Definition

Computerized systems are an integral part of today's society, and understanding them is key to success. Computer information science, computer networking, and computer applications are fields that are dynamic, exciting, and rewarding for people who enjoy challenges. At AVC, the computer studies programs are designed to provide students with the skills necessary to compete in computer-related fields or to prepare for further study at the university level.

Staff

To access faculty and staff, dial (661) 722-6300, then the 4-digit extension.

Dean:
Dr. Maria Clinton	ext. 6327

Administrative Assistant:
Mari-Ali Baiza	ext. 6327

Clerical Assistant III:
Leyla Recinos	ext. 6327

Department Chair:
Kathy Osburn	ext. 6898

Faculty:
Dr. Ed Beyer	ext. 6374
Richard Biritwum	ext. 6783
Jimmie Bowen	ext. 6173
Kathy Osburn	ext. 6898

Adjunct Faculty:

To access adjunct faculty voice mail, dial (661) 722-6300, then the 4-digit number.

	V.M.
Maximo Dueno	2353
Tim Etherington	2606
Robert Harvey	2382
Manuel Hidalgo	2337
Heather Hines	2341
Richard Hoffman	2954
Paul Hurd	2383
Mark Ivey	2128
Wayne Lynch	2611
Jonathan McCary	2358
Matthew McCloskey	2330
Daniel McMahon	2324
Kent Moser	2294
Megan Owens	2138
Garo Panossian	2525
Robert Price	2316
Angelo Tepedino	2333
Terry Tretter	2286
Alec Winetrobe	2102
Nathan Wonnacott	2212

Program Description

The Computer Applications, Computer Networking, CyberSecurity, Computer Software Developer, and Business Computer Information Science programs continue to evolve with today's technology. The Computer Applications program concentrates on microcomputer applications in the area of electronic spreadsheets, electronic presentations, database management, and word processing.

The Computer Networking Core-Certificates provides students with entry-level skills and the essential knowledge needed to succeed in the computer networking field. The Networking Multi-platform certificate program also provides an opportunity for students to expand their knowledge through advanced networking and network operating system classes.

The Cybersecurity program will give students a solid background in the field of Computer skills needed for an entry-level career in Cybersecurity. The courses provide an overview of the entire field. Topics covered will include Cisco Security, Windows Operating System Linux security, Firewalls, Intruder Detection systems, Security policies and procedures, e-mail and Web security, and designing and building a secure computer network.

In the Computer Software Developer Program, students explore the theory of software design and improve individual skills through a "hands-on" approach to writing, testing, and debugging computer programs. Students will develop analytical skills, along with a solid foundation in several computer programming languages, through the analysis of generalized computer algorithms.

The Business Computer Information Science Program offers students an opportunity to develop computer skills in a business environment. Through theoretical discussions and a "hands-on" approach, students will explore the integration of business and computer concepts, while developing skills necessary to enter and succeed in the work environment.

Students must receive a minimum grade of "C" or better in all required core courses and the specific courses listed as program electives in order to qualify for the degree or certificate.

Distinctive Features

Most computer courses include in-class time for "hands-on" computer work. Students in computer studies have access to open computer labs outside of class time. These open computer labs provide computer access for students who may not have the hardware or software required for computer courses.

Career Options

Business Applications Programmer
Communications Manager
Computer Engineer
Computer Sales
Cybersecurity Analyst
Database Specialist
Network Administrator
Programming Manager
Scientific Applications Programmer

Software Application Specialist
Software Engineer
Systems Analyst
Systems Programmer
(Some of these careers may require education beyond the two-year college level.)

Program Learning Outcomes

Computer Applications
1. Demonstrate an understanding of computer components and explain their purpose.
2. Demonstrate the ability to use a word processing software application.
3. Demonstrate the ability to use a spreadsheet software application.
4. Demonstrate the ability to use a database management software application.

Computer Networking, and Computer Networking Multi-Platform
1. Demonstrate the ability to set up, configure, troubleshoot, and maintain a microcomputer operating system.
2. Demonstrate networking skills that include installing, configuring, and troubleshooting network devices, protocols, and services.
3. Demonstrate networking administration skills related to server operating systems, network security, and directory services administration.

CyberSecurity
1. Describe the three common Security Operations Center (SOC) types, the different tools used by the SOC analysts, the different job roles within the Security Operations Center, and incident analysis within a threat-centric Security Operations Center.
2. Demonstrate an understanding of the concepts of computer forensics and summarize how to prepare for a computer investigation.
3. Identify various cloud interface standards and protocols for building a cloud infrastructure using the cloud computing reference model.

Business Computer Information Science
1. Create common documents in an Office Application Suite.
2. Design, create and test a program in a high-level, object-oriented, programming language based on a given set of specifications.
3. Identify the primary hardware components of a complete computer system.

Computer Software Developer
1. Design, create and test a program in a high-level, object-oriented, programming language based on a given set of specifications.
2. Design, create and test a program in assembly language based on a given set of specifications.
3. Solve common problems in the Binary and Hexadecimal numbering systems.

Certificate Programs

Computer Applications
This certificate requires a minimum of 31 units. A maximum of 6 pass/no pass units will be accepted for any of these certificates.

Required Courses:	units
CA 103, Intro. to Computers and Dig. Tech. *or* CA 221, Computer Concepts and Applications in Business	3-4
CA 111, Word Processing–Microsoft Word	3
CA 121, Microcomputer Spreadsheets	3
CA 131, Relational Database Management and Design	3
CA 151, Microcomputer Operating Systems	3
CA 171, Introduction to Networking	3
CIS 145, Intro. to Visual BASIC.NET Programming *or* CA 175, Administering Windows Server *or* CIS 157, Intro. to LINUX	3
CIS 141, Intro. to Basic Programming	3
MATH 102, Intermediate Algebra	4
Program Elective	3
Total	**31-32**

For a recommended plan of study for the certificate, please refer to the Associate Degree plan minus the general education requirements.

Program Electives:	units
Select any 3 units from the following program electives.	
CA 103, Intro. to Computers and Dig. Tech.	3
CA 175, Administering Windows Server	3
CA 199, Occupational Work Experience	1-8
CA 221, Computer Concepts and Applications in Business	4
CIS 145, Introduction to Visual BASIC.NET Programming	3
CIS 157, Introduction to LINUX	3
CIS 199, Occupational Work Experience	1-8

NOTE: Substitutions, with prior permission, may be made for certain courses that may not be offered in the two-year period.

Computer Networking
The Computer Networking Program consists of two parts: the Computer Networking Core Certificate–an 18-unit, entry-level certificate composed of five basic computer courses and one network operating system elective; and the Computer Networking Multi-Platform Certificate–a 30-unit program that includes the six courses in the Core program plus two more networking operating system courses and two computer networking electives to provide the student with a breadth of networking experience.

A maximum of 6 pass/no pass units will be accepted for any of these certificates.

Computer Networking Core
This entry-level "core" certificate is composed of five basic computer courses and one network operating system elective for a total of 18 units.

Required Courses:	units
CA 107, Microcomputer Hardware and Software Support	3
CA 151, Microcomputer Operating Systems	3
CA 171, Intro. to Networking	3
CA 175, Administering Windows Server *or*	
CIS 157, Intro. to LINUX	3
CA 176, Windows Server Networking	3
CA 182, Network Security	3
	Total 18

For a recommended plan of study for the certificate, please refer to the Associate Degree plan minus the general education requirements.

NOTE: Substitutions, with prior permission, may be made for certain courses that may not be offered in the two-year period.

Computer Networking Multi-Platform

The Multi-Platform Certificate builds on the Computer Networking Core certificate to enhance the skills and knowledge of the student. Any course taken in the Core Certificate does not need to be taken again for the Multi-Platform Certificate.

Required Courses:	units
CA 107, Microcomputer Hardware and Software Support	3
CA 151, Microcomputer Operating Systems	3
CA 171, Intro. to Networking	3
CA 175, Administering Windows Server	3
CA 176, Windows Server Networking	3
CA 182, Network Security	3
CIS 157, Intro. to LINUX	3
CIS 159, SUSE Linux Server Administration	3
Program Electives	6
	Total 30

For a recommended plan of study for the certificate, please refer to the Associate Degree plan minus the general education requirements.

Program Electives:	units
Select 6 units from the following networking program electives:	
CA 103, Intro. to Computers and Dig. Tech.	3
CA 131, Relational Database Management and Design	3
CA 132, Oracle SQLDatabase Management	3
CA 153, Windows Installation and System Support	3
CIS 111, Introduction to Programming and Algorithms	3
CIS 113, Data Structures	3
CIS 123, Assembly Language and Computer Architecture	3
CIS 141, Introduction to Basic Programming	3
CIS 145, Intro. to Visual BASIC.NET Programming	3
CIS 161, Introduction to C Programming	3
CIS 173, Introduction to C++ Programming	3
CIS 175, Java Programming	3

NOTE: Substitutions, with prior permission, may be made for certain courses that may not be offered in the two-year period.

Business Computer Information Science

Certificate requires a minimum of 30 units. This program provides entry-level training to the person entering the computer field and focuses on the operation and programming of computers with an emphasis on business application. Computer Information Science jobs go by a variety of titles, including applications developer, programmer analyst, software developer, customer support specialist, help desk technician, workstation support specialist, database designer, database analyst, database security, network control operator, network security administrator, Internet developer, webmaster, Internet systems integrator, among others.

A maximum of 6 pass/no pass units will be accepted for any of these certificates.

Required Courses:	units
ACCT 201, Financial Accounting	4
BUS 101, Intro. to Business *or* MGT 101, Mgt. Principles	3
BUS 105, Business Mathematics *or* MATH 128, College	
Alegebra for Liberal Arts *or* MATH 140, Precalculus	3-4
CA 103, Intro. to Computers and Dig. Tech. *or* CA 221,	
Computer Concepts and Applications in Business *or*	
CIS 101, Intro. to Computer Information Science	3-4
CA 121, Microcomputer Spreadsheets *or*	
ACCT 121, Computerized Accounting	2-3
CA 171, Introduction to Networking	3
CIS 111, Intro. to Programming and Algorithms *or*	
CIS 145, Intro. to Visual BASIC.NET Programming	3
CIS 141, Introduction to BASIC Programming	3
Program Electives	2-6
	Total 30

For a recommended plan of study for the certificate, please refer to the Associate Degree plan minus the general education requirements.

Program Electives:	units
Select any 2-6 units from the following program electives.	
ACCT 121, Computerized Accounting	2
BUS 101, Introduction to Business	3
BUS 105, Business Mathematics	3
CA 103, Intro. to Computers and Dig. Tech.	3
CA 121, Microcomputer Spreadsheets	3
CA 199, Occupational Work Experience	1-8
CA 221, Computer Concepts and Applications in Business	4
CIS 111, Introduction to Programming and Algorithms	3
CIS 145, Introduction to Visual BASIC.NET Programming	3
CIS 199, Occupational Work Experience	1-8
MATH 128, College Algebra for Liberal Arts	3
MATH 140, Precalculus	4
MGT 101, Management Principles	3

NOTE: Substitutions, with prior permission, may be made for certain courses that may not be offered in the two-year period.

Computer Software Developer

The Computer Software Developer certificate requires a minimum of 36 units. This program provides entry-level training to the person entering the computer programming field. The focus is on software development, and allows specialization in several programming languages. Certificate recipientshave enhanced employability in several fields. Career choices include systems programmer, systems software developer, applications programmer, Web programmer and database administrator.

A maximum of 6 pass/no pass units will be accepted for any of these certificates.

Required Courses:	units
CA 131, Relational Database Management and Design	3
CA 151, Microcomputer Operating Systems	3
CIS 101, Intro. to Computer Info. Science	3
CIS 111, Intro. to Programming and Algorithms	3
CIS 113, Data Structures	3
CIS 121, Computer Mathematics	3
CIS 123, Assembly Language and Computer Architecture	3
CIS 161, Intro. to C Programming	3
MATH 128, College Algebra for Liberal Arts *or*	
MATH 150, Calculus and Analytic Geometry *or*	
MATH 220, Linear Algebra	3-5
PHIL 110, Intro. to Logic	3
Program Electives	4-6
	Total 36

For a recommended plan of study for the certificate, please refer to the Associate Degree plan minus the general education requirements.

Program Electives:	units
Select any 4-6 units from the following program electives.	
CIS 157, Introduction to LINUX	3
CIS 173, Introduction to C++ Programming	3
CIS 174, Introduction to C#.NET Programming	3
CIS 175, Java Programming	3
CIS 177, Introduction to Python	3
CIS 199, Occupational Work Experience	1-8
MATH 128, College Algebra for Liberal Arts	3
MATH 140, Precalculus	4
MATH 150, Calculus and Analytical Geometry	5
MATH 220, Linear Algebra	4

NOTE: Substitutions, with prior permission, may be made for certain courses that may not be offered in the two-year period.

IT Cybersecurity

Students who complete the IT Cybersecurity certificate have enhanced employability in cyber security and computer networking, and in a similarly titled positions. The IT Cybersecurity certificate prepares students to begin a career working with associate-level cybersecurity analysts within security operations centers where responsibilities include detecting cybersecurity breaches and effectively responding to security incidents.

Required Courses:	units
A maximum of 6 pass/no pass units will be accepted for any of these certificates	
CA 171, Introduction to Networking	3
CA 175, Administering Windows Server	3
CA 182, Network Security	3

Required Electives Group A:	units
Select 9 units or 3 courses from the following:	
CA 183, Seurity Counter Measures	3
CA 165, Digital Forensics Fundamentals	3
CA 166, Cloud Security Fundamentals	3
CA 170, Virtualization and Cloud Essentials	3
CA 179, Cybersecurity Operations - CCNA CyberOps	3
CA 182, Network Security - CCNA Security	3

Required Electives Group B:	units
Select 3 units or 1 courses from the following:	
CIS 111, Introduction to Programming and Algorithms	3
CA 157, Introduction in Linux	3
CA 250, Introduction to Python Programming	3

TRANSFER STUDENTS:

Students planning to transfer to a four-year institution are strongly advised to follow the Business Administration for Transfer degree listed in the Business section of this catalog.

Associate Degrees

Computer Applications

The requirements for an associate degree in Computer Applications may be satisfied by completing the Computer Applications certificate, 21 units of general education requirements, and sufficient elective credits to total 61-62 units. (See Graduation/Associate Degree Requirements.)

Students who complete the associate degree have enhanced employability in several fields, and are well prepared for entry-level career opportunities in areas such as information technology, help desk support, and general office computer management. The associate degree will also provide students with a broad range of knowledge with which to evaluate and appreciate the physical environment, culture, and society in which they live, with the ability to think and communicate clearly and effectively.

Except in cases of a prerequisite requirement, it is not required that courses be taken in exactly this sequence; they are recommended in this order to facilitate success.

Recommended Plan of Study

First Semester	units
CA 103, Intro. to Computers and Dig. Tech. *or* CA 221, Computer Concepts and Applications in Business	3-4
MATH 102, Intermediate Algebra	4
Course from GE requirement Area B	3
Course from GE requirement Area D1	3
Elective	3
Total 16-17	

Second Semester	units
CA 121, Microcomputer Spreadsheets	3
CA 151, Microcomputer Operating Systems	3
Course from GE requirement Area D2	3
Course from GE requirement Area F (BUS 212 or MGT 212 recommended)	3
Program Elective	3
Total 15	

Third Semester	units
CA 111, Word Processing–Microsoft Word	3
CA 171, Introduction to Networking	3
CIS 141, Introduction to BASIC Programming	3
Course from GE requirement Area C	3
Elective	3
Total 15	

Fourth Semester	units
CA 131, Relational Database Management and Design	3
CIS 145, Intro. to Visual BASIC.NET Programming *or* CA 175, Administering Windows Server *or* CIS 157, Intro. to LINUX	3
Course from GE requirement Area A	3
Course from GE requirement Area E	3
Elective	3
Total 15	
Degree Total 61-62	

Program Electives:
Please refer to the Program Electives listed under the certificate program.

Computer Networking

The requirements for an associate degree in Computer Networking Multi-Platform may be satisfied by completing the Computer Networking Multi-Platform certificate, 21 units of general education requirements, and sufficient elective credits to total 60 units (See Graduation/Associate Degree Requirements).

Students who complete the associate degree have enhanced employability in several fields, and are well prepared for entry-level career opportunities in areas such as computer repair, service, maintenance, and installation of computer network hardware and software. The associate degree will also provide students with a broad range of knowledge with which to evaluate and appreciate the physical environment, culture, and society in which they live, with the ability to think and communicate clearly and effectively.

Except in cases of a prerequisite requirement, it is not required that courses be taken in exactly this sequence; they are recommended in this order to facilitate success.

Recommended Plan of Study

First Semester	units
CA 107, Microcomputer Hardware and Software Support	3
CA 151, Microcomputer Operating Systems	3
Course from GE requirement Area B	3
Course from GE requirement Area D1	3
Elective	3
Total 15	

Second Semester	units
CA 171, Intro. to Networking	3
CA 175, Administering Windows Server	3
Course from GE requirement Area A	3
Course from GE requirement Area D2	3
Elective	3
Total 15	

Third Semester	units
CA 176, Windows Server Networking	3
CIS 157, Intro. to LINUX	3
Course from GE requirement Area C	3
Course from GE requirement Area E	3
Elective	3
Total 15	

Fourth Semester	units
CA 182, Network Security	3
CIS 159, SUSE Linux Server Administration	3
Course from GE requirement Area F	3
Program Elective	6
Total 15	
Degree Total 60	

Program Electives:
Please refer to the Program Electives listed under the certificate program.

Business Computer Information Science

The requirements for an associate degree in Business Computer Information Science may be satisfied by completing the certificate program in addition to the associate degree requirements. (See Graduation/Associate Degree Requirements.)

Students who complete the associate degree have enhanced employability in several fields. With a varied background in Business, Computer Programming and Computer Applications, students are well prepared for full-time, entry-level positions in the programming of business and other applications as well as advanced use of existing office applications in industry. The associate degree will also provide students with a broad range of knowledge with which to evaluate and appreciate the physical

environment, culture, and society in which they live, with the ability to think and communicate clearly and effectively.

Except in cases of a prerequisite requirement, it is not required that courses be taken in exactly this sequence; they are recommended in this order to facilitate success.

Recommended Plan of Study

First Semester	units
BUS 101, Intro. to Business *or* MGT 101, Mgt. Principles	3
BUS 105, Business Mathematics *or* MATH 128, College Alegebra for Liberal Arts *or* MATH 140, Precalculus	3-4
CA 103, Intro. to Computers and Dig. Tech. *or* CA 221, Computer Concepts and Applications in Business *or* CIS 101, Intro. to Computer Info. Science	3-4
Course from GE requirement Area D1	3
Elective	3
Total 15-18	

Second Semester	units
ACCT 201, Financial Accounting	4
CIS 141, Intro. to BASIC Programming	3
Course from GE requirement Area B	3
Course from GE requirement Area D2	3
Elective	3
Total 16	

Third Semester	units
CA 121, Microcomputer Spreadsheets *or* ACCT 121, Computerized Accounting	2-3
CIS 111, Intro. to Programming and Algorithms *or* CIS 145, Intro. to Visual BASIC.NET Programming	3
Course from GE requirement Area A	3
Course from GE requirement Area C	3
Program Elective	2-3
Total 14-15	

Fourth Semester	units
CA 171, Introduction to Networking	3
Course from GE requirement Area E	3
Course from GE requirement Area F (BUS 212 or MGT 212 recommended)	3
Program Elective	0-3
Elective	3
Total 15	

Degree Total 60

Program Electives:
Please refer to the Program Electives listed under the certificate program.

Computer Software Developer
The requirements for an associate degree in Computer Software Developer may be satisfied by completing the certificate program in addition to the associate degree requirements. (See Graduation/Associate Degree Requirements.)

Students who complete the associate degree have enhanced employability in the field of computer programming/software development, and are well prepared for full-time, entry-level positions in such job titles as programmer or programmer/analyst. The associate degree will also provide students with a broad range of knowledge with which to evaluate and appreciate the physical environment, culture, and society in which they live, with the ability to think and communicate clearly and effectively.

Except in cases of a prerequisite requirement, it is not required that courses be taken in exactly this sequence; they are recommended in this order to facilitate success.

Recommended Plan of Study

First Semester	units
CIS 101, Introduction to Computer Information Science	3
MATH 128, College Algebra for Liberal Arts *or* MATH 150, Calc. & Analytic Geometry *or* MATH 220, Linear Algebra	3-5
Course from GE requirement Area B	3
Course from GE requirement Area D1	3
Elective	3
Total 16-17	

Second Semester	units
CIS 111, Intro. to Programming and Algorithms	3
CIS 121, Computer Mathematics	3
CIS 161, Intro. to C Programming	3
PHIL 110, Introduction to Logic	3
Course from GE requirement Area D2	3
Total 15	

Third Semester	units
CIS 113, Data Structures	3
CIS 123, Assembly Language and Computer Architecture	3
Course from GE requirement Area A	3
Course from GE requirement Area F (BUS 212 or MGT 212 recommended)	3
Program Elective	2-3
Total 15	

Fourth Semester	units
CA 131, Relational Database Management and Design	3
CA 151, Microcomputer Operating Systems	3
Course from GE requirement Area C	3
Course from GE requirement Area E	3
Program Elective	2-3
Total 15	

Degree Total 60

Program Electives:
Please refer to the Program Electives listed under the certificate program.

Transfer

Students planning to continue studies at a four-year college or university after AVC should visit the Transfer Resource Center and consult with a counselor as soon as possible. Additional information on official transfer articulation agreements from AVC to many CSU/UC campuses can be found at the following Web site: *www.assist.org*

Prerequisite Completion

If a course is listed as a prerequisite for another course, that prerequisite course must be completed with a satisfactory grade in order to enroll in the next course. According to Title 5, Section 55200(d), a satisfactory grade is a grade of "A," "B," "C" or "P". Classes in which the Pass/No Pass option is available are indicated with an asterisk **(*)** before the course title. See "Pass/No Pass Option" in the catalog for full explanation.

Computer Applications Courses

CA 103 *INTRODUCTION TO COMPUTERS AND DIGITAL TECHNOLOGY

3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
This course is designed to introduce students to digital technology and the features of a microcomputer, how a microcomputer operates, and how to select a microcomputer that best fits individual needs. The course includes an examination of information systems and their role in business. Through hands-on operation of a computer, students will develop computer-based solutions to business problems utilizing the major features of popular software applications, including word processors, spreadsheets, database managers, presentation managers, and Internet browsers. (CSU, UC, AVC)

CA 107 *MICROCOMPUTER HARDWARE AND SOFTWARE SUPPORT

4 units
4 hours weekly
Advisory: Completion of CA 103, CA 221 or CIS 101.
This course is intended to provide students with a workable knowledge that is required for the installation, setup, and troubleshooting of hardware and software related to personal computers and peripheral devices. The fundamentals of computer hardware and software as well as advanced concepts such as security, networking, and the responsibilities of an ICT professional will be introduced. This course will help students prepare for the A+ Certification Exam. **BEFORE ENROLLING** students should be able to create folders, format disks, copy files, rename files, create shortcuts, and use Windows Explorer. This course will involve problem solving and troubleshooting. Students should also be familiar with various operating systems

and the installation of application software. (CSU, AVC)

CA 111 *WORD PROCESSING–MICROSOFT WORD

3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Advisory: Completion of CA 103 or CA 221 and OT 101, and the Ability to type 30 wpm.
This course covers the concepts of word processing emphasizing Microsoft Word. Topics covered include preparing documents, text formatting and editing, management of files and folders, formatting paragraphs, using multiple windows, and standard letter and punctuation styles. This vocationally oriented course will serve students seeking a certificate, associate degree, or desiring to transfer to a four-year institution. **BEFORE ENROLLING,** students should have used a word processing program to create, save, retrieve, edit, and print. (CSU, AVC)

CA 121 *MICROCOMPUTER SPREADSHEETS

3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Advisory: Completion of CA 103 or CA 221.
This course is designed to teach computer users how to develop electronic spreadsheets using spreadsheet software such as Microsoft Excel, to solve business related quantitative problems. Topics of instruction include data entry, formulas, functions, charts, macros, and other beginning to intermediate level features of spreadsheet software. **BEFORE ENROLLING,** students should be able to save and retrieve files and perform other basic file management tasks on the computer. (CSU, AVC)

CA 131 *RELATIONAL DATABASE MANAGEMENT AND DESIGN

3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Prerequisite: Completion of CA 103 or CA 221 or CIS 101.
Database management systems (DBMS) concepts and designs are explored using Microsoft Access. The relational model of database management, which is commonly used on micro and larger computers, is emphasized. The course covers database design, building a model using computer software, application generators, programming in database software, structured query language, and database administration. **BEFORE ENROLLING,** students should possess an understanding of how personal computers, software, and peripherals work together (CSU, AVC)

CA 132 *ORACLE SQL DATABASE MANAGEMENT

3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Advisory: Completion of CA 103 or CA 131.
In this course, students will work with the Oracle Relational Database Management System in a client server environment. In both lecture and lab, students will learn Structured Query Language (SQL) by using the Oracle SQL*Plus tool. Proper relational database design that enforces referential integrity will be taught using schema diagrams and entity relationship diagrams. SQL Data Manipulation Language (DML) for reporting and Data Definition Language (DDL) for database creation will be covered. Students will also learn about database security issues such as database users, roles, and grants. BEFORE ENROLLING students should have used database software to create tables, and enter, edit, delete, and sort records. Students should also possess an understanding of how to save and retrieve files from local and network drives. (CSU, AVC)

CA 141 *DEVELOPING POWERPOINT PRESENTATIONS

1.5 units
36 hours total
Advisory: Completion of CA 103 or CA 221.
Students will acquire intermediate knowledge of presentation graphics software by using Microsoft PowerPoint. Students will create various types of presentations and will learn to insert and edit objects to produce the desired graphics; this will include bulleted lists, clip art, sounds, graphs, and tables. **BEFORE ENROLLING,** students should be able to perform basic operations of a personal computer including working with a keyboard and mouse. There should also be a basic understanding of the Windows Operating System. (CSU, AVC)

CA 151 *MICROCOMPUTER OPERATING SYSTEMS

3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Advisory: Completion of CA 103 or CA 221.
The purpose of this course is to provide an understanding of the role of an operating system in the interaction between computer hardware components and application software. The concept of how a computer works from power-on until power-off will be discussed at length, as well as the boot process. Details will be explored on how an operating system is evaluated based on user needs. This course includes discussions on Windows 7, Linux, and Mac OS. There will be extensive hands on exposure to Windows 7 and Linux. **BEFORE ENROLLING**, students should be advanced Windows Vista or Windows 7 computer users with the ability to manage disks, folders, and files using Windows Explorer. (CSU, AVC)

CA 153 *WINDOWS INSTALLATION AND SYSTEM SUPPORT

3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Advisory: Completion of CA 103 or CIS 101.
This course is designed to provide the knowledge and skills needed to support Microsoft Windows in both a stand-alone environment and networking environment. These skills include setup, configuration, migration, optimization, network integration, administration, troubleshooting, and messaging. **BEFORE ENROLLING,** students should be advanced Windows users with ability to create folders, copy files, rename files, create shortcuts and execute applications. (CSU , AVC)

CA 157 *INTRODUCTION TO LINUX

formally CIS 157
3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Advisory: Completion of CA 103 or Completion of CA 221 or Completion of CIS 101
This course introduces a variety of the tools and concepts used while working with a UNIX/Linux-based computer system. The course will focus on the shell environment, system administration and security, programming, and the graphical user interface. Students will learn to write shell scripts using basic commands and regular expressions. They will then use those tools to write scripts first with basic shell commands, then with grep, sed, and awk, then with more advanced decision-making and flow control commands. Other scripting tools such as Perl and Python will also be explored. Students will write shell scripts programs to exercise their understanding of tools and concepts. This course will be taught using a combination of lectures, demonstrations, discussions, and hands-on labs. (CSU, AVC)

CA 159 *LINUX SERVER ADMINISTRATION

formally CIS 159
3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Prerequisitee: Completion of CA 151 or Completion of CA 171 or Completion of CIS 157.
This course will provide a student with the knowledge and skills required to build, maintain, troubleshoot and support server hardware and software technologies. The student will be able to identify environmental issues; understand and comply with disaster recovery and physical/software security procedures; become familiar with industry terminology and concepts; understand server roles/specializations and interaction within the overall computing environment. This in-depth, hands-on course covers a variety of topics: installing and configuring SUSE Linux Enterprise Server, managing users and groups, securing the system, and configuring Web services. By completing multiple lab exercises, students will be able to apply course concepts

and strengthen their proficiency in Linux administration. (CSU, AVC)

CA 165 *DIGITAL FORENSICS FUNDAMENTALS
3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Prerequisite: *Completion of CA 182.*
This course is an introduction to the methods used to properly conduct a computer forensics investigation beginning with a discussion of ethics, while mapping to the objectives of the International Association of Computer Investigative Specialists (IACIS) certification. Topics covered include an overview of computer forensics as a profession; the computer investigation process; understanding operating systems boot processes and disk structures; data acquisition and analysis; technical writing; and a review of familiar computer forensics tools. (CSU, AVC)

CA 166 *CLOUD SECURITY FUNDAMENTALS
3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Advisory: *Completion of CA 182 and CA 170.*
Students will learn how to properly evaluate cloud providers, and perform risk assessment and review. Students will be introduced to the various cloud computing delivery models, ranging from Software as a Service (SaaS) to Infrastructure as a Service (IaaS) and how each delivery models represents an entirely separate set of security conditions to consider, especially when coupled with various cloud types, including public, private, and hybrid. The course will also touch on architecture and infrastructure fundamentals for the private, public, and hybrid clouds, including a wide range of topics such as patch and configuration management, virtualization security, application security, and change management. Policy, risk assessment, and governance within cloud environments will also be covered, with recommendations for both internal policies and contract provisions. This will lead us to a discussion of compliance and legal concerns. (CSU, AVC)

CA 170 *VIRTUALIZATION AND CLOUD ESSENTIALS
3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
This course covers cloud deployment and service models, cloud infrastructure, and the key considerations in migrating to cloud computing. This course also provides the required technology essentials across all domains—including server, storage, networking, applications, and databases—-to help develop a strong understanding of virtualization and cloud computing technologies. Prepares students for the Cloud Infrastructure and

Services Associate (EMCCIS) Certification and the CompTIA Cloud+. (CSU, AVC)

CA 171 *INTRODUCTION TO NETWORKING
3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Prerequisite: *Completion of CA 107.*
Advisory: *Completion of CA 103 or CA 221.*
This course introduces the architecture, structure, functions, components, and models of the Internet and other computer networks. The principles and structure of IP (Internet Protocol) addressing and the fundamentals of Ethernet concepts, media, and operations are introduced to provide a foundation for further study of computer networks. It uses the OSI (Open Systems Interconnection) and TCP (Transmission Control Protocol) layered models to examine the nature and roles of protocols and services at the application, network, data link, and physical layers. The course will cover Local Area Networks (LANs), Wide Area Networks (WANs), physical topologies, logical topologies, network operating systems, network hardware, network troubleshooting, network maintenance, network security. Preparation for the CompTIA Network+ certification exam will be studied. (CSU, AVC)

CA 175 *ADMINISTERING WINDOWS SERVER
3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Prerequisite: *Completion of CA 171.*
Advisory: *Completion of CA 103 or CA 221 or CIS 101.*
This course will provide a student with the knowledge, and skills required to build, maintain, troubleshoot and support server hardware and software technologies. The student will be able to identify environmental issues; understand and comply with disaster recovery and physical/software security procedures; become familiar with industry terminology and concepts; understand server roles/specializations and interaction within the overall computing environment. (CSU, AVC)

CA 176 *WINDOWS SERVER NETWORKING
3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Prerequisite: *Completion of CA 175.*
Advisory: *Eligibility for ENGL 100A, READ 099 and MATH 102.*
This course trains network administrators and support professionals to design, implement, optimize, monitor and troubleshoot networking services on a Windows server. Students will also learn Transfer Control Protocol/Internet Protocol (TCP/IP) networking design, subnetting, and address resolution. Topics covered will also include Dynamic Host Configuration Protocol (DHCP), Domain Name System (DNS), Windows

Internet Naming Service (WINS), Remote Access Service (RAS), Internet Protocol (IP) routing and IP security. **BEFORE ENROLLING,** students should know how to install Microsoft Windows server, create and administer user and group accounts, set share permissions, set up network printing, and audit resources. (CSU, AVC)

CA 179 *CYBERSECURITY OPERATIONS -CCNA-CYBEROPS

3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Advisory: Completion of CA 171 or CA182.
This course introduces students to the knowledge and skills needed to rapidly detect cybersecurity breaches and effectively respond to security incidents. Students will learn to be part of a team of people in a Security Operations Center (SOC) and how to keep a vigilant eye on security systems and protect their organizations by detecting and responding to cybersecurity threats. This course helps prepare students to take the required exams to achieve the CCNA Cyber Ops certification. (CSU, AVC)

CA 182 *NETWORK SECURITY

3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Prerequisite: Completion of CA 171 or CA 176.
An introduction to the fundamental principles and topics of Information Technology Security and Risk Management at the organizational level. It addresses hardware, software, processes, communications, applications, and policies and procedures with respect to organizational Cybersecurity and Risk Management. Preparation for the CompTIA Security+ certification exams. (CSU, AVC)

CA 183 *SECURITY COUNTERMEASURES

3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Prerequisite: Completion of CIS 157.
Advisory: Completion of CA 182.
This course introduces the network security specialist to the various methodologies for attacking a network. Students will be introduced to the concepts, principles, and techniques, supplemented by hands-on exercises, for attacking and disabling a network within the context of properly securing a network. The course will emphasize network attack methodologies with the emphasis on student use of network attack techniques and tools and appropriate defenses and countermeasures. Students will receive course content information through a variety of methods: lecture and demonstration of hacking tools will be used in addition to a virtual environment. Students will experience a hands-on practical approach to penetration testing measures and ethical hacking. (CSU, AVC)

CA 185 *NETWORK SECURITY - CCNA SECURITY

3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Prerequisite: Completion CA 182.
Students will be introduced to security principles and technologies, using Cisco security products to provide hands-on examples. This course allows learners to understand common security concepts and deploy basic security techniques utilizing a variety of popular security appliances within a "real-life" network infrastructure. This course will help students prepare for the CCNA Security exam 210-260 IINS. (CSU, AVC)

CA 199 *OCCUPATIONAL WORK EXPERIENCE

1–8 units
hours vary
Prerequisite: To participate in work experience, students must have a job or internship which is either paid or voluntary and have the approval of the supervisor and instructor supervising work experience in the specific subject area. PRIOR TO ENROLLING, students must attend a scheduled orientation or meet individually with the supervising instructor for an individual orientation.
Occupational Work Experience Education is supervised employment designed to provide students a realistic learning experience through work. The ultimate goal is to teach students those skills and attitudes that will equip them to function and adapt as an employee in a variety of situations and jobs. Occupational Work Experience Education is supervised employment extending classroom-based occupational learning at an on-the-job learning station related to the student's educational major or occupational goal. Credit may be accrued at the rate of one to eight units per semester. For the satisfactory completion of all types of Cooperative Work Experience Education (WE 197 and WE 199), students may earn up to a total of sixteen semester credit hours. (CSU, AVC) **(R3)**

CA 221 *COMPUTER CONCEPTS AND APPLICATIONS IN BUSINESS

4 units
5 hours weekly.
(3.5 lecture hours, 1.5 lab hours)
This course includes an examination of information systems and their role in business. The focus will be on information systems, electronic spreadsheets, database management systems, networking, e-commerce, ethics and security, and computer systems hardware and software components. This course includes the application of these concepts and methods in a business enviroment through hands-on projects developing computer-based solutions to business problems. **NOTE:** Computer-oriented majors should consider CIS 101. (C-ID: BUS 140 or ITIS 120) (CSU, UC, AVC)

Computer Information Science Courses

(Engineering and science majors consult counselors.)

CIS 101 *INTRODUCTION TO COMPUTER INFORMATION SCIENCE
3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
This course is designed to introduce to the general concepts and basic vocabulary of computers and information systems. Students will be introduced to the organization and functions of basic computer and information processing systems components. Instruction in programming procedures and programming logic is provided. Other topics include Internet and networking fundamentals as well as basic computer software such as spreadsheets and database applications. Appropriate for the student with a general interest in this area as well as for the student desiring to pursue further training in computer science or information systems. (Engineering and science majors consult counselors.) (C-ID: BUS 140) (CSU, UC, AVC)

CIS 111 *INTRODUCTION TO PROGRAMMING AND ALGORITHMS
3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Advisory: Completion of CA 103 or CA 221 or CIS 101, and Eligibility for ENGL 100A, READ 099 and MATH 102.
This is a first course for students planning or exploring a career in software design and development. This course emphasizes a careful disciplined approach to computer programming. Problem solving through stepwise development of algorithms is presented. Students will learn programming language syntax, coding, program logic, and program testing. Students will plan, create, test, and run their own programs to solve typical problems. **BEFORE ENROLLING**, students should have basic computer experience and be able to save and retrieve files, run applications, and print documents. (Engineering and science majors consult counselors.) (C-ID: COMP 112) (CSU, UC, AVC)

CIS 113 *DATA STRUCTURES
3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Prerequisite: Completion of CIS 111.
Advisory: Completion of MATH 128 or MATH 140.
This course continues the introduction to programming and algorithms initiated in CIS 111, with a particular focus on the ideas of data abstraction and object-oriented programming. Topics include object-oriented programming, fundamental data structures, design and implementation of abstract data types, common types of collections (such as stacks, queues, lists, graphs, trees and sets), algorithm analysis and complexity, search and sort algorithms, and the use of recursion. Students plan and create programs using data structures and collection types to solve problems frequently encountered by professional computer scientists. This course is intended for students majoring in CIS. (Engineering and science majors consult counselors.) (C-ID: COMP 132) (CSU, UC, AVC)

CIS 121 *COMPUTER MATHEMATICS
3 units
3 hours weekly
Advisory: Completion of CIS 111, CIS 113, and MATH 128 or MATH 140, and Eligibility for College Level Reading and ENGL 100A.
This is an introductory course in the area of mathematics applicable to computer science. Topics include logic and circuits, sets, mathematical induction, graphs, trees, algorithm development and refinement, and computational models like finite state automata and Turing machines. Emphasis is placed on problem solving and application of mathematical theory to data structures and database construction and operation. (Engineering and science majors consult counselors.) (C-ID: COMP 152) (CSU, UC, AVC)

CIS 123 *ASSEMBLY LANGUAGE AND COMPUTER ARCHITECTURE
3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Advisory: Completion of CIS 111
This course introduces assembly language programming and computer architecture to enable students to understand how programs are actually executed at the machine level. Students will use Intel-compatible personal computers for the detailed study of the Intel IA-32 processor instruction set and architecture and to develop programs using a macro assembler. Both 32-bit Windows console programming and 16-bit real-mode programming are covered. Topics include machine/assembly level programming, instruction formats, internal data representation, addressing modes, procedure call and return mechanisms, and how high-level language constructs are implemented at the machine level, basic microcomputer organization, instruction execution cycle, memory segmentation and paging, and details of programming the processor in both protected-mode and in real-mode. **BEFORE ENROLLING**, students should be proficient in writing programs in a high-level language. (Engineering and science majors consult counselors.) (C-ID: COMP 142) (CSU, UC, AVC)

CIS 141 *INTRODUCTION TO BASIC PROGRAMMING

3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Advisory: Completion of CA 103 or CIS 101.
This course is an introduction to the structure of the BASIC (Beginners All-Purpose Symbolic Instructional Code) programming language, syntax, coding, program logic, and program testing. Students will learn the fundamentals of computer programming, problem specification, algorithm design, and the elements of the BASIC programming language. The course will include reading, writing, debugging, and verifying BASIC programs. This course will prepare students for entry-level programming jobs and upper division courses requiring BASIC programming experience. (Engineering and Science majors consult counselors.) (CSU, UC, AVC)

CIS 145 *INTRODUCTION TO VISUAL BASIC. NET PROGRAMMING

3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Advisory: Completion of CIS 141 and either CIS 111 or CIS 173, and Eligibility for ENGL 100A, READ 099 and MATH 102.
The students will learn the fundamentals of Microsoft Windows programming using the Visual Basic.NET programming language. The course will include designing, implementing and testing Visual Basic.NET programs, which will provide useful Windows applications to solve representative problems for business, science, mathematics, and engineering. This course is intended for students majoring in Business or CIS or those desiring to increase their programming skills. (CSU, AVC)

CIS 161 *INTRODUCTION TO C PROGRAMMING

3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Advisory: Completion of CIS 101, and Eligibility for MATH 128.
This course is designed to give the student an introduction to the C programming language. Students will learn the basic elements of the C language and a disciplined approach to program development using structured programming techniques for readability, maintainability and defensive programming. Problem solving through stepwise development of algorithms and the mechanics of running, testing, and debugging programs is presented. Students will plan, create, test, and run their own programs to solve typical problems. **BEFORE ENROLLING,** students should have basic computer experience and be able to save and retrieve files, run applications, print documents, and have sufficient aptitude with mathematics to solve simple algebraic equations and to appreciate the use of mathematical

notation and formalism. (Engineering and science majors consult counselors.) (CSU, UC, AVC)

CIS 173 *INTRODUCTION TO C++ PROGRAMMING

3 units
4 hours weekly
(2.5 lecture hours, 1.5 lab hours)
Prerequisite: Completion of CIS 161.
Advisory: Eligibility for MATH 128.
Students will learn the syntax and semantics of the C++ programming language, what modifications and additions were made to the C programming language to produce C++, and how to implement an object-oriented design in C++. The course will include designing, implementing, and testing C++ programs that solve representative problems from business, science, mathematics, and engineering. This course is intended for students majoring in CIS. (CSU, UC, AVC)

CIS 174 *INTRODUCTION TO C# PROGRAMMING

4 units
4 hours weekly
Prerequisite: Completion of CIS 111.
Advisory: Eligibility for MATH 128.
The students will learn the fundamentals of Microsoft Windows programming using the C# programming language. The course will include designing, implementing and testing C# programs, which will provide useful Windows applications to solve representative problems for business, science, mathematics, and engineering. Before enrolling, students should understand object oriented programming concepts. This course is intended for students majoring in Business or CIS or those desiring to increase their programming skills. (AVC, CSU)

CIS 175 *ADVANCED JAVA PROGRAMMING

3 units
4 hours weekly
Prerequisite: Completion of CIS 111.
Advisory: Eligibility for MATH 128.
This course teaches the Advanced Java programming concepts, the extensive Java class library, and Object Oriented design and programming. The students will learn advanced techniques for using exceptions, file input/output, utility classes, multi-threading, network/Internet programming, streams, developing Web applications and Graphical User Interface (GUI) programming. BEFORE ENROLLING, students should be able to solve programming problems using step-wise development of Java algorithms. Using the high-level programming language, students should be able to plan, create, test and run their own programs using proper syntax, code and

logic. This course is intended for students majoring in Business or Computer Information Science or those desiring-to increase their programming skills. (CSU, UC, AVC)

CIS 177 INTRODUCTION TO PYTHON PROGRAMMING
formally CIS 250
3 units
4 hours weekly
Prerequisite: *Completion of CIS 101.*
This course is designed to give the student an introduction to the Python object-oriented programming language. Students will learn the basic elements of the Python language, and a disciplined approach to program development using Object-Oriented programming techniques for readability, maintainability, and rapid application development. Problem solving is accomplished through a methodical development of algorithms and the mechanics of running, testing, and debugging programs. Students will plan, create, test, and run their own programs to solve typical business problems. (Engineering and Science majors consult counselors.) (CSU, AVC)

CIS 199 *OCCUPATIONAL WORK EXPERIENCE
1–8 units
hours vary
Prerequisite: *To participate in work experience, students must have a job or internship which is either paid or voluntary and have the approval of the supervisor and instructor supervising work experience in the specific subject area. PRIOR TO ENROLLING, students must attend a scheduled orientation or meet individually with the supervising instructor for an individual orientation.*
Occupational Work Experience Education is supervised employment designed to provide students a realistic learning experience through work. The ultimate goal is to teach students those skills and attitudes that will equip them to function and adapt as an employee in a variety of situations and jobs. Occupational Work Experience Education is supervised employment extending classroom-based occupational learning at an on-the-job learning station related to the students' educational major or occupational goal. Credit may be accrued at the rate of one to eight units per semester. For the satisfactory completion of all types of Cooperative Work Experience Education (WE 197 and WE 199), students may earn up to a total of sixteen semester credit hours. (CSU, AVC) **(R3)**