

# COMPUTER AND INFORMATION SCIENCES DEPARTMENT

## Goals

The computer and information sciences department will provide students with the ability to develop, implement and critically assess vital informational and technological systems within organizational contexts and governmental agencies. Current key technological competences include, but are not limited to, information security and computer forensics, programming, database administration, Web technologies and networking.

## Department Objectives

- To provide students with theoretical foundations in information security specializing in forensics, database structures, networking and communication technologies, web applications and programming.
- To prepare students for graduate school or for careers as certified forensic examiners, database administrators, network administrators, Web developers and programmers.
- To provide expertise and support for the university community including interdisciplinary programs in conjunction with the departments of accounting, criminal justice, communication and English.

Graduates of this program are articulate, logical thinkers who successfully take their places as forensic and security specialists, systems analysts, database managers, network administrators, and web designers. Students may pursue the 4+1 B.S. Computer & Information Sciences/M.S. degree in Information and Digital Forensics. They may also pursue graduate or professional education, typically for the M.B.A. degree or the M.S. degree in computer science.

## Bachelors

- Computer and Information Sciences, B.S. (<http://catalog.niagara.edu/undergraduate/programs-az/arts-sciences/computer-information-sciences/computer-information-sciences-bs/>)

## Minor

- Computer and Statistical Analysis, Minor (<http://catalog.niagara.edu/undergraduate/programs-az/arts-sciences/computer-information-sciences/computer-statistical-analysis-minor/>)
- Information Systems, Minor (<http://catalog.niagara.edu/undergraduate/programs-az/arts-sciences/computer-information-sciences/information-systems-minor/>)

## Courses

### CIS 138 — Intro to Prog & Comp (AS) (3 credits)

The course provides an intensive introduction to computers and to programming as a tool for problem solving. Students will use and write programs in a beginners programming language. Applications involve personal, scientific, and health or business worlds. (This course does not satisfy the CIS major requirement.)

### CIS 140 — STEM Programming (3 credits)

Students are introduced to computing and apply problem solving techniques to a variety of contexts including, but not limited to, web page design, introductory programming and robotics. Students will consider the societal and ethical issues regarding technology while applying computing concepts and utilizing computing tools to solve problems.

### CIS 160 — Struct Bus Progrm I (AS) (3 credits)

This is a first course using a structured business language. Design and style are emphasized. Typical business problems are coded and documented, compiled and tested to acquaint the student with practical use of the language.

### CIS 190 — Web Design (3 credits)

Students in this course will learn how to plan and develop dynamic web pages utilizing graphics, CSS, multimedia, animation, database applications, sharing and distribution of documents via the Web.

### CIS 198 — Intro Computers/Tchr (AS) (3 credits)

This course presents an introduction to computers and their use in the schools. It is designed as a first course for teachers. Emphasis is placed upon fundamental concepts and their applications in education. Students use an integrated software package and programs relating to the subject matter of their discipline. They have the opportunity to write programs in a structured language. No prior experience with computers is assumed. (This course does not satisfy the CIS major requirement.)

### CIS 200 — Intro Programming Struct (3 credits)

Students will be introduced to fundamental programming concepts and core programming structures including but not limited to variables, data types, arithmetic operators, decisions, loops, functions, arrays and objects. Students will obtain basic knowledge of standard programming practices utilizing a minimum of two programming languages.

### CIS 232 — Computer Applications for Business I (AS) (3 credits)

The course presents business-related software for the microcomputer (PC). The main applications examined are spreadsheets, business graphics, databases, word processing, and presentation graphics. Integration of these applications is also covered. (This course satisfies the CIS major or minor requirements.)

### CIS 233 — Statistics Applications for Research (AS) (3 credits)

*Prerequisite take mat\*102*

This course presents computers as research tools to students in the behavioral and social sciences and human services. It presents an overview of computer hardware and software and use of an operating system and an editor as tools for the computer user. The student will also become familiar with the use of a word processor for report and proposal writing, spreadsheets for budgeting, and database design and access. Students will learn SPSS as a research tool for statistical applications. (This course does not satisfy the CIS major requirement.)

### CIS 255 — Introduction to Geographic Information (AS) (3 credits)

(also listed as GIS 100) This course is a broad and intensive introduction to the study of Geographic Information Systems (GIS). Using this extensive computer-based mapping software, students will learn the nature and models of spatial data, organize, manage, and present such data, as well as plan and conduct research. Applications in various social and natural sciences will be introduced and discussed. This learning is to be continued in upper division courses within related fields.

**CIS 256 — Mobile Gaming I (AS) (3 credits)**

This course will introduce students to mobile game development including fundamental knowledge and skills in game design. A practical introduction to game design and implementation will be presented including history of mobile games, game elements, human-computer interaction, interface design, collision detection, testing and publishing, and game-related math and physics.

**CIS 258 — Mobile Applications I (AS) (3 credits)**

This course will introduce students to mobile application development including the general principles and skills for developing apps using the Android operating system. Students will learn Java and how to use development tools, such as JDK, SDK, Eclipse, ADT including testing and debugging using an emulator and an actual device.

**CIS 259 — Python and Data Analysis I (QR) (3 credits)**

This course is an introduction to the fundamentals of computer programming in Python and data analysis with Python. Topics include computer programming concepts, Python fundamentals, control structures, functions and modules, strings, lists, dictionaries, file input and output, data analysis and data visualization. Problems examined include real-life applications.

**CIS 260 — Struct Bus Progm II (AS) (3 credits)**

*Prerequisite Must have taken CIS\*160;*

This is a second course in a structured business programming language. It emphasizes structured design, file organization, editing, data input techniques, indexed and keyed files, file updating, merging and sorting, debugging techniques, and program maintenance.

**CIS 265 — Visual Programming I (AS) (3 credits)**

This course provides an intensive introduction to structured and object-oriented programming in a modern programming language. Algorithm development is introduced. Designing, coding, debugging, and documenting programs are emphasized. Problems examined include numerical and non-numeric applications.

**CIS 270 — Computer Hardware (AS) (3 credits)**

This course presents the students with the fundamentals of computer hardware, operating systems, and data communications. The students will have the opportunity to assemble, upgrade, troubleshoot and configure computers. Students will be exposed to tools and technologies necessary to take the A+ certification upon completion of this class.

**CIS 285 — Computer Forensics I (AS) (3 credits)**

This course introduces students to the techniques and tools of computer forensic investigations. Students will learn how to utilize computer forensic tools in investigations. The course maps to the objectives of the IACIS certification. Topics include coverage of the latest technology including cell phones, and portable devices.

**CIS 290 — Web Programming (3 credits)**

*Prerequisite take cis\*190*

Students will develop web sites using PHP and access MySQL databases and tables, be able to use PHP variables and operators, make decisions using conditional statements, code arrays, utilize loops to process data, develop basic XML web pages, and apply the concepts of DTD and XSL to create dynamic pages.

**CIS 301 — Object Oriented Prog I (AS) (3 credits)**

This course provides an intensive introduction to structured and object-oriented programming using the C++ language. Algorithm development is stressed. Designing, coding, debugging, and documenting programs are emphasized. Problems examined include numerical and non-numeric applications.

**CIS 302 — Object Oriented Prog II (AS) (3 credits)**

*Prerequisite TAKE CIS\*301*

This course continues CIS 301. Advanced techniques of object-oriented programming are introduced using the C++ programming language. Data structures and algorithms associated with arrays, several forms of linked lists, and trees are studied. Other topics include sorting and searching, analysis of algorithms, and an introduction to parallel programming.

**CIS 320 — Networking & Comm Systems (AS) (3 credits)**

*Prerequisite Take CIS\*270*

This course introduces the broad and constantly changing field of local networks. The course emphasizes technology and architecture issues such as transmission medium, network topology, communications protocols, and hardware/software interfaces. Local area networks and digital switch/computerized branch exchanges are discussed.

**CIS 332 — Computer Applications for Business II (AS) (3 credits)**

*Prerequisite Must have taken CIS\*232*

This course prepares students to produce professional-quality business documents and to communicate effectively in academic and business environments. The course involves using advanced features of spreadsheets, databases, word processing, presentation graphics and the Internet as tools for analyzing business problems and communicating business information.

**CIS 340 — Fraud Exam & Econ Crime (3 credits)**

*Prerequisite Must have taken ACC\*111, ACC\*112, ECO\*102, CIS\*232 and*

This course examines forensic accounting and economic crime interrelating accounting, criminal justice and computer and information systems concepts and issues. The course will include limited accounting theory and concentrate on financial fraud, white-collar crime, how financial fraud is perpetrated, approaches to fraud investigations and documentation, fraud detection and prevention.

**CIS 350 — Intro Systm Analysis (AS) (3 credits)**

*Prerequisite Take either CIS 160, CIS 232, or CIS 265*

This is the first course in the general concepts and techniques of systems development. The study, logical design, physical construction, and implementation phases for development of a system will be examined in detail. Students are presumed to have a general knowledge of information systems hardware and software from prerequisite courses.

**CIS 355 — Artificial Intelligence (3 credits)**

This is an introductory course covering the foundational principles and techniques from Artificial Intelligence (AI) including search, reasoning, machine learning, natural language processing, robotics, and computer vision, as well as a study of ethical issues pertaining to AI.

**CIS 356 — Mobile Gaming II (AS) (3 credits)**

*Prerequisite Take CIS\*256 prior to this course.*

This course continues CIS 256: Mobile Gaming I. Students will learn techniques including game control, advanced collision detection, advanced math and advanced physics for game design, data structures and algorithms for game design, and using game engines to develop mobile games. Students will also learn advanced debug techniques with IDE.

**CIS 358 — Mobile Applications II (AS) (3 credits)***Prerequisite Take CIS\*258*

This course will continue application development for mobile devices using the android platform. Students will utilize and integrate specific features, such as client-server communicating, location-based services, computer graphics/animation, multimedia, and on-device sensors. Students will use Java for software development. The class will be oriented around intensive hands-on activities.

**CIS 359 — Advanced Python & Data Analysis (AS) (3 credits)***Prerequisite TAKE CIS\*259*

This course introduces advanced topics in data analysis with Python. Topics include advanced programming techniques in Python, machine learning algorithms and the use of libraries including NumPy, Pandas, and Matplotlib, to conduct advanced data analysis and data visualization. This course emphasizes problem solving skills and real-world applications.

**CIS 365 — Visual Programming II (AS) (3 credits)***Prerequisite Must have taken CIS\*265;*

This course continues CIS 265. Advanced techniques of object-oriented programming are introduced. Data structures and algorithms associated with arrays, several forms of linked lists, and trees are studied. Other topics include sorting and searching, and analysis of algorithms.

**CIS 375 — Internship I (AS) (3 credits)**

Internships allow students to experience working in a professional environment. Area businesses, government offices, and nonprofit organizations provide these opportunities. Internships are generally unpaid; see CIS 493-494 and 496-497 for paid cooperative education experiences. CIS department chair permission required.

**CIS 380 — Data Management (AS) (3 credits)***Prerequisite Take CIS\*232*

The application, logical structure, and physical implementation of database management systems (DBMS) are considered. The storage, management, and retrieval of information in hierarchical, network, and relational database systems, some specific database languages, and normalization and data dictionaries, file security, integrity, and reliability will be discussed. The student designs, programs, and implements a database system using state-of-the-art relational database packages.

**CIS 385 — Computer Forensics II (AS) (3 credits)***Prerequisite take cis\*285*

This course will give students the ability of investigating advanced forensics and incident response, including cutting-edge network investigation and mobile devices. The course will utilize advanced industry standard tools to investigate data breach intrusions, tech-savvy employee investigation, and complex digital forensic cases.

**CIS 390 — Visual Systems Integration (AS) (3 credits)***Prerequisite Take CIS\*265*

Students in this course will learn to integrate tools built on multiple software platforms into complex applications with graphical user interfaces.

**CIS 403 — Honors Thesis I (AS) (3 credits)**

Individual research of a substantive nature pursued in the students major field of study. The research will conclude in a written thesis or an original project, and an oral defense.

**CIS 404 — Honors Thesis II (AS) (3 credits)***Prerequisite Take CIS\*403*

Individual research of a substantive nature pursued in the students major field of study. The research will conclude in a written thesis or an original project, and an oral defense.

**CIS 465 — Scientific Computing (3 credits)***Prerequisite Must have taken CIS\*365;*

Theory and practice in problems of scientific computing. Students will study the development of solutions to important scientific problems requiring powerful computing resources. Students will write programs for a parallel supercomputer.

**CIS 468 — Info Technology for Health (AS) (3 credits)**

This online course familiarizes the nurse with terminology, standards and rationale for health system information technology. Computer systems to access, enter and manage information are demonstrated. Students employ search and retrieval of scientific literature to support evidence-based practice. Ethics regarding privacy, information storing, sharing, and security are discussed.

**CIS 475 — Internship II (AS) (3 credits)**

Internships allow students to experience working in a professional environment. Area businesses, government offices, and nonprofit organizations provide these opportunities. Internships are generally unpaid; see CIS 493-494 and 496-497 for paid cooperative education experiences. CIS department chair permission required.

**CIS 480 — IT Project Management (AS) (3 credits)***Prerequisite Take CIS\*350*

This course considers the selection of a computer system (software and hardware); management of small and large systems including distributed processing; establishment of priorities and information systems security; and project management. Advanced database languages and applications generators are examined.

**CIS 485 — Information Security (AS) (3 credits)***Prerequisite Take CIS\*270*

This course presents students with the opportunity to explore and discuss information security, specifically learn about current information security threats, how to protect information, the relationship between policy and security, and the importance of the use of network protection mechanisms such as firewalls, intrusion detection systems, and other security tools.

**CIS 490 — Topic: (AS) (3 credits)**

Special topics courses in information systems and computer science are offered whenever departmental resources are sufficient to do so. Topics could include, but are not limited to, new software design technologies; recent hardware and software developments; data communications; special high-level languages; parallel processing; ethical, legal and societal issues in computer and information systems; assemblers, compilers, and interpreters; simulation and modeling.

**CIS 493 — Computer Co-op (AS) (3 credits)**

A junior or senior work-study employment experience. The student must work two semesters, including one semester full time. Registration will occur at the beginning of the experience. The objective of the program is to integrate classroom theory and practical work experience, lending relevance to learning and providing the student with a realistic exposure to career opportunities.

**CIS 494 — Computer Co-op (AS) (6 credits)**

A junior or senior work-study employment experience. The student must work two semesters, including one semester full time. Registration will occur at the beginning of the experience. The objective of the program is to integrate classroom theory and practical work experience, lending relevance to learning and providing the student with a realistic exposure to career opportunities.

**CIS 495 — Independent Study (AS) (3 credits)**

The independent study elective provides an opportunity to do intensive work in an area of particular interest to the student and a faculty member. Departmental approval necessary.

**CIS 496 — Computer Co-op (AS) (3 credits)**

A junior or senior work-study employment experience. Students will work part time for four semesters. Registration will occur during the second and fourth semesters of the experience. The objective of the program is to integrate classroom theory and practical work experience, lending relevance to learning and providing the student with a realistic exposure to career opportunities.

**CIS 497 — Computer Co-op (AS) (3 credits)**

A junior or senior work-study employment experience. Students will work part time for four semesters. Registration will occur during the second and fourth semesters of the experience. The objective of the program is to integrate classroom theory and practical work experience, lending relevance to learning and providing the student with a realistic exposure to career opportunities.

**CIS 499 — Senior Software Project (AS) (3 credits)**

*Prerequisite Must have taken CIS\*350;*

This is a capstone course emphasizing the skills necessary for building high-quality software. A significant team project is required; knowledge obtained by students in prerequisite courses will be applied to bring about proper completion of the team project. Systems development models and software relevant to systems engineering will be discussed.