission of department Chairperson

Course Rotation: NY and PL: Fall, Spring, and Summer.

Prerequisites: CIS 101 or CIT 110 with minimum grade of D.

CIT 252 Overview of Network and Internet Security (3 credits)

This course provides a thorough introduction to perimeter defense fundamentals. Although the primary emphasis is on intrusion detection, the course covers essential practices such as developing security policies and then implementing that policy by performing network address setting up packet filtering, firewalls, and virtual private networks. This course provides the student with a solid foundation in network and web security fundamentals but assumes familiarity with TCP/IP and basic security concepts.

Course Rotation: Fall and Spring; Online

Prerequisites: CIT 251 with minimum grade of D.

CIT 254 Overview of Computer Forensics (3 credits)

This course provides an overview of the essential skills necessary to launch and complete a successful computer investigation. It will introduce the necessary steps in conducting a high-tech investigation, from acquiring digital evidence to reporting its findings. Students will learn about how to set up a forensics lab, how to acquire the proper and necessary tools, and how to conduct the investigation and subsequent digital analysis. The required textbook features free downloads of the latest forensics software, so the students can become familiar with the tools of the trade.

Course Rotation: Fall and Spring; Online

Prerequisites: CIT 251 with minimum grade of D.

CIT 261 Introduction to Coding Using Python (4 credits)

This course covers methods for developing solutions to programming problems using object-oriented techniques with the Python language. The course covers the fundamental elements of object-oriented programming. Students will learn how to use classes and objects, and Python libraries such as NumPy (<https://numpy.org/>) to develop object-oriented solutions. Students will be introduced to the use of data structures in programs and the use of UML (Unified Modeling Language). Programming problem-solving is emphasized throughout. Credit Badge: Data Science.

Course Rotation: NYC & PLV: Fall & Spring

Prerequisites: CIS 101 or CIT 110 with minimum grade of D.

CIT 262 Advanced Coding in Python (4 credits)

This course will focus on advanced topics in Python coding with an emphasis on data structures, algorithms, and object-oriented concepts. Data structures will include stacks, queues and linked lists. The course will also cover searching and sorting algorithms, with an introduction to Big O notation. Object-oriented concepts covered will include inheritance and polymorphism. Students will work on advanced projects in data science, cybersecurity, and Web technologies.

Course Rotation: NYC & PLV: Fall & Spring

Prerequisites: CIT 261 with minimum grade of D.

CIT 322 Distributed Computing (4 credits)

This course provides students with an understanding of the alternatives and related issues regarding the distribution of Information Technology resources. Topics to be covered include centralized versus distributed systems from both a technical and organizational perspective, the role of the communications network, distributed database systems and operating systems, distributed transaction processing, two and three tier client/server systems, distributed systems management, standards and protocols, web services and the Internet as a distributed system, and systems security. Students will complete a substantial group course project.

Course Rotation: NY and PL: Fall, Spring, and Summer.

Prerequisites: CIT 221 and CIT 241 with minimum grades of D.

CIT 336 Web Scripting (4 credits)

This course provides students with an introduction to scripting languages for use on the World Wide Web and includes a client-side scripting language and a server-side scripting language. Students will use JavaScript, PHP, and MySQL to develop interactive Web sites.

Course Rotation: Fall and Spring

Prerequisites: CIT 231 with minimum grade of D.

CIT 342 Systems Design and User Experience (4 credits)

This course examines the fundamental concepts of Systems Analysis and Design and will concentrate on the design and technical aspects of information systems. It will provide students with the essentials of contemporary software engineering issues including object-oriented systems analysis and design, database design considerations, input and output prototyping, user interface design and usability evaluation, software development methodologies and agile methods, and current trends in systems development.

Course Rotation: NY, PL, and WP: Fall, Spring, and Summer.

Prerequisites: CIS 101 or CIT 110 with minimum grade of D.

CIT 344 Project Management (4 credits)

This course combines project management methods and structured systems development techniques and applies them to the complex world of information systems development. The central project management functions of planning, organizing and controlling are presented in the context of the systems development process. Topics include project planning, estimating, and testing, implementation, and documentation, management of change, and utilization of services consultants, software houses, turn-key systems and proprietary software packages. Restrictions/Requirements: Junior Standing

Course Rotation: NY and PL: Fall, Spring, and Summer.

Prerequisites: This course does not have a prerequisite.

CIT 346 Database Programming (4 credits)

An introduction to database programming. Concepts and techniques of database queries and updates using SQL or another database language will be stressed. The concepts of triggers and stored procedures will be discussed and illustrated. Students will write application programs in a relational database environment.

Course Rotation: NY, PL, WP, Online: Fall, Spring, and Summer.

Prerequisites: CIT 241 and CIT 261 with minimum grades of D.

CIT 348 Data Mining (4 credits)

Advances in database technology along with the phenomenal growth of the Internet have led to unprecedented masses of data available for analysis. Data mining and knowledge discovery are methods and techniques used to analyze these data in order to determine patterns and their relationships. Because of its massive size, it is difficult for analysts to sift through the data even though it may contain useful information. Credit Badge: Data Science.

Course Rotation: NY, PL, WP: Fall, Spring, and Summer.

Prerequisites: CIT 241 and CIT 261 with minimum grades of D.

CIT 349 Blue CoLab I (1-3 credits)

This is a hands-on, team-based course in which students use and manage Blue CoLab's realtime water and weather sensing and related technologies, as well as real-time streaming data in projects aimed at the protection of human and environmental health. Blue CoLab allows students to advance their knowledge of a chosen specialty or a new specialty through project development and applications in areas, such as data analytics, Web presentation, data visualizations, data sonification (mapping data to music), mobile apps, application Programming Interface (API) development, etc. Lectures cover topics, such as sensor engineering, instrument deployment, user experience (UX), product development, relevant languages, and more. In addition, Blue CoLab students can utilize an on-campus data lab and a nearby offcampus tech lab. Assignments primarily include team projects culminating in team presentations. The work of each semester differs from and builds upon the work of previous semesters in the application of both CS and IT to the Blue CoLab mission; therefore, no two semesters are alike.

Course Rotation: PLV: Fall

Prerequisites: This course does not have a prerequisite.

CIT 350 Blue CoLab II (1-3 credits)

Blue CoLab is a hands-on, team-based course that focuses on training and research in the technology and data science of real-time water monitoring. Blue CoLab 2, which is offered in Spring, is a companion course to Blue CoLab 1, offered in Fall. However, the courses are not required to be taken in sequence. Blue CoLab 2 will have a strong emphasis on the use of instrumentation and hardware to create data that enhances and informs the user experience with water, particularly drinking water. In addition, because Blue CoLab is also a full-time, 365 day/year program, students work directly with faculty and staff in the operation of Blue CoLab's real-time water and weather sensors, stations, and related technologies, as well as management and translation of the real-time streaming data they generate. With operating labs in Goldstein Academic Center, Choate Pond, and off-campus, students have workspace that allows them to experience operation of the full program while creating projects, apps and presentations that advance the Pace community's understanding of its own water. The work of each semester differs from and builds upon the work of previous semesters in the application of both CS and IT to the Blue CoLab mission; therefore, no two semesters are alike.

Course Rotation: PLV: Spring

Prerequisites: This course does not have a prerequisite.

CIT 351 Introduction to Geographic Information Systems (4 credits)

This course provides an introduction to the analysis and design of geographic information systems. These are systems for which the data and solutions are location based. GIS systems are used in a variety of disciplines and applications including geosciences, environmental science, government, land management, non-profits and business. Students will learn how to create comprehensive GIS systems in a range of application areas. Credit Badge: Data Science.

Course Rotation: NY and PL: Spring

Prerequisites: CIS 101 with minimum grade of D.

CIT 352 Network and Internet Security (4 credits)

This course provides a practical approach to network security applications and standards. The focus is to provide an in-depth understanding of the current network security principles, features, protocols, and implementations. The course includes a detailed discussion on design and maintaining a computer network from the security point of view. The emphasis is on applications that are widely used on the Internet and for corporate network, and on standards, especially Internet standards that have been widely deployed.

Course Rotation: NYC & PLV: Fall, Spring, and Summer.

Prerequisites: CIT 251 with minimum grade of D.

CIT 354 Computer Forensics (3 credits)

This course provides a thorough introduction to computer networks and data communications. Topics include major applications of networking, protocols, the OSI reference model, physical links and interfaces, modems and modem standards, interface standards, multiplexing and communication links, LANs, WANs, routers and Internetworking, application support protocols, overview of TCP/IP, Internet layer functions, address resolution, DNS, IP addressing system, subnets, IP routers, TCP and UDP and Internet services.

Course Rotation: NY, PL, WP, Online: Fall, Spring, and Summer.

Prerequisites: CIT 251 with minimum grade of D.

CIT 356 Operating Systems Concepts (4 credits)

An operating system is responsible for the optimal allocation and utilization of the resources of a computer system. This course introduces the techniques used and problems encountered in developing operating systems for batch, on-line and multiprogramming and multiprocessing environments. Restrictions/Requirements: Junior Standing.

Course Rotation: NY, PL, WP, Online: Fall, Spring, and Summer.

Prerequisites: This course does not have a prerequisite.

CIT 361 Digital Forensics Overview (4 credits)

With much of our personal information now being recorded digitally, the field of digital forensics has grown exponentially. This course will provide students with a strong foundation in the principles of digital forensics. Students will learn how the field has evolved over time and why digital investigations have become more pervasive. A keen understanding of file systems, including operating systems and registries, is vital to understanding the evidence that a suspect leaves behind, and therefore provides the core of this course. The ultimate objective is to use digital evidence to prove control, ownership and intent to successfully prosecute a case. Students will gain practical experience with professional digital imaging tools, like Helix, X-Ways and FTK, which are used to extract, filter and analyze digital evidence. The course will include forensic imaging techniques for both Windows Personal Computers and Apple Macintosh machines.

Course Rotation: NYC & PLV: Fall, Spring

Prerequisites: CIS 101 or CIT 110 or TS 105 or CIT 261 or CIT 262 with minimum grade of D.

CIT 363 Computer Forensics, Cyber Law and Evidence Admissibility (4 credits)

Every computer forensics examiner must understand the interactions of people with hardware and software. Additionally, knowledge of the law is imperative to the successful conviction of a criminal. This course will detail the legal aspects of computer forensics investigations and evidence admissibility. Students will gain understanding of the legal documentation required for gaining access to a suspect's information, like letters of preservations and warrants; also included will be evidence custody and chain of custody forms. Finally, students will experience the intricacies of investigative report writing. A series of case studies will be incorporated into the course to explore reasons why some computer forensics investigations have been highly successful and in the pitfalls that caused others to fail.

Course Rotation: Fall:Spring;NY:PLV

Prerequisites: CIS 101 or CIT 110 or TS 105 or CIT 261 or CIT 262 with minimum grade of D.

CIT 365 Mobile Device Forensics (4 credits)

Computer forensics investigators no longer simply rely on traditional computers as sources of evidence. Incriminating evidence can be found on cell phones, smartphones, PDAs, cameras and even game systems. This course will introduce students to mobile forensic file systems. Students will learn methods of evidence extraction from the mobile devices and how these devices should be handled and analyzed. Lab sessions will allow students with hands-on analysis of phones, flash memory and SIM cards. Students will also learn about recovering deleted SMS text messages, call logs. An introduction to CDMA and GSM networks will also be provided. This practical experience will be supplemented with exposure to the use of digital images and video investigations. This course will teach students how to find photo metadata, identify whether images have been edited, reconstruct damaged image files and subsequently use these files as admissible evidence.

Course Rotation: Fall:Spring;NY:PLV

Prerequisites: CIS 101 or CIT 110 or TS 105 or CIT 261 or CIT 262 with minimum grade of D.

CIT 380 Applied AI with Deep Learning (4 credits)

This course provides an understanding of the capabilities and the challenges of deep learning implementations and strategies to build and train efficient neural network architectures. The course topic includes the fundamentals of neural networks (i.e., theoretical concepts and what they are suitable for), building and training neural networks using APIs (i.e., Keras and Tensorflow), and implementing relevant neural network architectures for real-world cases. Credit Badge: Data Science.

Course Rotation: NYC & PLV: Fall & Spring

Prerequisites: CIT 261 with minimum grade of D.

CIT 397U Topic: Applied Cyber Defense and Operations (4 credits)

This course is designed to prepare students for skills and knowledge to monitor, analyze and respond to network security issues. Students will learn about system administration, network security, and incident response techniques. In addition, students will learn to work as a team to resolve network security incidences and to respond to organizational management requests. The course aims to train students to perform the role as a security operation center (SOC) analyst by simulating real-world scenarios in a virtualized network environment, such as the one for the Collegiate Cyber Defense Competition (CCDC). Students who took this class are expected to participate in CCDC and similar events for additional experience.

Course Rotation: NYC & PLV: Fall

Prerequisites: This course does not have a prerequisite.

CIT 471 Information Technology Internship (4 credits)

This internship is designed to provide the senior level student with a pre-professional experience in information technology at an approved worksite. Students will meet periodically to discuss problems and issues and complete weekly assignments and projects. Restrictions/Requirements: Senior standing and permission of department chairperson required to register.

Course Rotation: NY and PL: Fall, Spring, and Summer.

Prerequisites: This course does not have a prerequisite.

CIT 481 Capstone in Information Technology (4 credits)

This capstone course focuses on contemporary issues in information technology. The case study/project approach is used to analyze and discuss problem situations related to information technology. Restrictions/Requirements: Senior standing.

Course Rotation: NY, PL, WP, Online: Fall, Spring, and Summer.

Prerequisites: This course does not have a prerequisite.

CIT 490 Independent Study in Information Technology (1-4 credits)

Independent study projects in special areas of information technology upon the submission of a proposal, acceptance by an instructor and permission of the department chair. This course may be taken for 1 to 4 credits. Permission from Instructor and Chairperson required.

Course Rotation: Fall:Spring;NY:PLV

Prerequisites: This course does not have a prerequisite.