COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

The computer science field has demonstrated dramatic growth and technological development within the last decade. The 21st century is heralding the emergence of nanotechnology, ubiquitous computing, computer games, and wireless networking. The Computer Science and Information Technology (CS/IT) Department is responding to these technological challenges by offering a dynamic course of study that is responsive to the ever-changing field of computer technology.

(CS/IT) curriculum has three tracks: Computer Science, Information Technology and Computer Gaming - Design and Development. The Computer Science track is geared to those students with strong mathematics and the desire to participate in the research and development side of computer science. The Information Technology track is for those students interested in interface, multimedia and system design for various business applications and the Computing Gaming Design and Development track is for students who wish to design and develop games for entertainment, simulation and training.

Faculty

FRANCES GRODZINSKY, PH.D.
Professor

SANDRA HONDA ADAMS, M.S.
Associate Professor

EFIM KINBER, PH.D.
Professor

KERI MATTHEWS, M.S.
Instructor

ROBERT MCCLOUD, ED.D.
Associate Professor

DOMENICK J. PINTO, M.A., M.A., M.S.
Associate Professor, Chair

FRANCESCO SARDO, M.S.
Instructor

Computer Science Facilities

There are three state of the art computing labs dedicated to computer science courses. These contain the latest flat screen Dell Optiplex computers with DVD, CD-R/W drives. In addition the conference room of the CS/IT department serves as a mini-lab used exclusively by CS/IT majors for projects, homework and tutoring and is equipped with the same state of the art equipment. There is also a Networking/Unix lab equipped with 15 Linux machines and a variety of Cisco routers. This closed LAN laboratory is used for networking and Unix shell programming courses and is open 24 hours a day, seven days a week for those students. All labs are on a 3-year replacement cycle.

SOFTWARE AVAILABLE IN THE LABS INCLUDES:

Microsoft Office 2010
Adobe Director 11.5
Flash CS5
Fireworks CS5
Dreamweaver CS5
V.B. Net 2010
Visual C++ 2010
Visual C# 2010
Visual Studio 2010
Borland JBuilder
Sony Sound Forge 10.0
Adobe Photoshop CS5
Visio 2010
Major in Computer Science

The major in Computer Science with a concentration in Computer Science requires the completion of 54 credits for the Computer Science track and 54 credits for the Computer Gaming track. The major in Computer Science with a concentration in Information Technology requires 52 credits. CS 110 may be required if a student has no previous programming experience.

REQUIRED COURSES FOR COMPUTER SCIENCE, INFORMATION TECHNOLOGY, AND COMPUTER GAMING DESIGN AND DEVELOPMENT TRACKS

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<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>CS 111</td>
<td>Introduction to Structured Programming</td>
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<td>Software Engineering</td>
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<td>CS 318</td>
<td>Project Course</td>
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<tr>
<td>CS 319</td>
<td>Computer Ethics</td>
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REQUIRED COURSES FOR COMPUTER SCIENCE TRACK

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<td>CS 241</td>
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<tr>
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<td>Database Design</td>
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<tr>
<td>CS 339</td>
<td>Networking and Data Communication</td>
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<tr>
<td>CS 341</td>
<td>Analysis of Algorithms</td>
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<tr>
<td>CS 348</td>
<td>Programming in Unix</td>
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<td>CS 349</td>
<td>Operating Systems</td>
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<tr>
<td>CS 171</td>
<td>Introduction to Computer Gaming</td>
</tr>
<tr>
<td>CS 271</td>
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<tr>
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<td>CS 349</td>
<td>Operating Systems</td>
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<tr>
<td>CS 371</td>
<td>Advanced Game Programming</td>
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<tr>
<td>CS 372</td>
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REQUIRED SUPPORTING COURSES FOR COMPUTER SCIENCE TRACK

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<tbody>
<tr>
<td>MA 151</td>
<td>Calculus I and MA 152 Calculus II should be taken as part of the required Baccalaureate core.</td>
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<tr>
<td>MA 261</td>
<td>Linear Algebra</td>
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<tr>
<td>MA 331</td>
<td>Probability and Statistics I</td>
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<tr>
<td>MA 140</td>
<td>Precalculus</td>
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<tr>
<td>MA 151</td>
<td>Calculus I</td>
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<tr>
<td>AR 110</td>
<td>Design: Visual Organization</td>
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<td>AR 114</td>
<td>Digital Design Basics</td>
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REQUIRED COURSES FOR INFORMATION TECHNOLOGY TRACK

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<td>Human–Computer Interaction</td>
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<td>CS 233</td>
<td>Visual Basic</td>
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<td>CS 311</td>
<td>Database Design</td>
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<tr>
<td>CS 331</td>
<td>Multimedia Applications</td>
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<tr>
<td>CS 338</td>
<td>Systems Analysis and Design</td>
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<td>CS 339</td>
<td>Networking and Data Communication</td>
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One Computer Science elective
REQUIRED SUPPORTING COURSES FOR INFORMATION TECHNOLOGY TRACK

BU 103  Business: Its Nature and Environment

OR

BU 201  Organizational Management

MA 131  Statistics for Decision Making

SUPPORTING COURSES FOR COMPUTER SCIENCE CONCENTRATION (NETWORK SECURITY EMPHASIS)

MA 151  Calculus I

MA 152  Calculus II

MA 261  Linear Algebra

MA 331  Probability and Statistics I

Network Security Emphasis for Computer Science

COURSES REQUIRED

CS 111  Introduction to Structured Programming

CS 112  Data Structures

CS 113  Discrete Structures

CS 215  Computer Systems Organization with Assembler

CS 311  Database Design

CS 312  Software Engineering

CS 318  Project Course

CS 319  Computer Ethics

CS 339  Networking and Data Communications

REQUIRED COURSES FOR COMPUTER SCIENCE CONCENTRATION (NETWORK SECURITY EMPHASIS)

CS 241  Advanced Programming Concepts Using “C”

CS 272  OOP with C# and Games

CS 341  Analysis of Algorithms

CS 349  Operating Systems

CS 367  Managing, Securing, and Designing Modern Networks

CS 368  Hands-on Network Security

Minor in Computer Science

CS 111  Introduction to Structured Programming

CS 112  Data Structures

CS 113  Discrete Structures

CS 215  Computer Systems Organization with Assembler

CS 272  OOP with C# and Games

CS 311  Database Design

CS 312  Software Engineering

One Computer Science elective

Minor in Information Technology

CS 111  Introduction to Structured Programming

CS 112  Data Structures

CS 113  Discrete Structures

CS 215  Computer Systems Organization with Assembler

CS 233  Visual Basic

CS 311  Database Design

CS 312  Software Engineering

One Computer Science elective

Minor in Information Technology

CS 111  Introduction to Structured Programming

CS 112  Data Structures

CS 113  Discrete Structures

CS 215  Computer Systems Organization with Assembler

CS 233  Visual Basic

CS 311  Database Design

CS 312  Software Engineering

One Computer Science elective
Associate’s Degree in Computer Science

The Associate of Science degree in Computer Science offers two concentrations: Computer Science and Information Technology. Both concentrations require the completion of 60 credits. The program is designed for high school graduates who intend to make a career in the field of Computer Science and college graduates who want to obtain a sufficient level of computer experience.

The Computer Science concentration is intended for college students majoring in mathematics or the sciences who wish to supplement their major in order to increase their employment opportunities after graduation. The Information Technology concentration is intended for high school graduates who wish to make a career in information technology and for business students or individuals working with computers who want a formal education in order to advance their careers.

COURSES REQUIRED FOR BOTH CONCENTRATIONS

CS 111  Introduction to Structured Programming
CS 112  Data Structures
CS 113  Discrete Structures
CS 215  Computer Systems Organization with Assembler

REQUIRED CORE COURSES FOR BOTH CONCENTRATIONS

ENG 110  Academic Writing
ENG 111  Effective Communication
Eight Liberal Arts electives

REQUIRED COURSES FOR COMPUTER SCIENCE CONCENTRATION

CS 241  Advanced Programming Concepts
CS 272  OOP with C# and Games
One Computer Science and Information Technology elective (not CS 100, 101, 102, 104, 106)

REQUIRED SUPPORTING COURSES FOR COMPUTER SCIENCE CONCENTRATION

MA 151  Calculus I
MA 152  Calculus II
MA 261  Linear Algebra

REQUIRED COURSES FOR INFORMATION TECHNOLOGY CONCENTRATION

CS 232  Human–Computer Interaction
CS 233  Visual Basic
One Computer Science and Information Technology elective (not CS 100, 101, 102, 104, 106)

REQUIRED SUPPORTING COURSES FOR INFORMATION TECHNOLOGY CONCENTRATION

MA 109  Mathematics for Decision Making
MA 110  Calculus for Decision Making
BU 103  Business: Its Nature and Environment
OR
BU 201  Organizational Management

Certificate Program in Computer Science and Information Technology

The Computer Science Certificate program provides a foundation for scientific use of computers and information technology applications. The student can earn a certificate by completing six courses from either the Computer Science or Information Technology options, provided that the
prerequisites are met.

**REQUIRED COURSES FOR BOTH CERTIFICATES**

CS 111  Introduction to Structured Programming  
CS 112  Data Structures

**COURSES FOR COMPUTER SCIENCE CERTIFICATE**

CS 241  Advanced Programming Concepts Using “C”  
CS 272  OOP with C# and Games  
CS 312  Software Engineering  
CS 341  Analysis of Algorithms

**REQUIRED COURSES FOR INFORMATION TECHNOLOGY CERTIFICATE**

CS 101  Web Design and Visual Tools for Non Majors  
CS 102  Multimedia for Non-Majors  
CS 232  Human–Computer Interaction  
CS 233  Visual Basic

**Certificate Program in Computer Gaming Design and Development**

The undergraduate certificate in Computer Gaming Design and Development utilizes all existing courses to package a certificate program particularly geared toward the part-time evening student. The certificate also feeds into a possible BS or AS degree in CS in the Computer Science or Computer Gaming track.

**REQUIRED COURSES**

CS 111  Introduction to Structured Programming  
CS 112  Data Structures  
CS 171  Introduction to Computer Gaming  
CS 271  Advanced Computer Gaming  
CS 272  OOP with C# and Games

**SUGGESTED SUPPORTING COURSES (NOT REQUIRED)**

MA 140  Precalculus  
MA 151  Calculus I

**Course Descriptions**

**CS 100 - Introduction to Information Technology | 3 CR**

An introduction to computing and data processing for non-computer science majors. This course is half theory and half hands-on application using Microsoft Office. It includes word processing, spreadsheets, databases, presentation software, and using the Internet as a research tool effectively. This course provides the knowledge and understanding necessary to communicate effectively in the personal computing environment of business today. Non-majors only.

**CS 101 - Web Design and Visual Tools for Non Majors | 3 CR**

This course aids in the understanding of the design and production of web sites. It presents what design elements go into web page development. Students browse sites and identify good design elements. They construct their own web page early on and allow it to evolve throughout the semester. Prerequisite: CS 100 or permission of department chair.

**CS 102 - Multimedia for Non-Majors | 3 CR**

This course aids the non-programmer in the understanding of multimedia authoring, incorporating text, graphics, sound and video. It discusses design and planning elements that go into multimedia
development. Students use Flash and some of the Action scripting language to choreograph media objects onto a stage using a score. Prerequisite: CS 100 or permission of department chair

CS 104 - Digital Animation and Gaming for Non Majors | 3 CR
The class will create electronic games using digital animation and timeline control. Topics covered include: creating gaming objects with drawing and color tools; timeline-based animation techniques; controlling screen action with buttons; integrating sound into a game; publishing and exporting a game to the web.

CS 106 - Introduction to Information Technology for Business Administration for Non Majors | 3 CR
An introduction to computing and data processing for non-Computer Science majors. This course is half theory and half hands-on application using Microsoft Office. It includes, spreadsheets, databases, and presentation software, and provides the knowledge and understanding necessary to communicate effectively in the personal computing environment of business today. For Business Administration majors.

CS 110 - Introduction to Computer Science | 3 CR
An introduction to programming logic, using a suitable introductory programming language. This course presents an overview of major programming concepts (selection, loops, input-output operations, procedures and functions) and serves as an introduction to the Unix operating system and Unix-based editors. For computer science majors with no previous programming experience. Prerequisite: Computer Science major or permission of department chair

CS 111 - Introduction to Structured Programming | 3 CR
A first course in programming using a structured programming language. Topics include iteration, selection, procedures, functions and arrays with the use of flowcharts and modules. Presents applications in both business and scientific areas. Prerequisite: CS 110 or permission of department chair

CS 112 - Data Structures | 3 CR
A continuation of CS 111 using a structured programming language to implement multidimensional arrays, stacks, queues, linked lists and binary trees. Also introduces recursion, pointers, and classes. Prerequisite: CS 111

CS 113 - Discrete Structures | 3 CR
Presents mathematical concepts for computer science, including sets, relations and functions; partitions; order relations; countability; permutations and combinations; probability; recurrences; big-Oh notation; elements of abstract algebra such as groups, rings and Boolean algebras. Prerequisite: MA 006

CS 171 - Introduction to Computer Gaming | 3 CR
Designing the vector gaming environment; Storyboarding; Tween and frame-by-frame animation; Using functions to control animation timelines; Using random number functions to instantiate digital objects; Artifact movement utilizing vector plot points. Prerequisite or Co-requisite: CS 111

CS 215 - Computer Systems Organization with Assembler | 3 CR
This course presents an overview of computer architecture and computer organization as they relate to computer science. Topics include computer
components, interconnection structures, internal memory, instruction sets, number representation in computers, parallel processing and an elementary introduction to assembly programming. Prerequisite: CS 112

**CS 232 - Human–Computer Interaction | 3 CR**
Focuses on how developers and designers of computer systems can produce computers that are beneficial to the user and easy to use. Human–computer interaction is the intersection of human behavior and computer technology. In understanding human behavior, developers can evaluate what makes the computer easy to learn and use. The course examines the ways people interact with computers and how to incorporate this knowledge into the design and evaluation of new technology. Prerequisite: CS 100 or CS 112

**CS 233 - Visual Basic | 3 CR**
Explores the use of controls and tools, forms, menus, frames, file browsers and buttons, creating windows interfaces for databases, linking to Windows and Excel, writing and debugging Visual Basic code. Uses VB.net 2010. Prerequisite: CS 112

**CS 241 - Advanced Programming Concepts Using “C” | 3 CR**
Covers advanced programming techniques in “C,” using pointers, data structures and recursion. Emphasis on algorithmic approach and use of mathematical functions. Prerequisite: CS 112

**CS 261 - Programming for the Web | 3 CR**
An introduction to Web-enabling technologies, this course addresses web design with HTML code, Cascading Style Sheets and Layers, Photoshop and Java script. Problems and trends faced by webmasters today are also discussed.

Prerequisites: CS 111 and Sophomore status

**CS 271 - Advanced Computer Gaming | 3 CR**
An object-oriented approach to programming digital objects using Flash and Action Script 3.0. These programming techniques will be applied to both arcade and adventure games. Prerequisite: CS 171 and Co-requisite or Prerequisite: CS 112

**CS 272 - OOP with C# and Games | 3 CR**
An object-oriented approach to computer graphics using C#. Topics covered will include: classes, instantiation, event listeners, polymorphism, encapsulation, event handlers, functions and methods, and basic game logic. Prerequisite: CS 271 and Co-requisite or Prerequisite: CS 112

**CS 299 - Special Topics I | 3 CR**
Various courses of current interest to the Computer Science major are introduced from time to time. Prerequisite: Sophomore status

**CS 311 - Database Design | 3 CR**
Explores fundamentals of database design theory and applications. Includes data models with emphasis on the relational model. Prerequisites: CS 112 and CS 215

**CS 312 - Software Engineering | 3 CR**
The study of software development methodology, both procedural and object oriented. This is a team project-based design course where teams develop software projects from requirements analysis through detailed design and testing. Umbrella activities such as configuration management, quality assurance, writing documentation, ethics and costing are covered. Automated software design tools are used and oral and written presentations required. Prerequisite: CS 311
CS 318 - Project Course | 3 CR
Students sign up for this senior project course one semester before the graduating semester, because of the independent study/work involved. Students work with a faculty member in the department and a mentor to define and implement an acceptable project. The student is required to assess requirements, design software and write detailed documentation that illustrates and supports design choices. Test plans, usability testing and prototypes are also required. Students present their projects to the department faculty and public as the culmination of this project. Prerequisites: Senior status and permission from Computer Science Department

CS 319 - Computer Ethics | 3 CR
This course focuses on the ethical and social issues associated with computer technology such as privacy, theft, intellectual property, accountability, hacking and cracking, codes of ethics and professional responsibility. Students also examine philosophers such as Aristotle, Kant and Mill and use their theories to support ethical debate and dialogue. This course is a Senior-level capstone course. It emphasizes both oral and written communication as students discuss and examine their own ethical beliefs in relation to society and technology. Prerequisites: Junior/Senior status, PH 101 or permission of instructor

CS 331 - Multimedia Applications | 3 CR
This course aids in the understanding of multimedia authoring, incorporating text, graphics, sound and video. It discusses design and planning elements that go into multimedia development. Students use Flash and Action scripting to choreograph media objects onto a stage using a score. It is designed for students with programming experience. Prerequisite: CS 112

CS 338 - Systems Analysis and Design | 3 CR
An advanced design course that studies the application of computer solutions to business problems. This is a project-based course where teams set milestones and present object-oriented analysis and design of their solutions. Oral and written presentations are required and automated software tools are used. Prerequisite: CS 312

CS 339 - Networking and Data Communication | 3 CR
The study of networks and data communication concentrating on the Internet model. This is a laboratory-based course that includes projects implemented on both Unix and Windows machines. Topics such as LANs, WANs and MANs; hardware, software, protocols, routing, circuit-switching and packet-switching networks, analog and digital systems, compression and error handling are among those studied. Students use a simulation package to design and simulate networks. Prerequisites: CS 338 or CS 341 and Senior status

CS 341 - Analysis of Algorithms | 3 CR
Emphasis on theory and techniques underlying the analysis of algorithms including big/little-Oh, graphs and networks, searching, sorting, recursion and classical algorithms. Prerequisites: CS 112 and MA 151

CS 348 - Programming in Unix | 3 CR
Discusses main issues of Unix OS programming and administration. Explores the popular Unix text editor Emacs, Unix file system, process manipulation, regular expressions and their uses, filters, and system administration and security. Prerequisites: CS 241 and CS 341

CS 349 - Operating Systems | 3 CR
Examines resource management, including memory allocation and management, virtual
memory, process scheduling, protection, deadlock and concurrency, case studies and multiprocessing. Prerequisite: CS 341

**CS 367 - Managing, Securing, and Designing Modern Networks | 3 CR**

Focuses on wireless and mobile networks, multimedia networking, network management infrastructure, configuration management, network security, cryptography, authentication, access controls, network design (OpNet), designing network performance. Prerequisite: CS 339

**CS 368 - Hands-on Network Security | 3 CR**

Focuses on networking security topics, firewalls (using Linux), packet filters, NAT and PAT, public key infrastructure (using Microsoft Certification Server), encryption algorithms, decrypting passwords, dictionary decryption, brute force decryption, certificate servers, vulnerability assessment, identifying security holes, forensics, Layer 5 vulnerabilities, packet monitoring. Prerequisite: CS 367

**CS 371 - Advanced Game Programming | 3 CR**

A game oriented programming course focusing on advanced graphics techniques using OpenGL and/or DirectX. Prerequisite: CS 272

**CS 372 - Building Computer Games | 3 CR**

In this class we explore how logic and creativity work together in the well designed computer game. Topics include: genres of games; character development and gameplay; new and developing gaming concepts; creation and use of gaming engines; the role of sound and music; teaching a game to think. Prerequisite: CS 371