

Area: Business & Computer Science  
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Degree: A.S. - Computer Science  
 A.S. - CIS: Computer Networking Management  
 A.S. - CIS: Computer Programming  
 A.S. - CIS: Database Management  
 A.A. - CIS: Microcomputer Applications  
 A.S. - CIS: PC Support Management  
 A.S. - Information Systems Security  
 A.A.- Technical Communications

Certificates: CIS: Computer Networking Management  
 CIS: Database Management  
 CIS: Microcomputer Applications  
 CIS: PC Support  
 CIS: Computer Programming  
 Computer Information Security Essentials  
 Information Systems Security  
 Network Administration Essentials-Windows  
 Technical Communications  
 Web Developer  
 Web Publishing

## DEGREES AND CERTIFICATES

### Computer Science Degree

This program is a comprehensive exposure to programming languages, algorithms and problem solving in preparation for upper division computer science courses. The Computer Science degree includes substantial course work in mathematics as is required by most university computer science programs.

#### Student Learning Outcomes

*Upon completion of this program, the student will be able to:*

- evaluate various programming language solutions to a proposed problem.
- recommend tools and techniques for each step in the development of a computer program.
- integrate the basic mathematical knowledge that is fundamental to Computer Science into the solutions of proposed problems.
- evaluate the theories and core techniques of computer science using scientific methods.

Requirements for Degree	30-32 Units
[ CISP 300 Algorithm Design/Problem Solving (3) ..... 5 - 7 and CISP 360 Introduction to Structured Programming (4) ] or CISP 480 Honors Introduction to Structured Programming (5)	
CISP 310 Assembly Language Programming for Microcomputers.....4	
CISP 400 Object Oriented Programming with C++ .....4	
CISP 430 Data Structures .....4	
CISP 440 Discrete Structures for Computer Science .....3	
MATH 400 Calculus I .....5	
MATH 401 Calculus II .....5	

**Associate Degree Requirements:** The Computer Science Associate in Science (A.S.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.

### CIS: Computer Networking Management Degree

The degree covers network administration technologies, techniques, and the hardware and software used in today's business/enterprise networking environment. Major topics covered include installation, configuration, and troubleshooting of network operating systems. The degree stresses the knowledge and skills required for the day-to-day operation, business aspects, security and management of computer networks. This degree has three distinct concentrations with specific courses for each concentration track:

- Microsoft Windows networking concentration, focusing on preparing for the Microsoft Certified Systems Engineer (MCSE) and/or the Microsoft Certified Systems Administrator (MCSA) certification.
- Linux/Unix networking concentration, focusing on preparing for the administration of commercial Linux/Unix servers and network environments.
- Cisco router and network administration concentration, which covers all the objectives of the Cisco Certified Network Associate (CCNA) certification exam.

#### Student Learning Outcomes

*Upon completion of this program, the student will be able to:*

- **WINDOWS CONCENTRATION:**
- install, configure, monitor, manage, backup, and customize a Microsoft server.
- design, construct and apply group policies and NTFS file system permissions to secure files and network resources.
- design, construct and troubleshoot a Microsoft Active Directory network using Microsoft workstation and server operating systems.
- **CISCO CONCENTRATION:**
- design, evaluate, construct and implement a routed IP network using industry standard routing protocols and routing equipment, in a wired or wireless configuration.

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**(CIS: Computer Networking Management Degree continued)**

- design, evaluate, construct and implement a multilayer switching network using switching protocols, such as Ethernet, in a wired or wireless configuration.
- design, install and test Wide Area Network (WAN) connectivity solutions.
- design and evaluate basic security and access solutions in a switched or routed LAN or WAN.
- design, evaluate, specify, and install various types of network media.
- **LINUX/UNIX CONCENTRATION:**
- install, configure, monitor, manage, backup, and customize a Linux server.
- design, evaluate and implement and troubleshoot typical Linux server services in the areas of user accounts and security, printing, web server, telnet server, firewall, email server, domain name service, dynamic host configuration protocol, network file system, and Microsoft Windows compatibility.

**Career Opportunities**

The Network Management degree is designed for career/technical students who plan to enter the work force as well as working IT professionals that wish to upgrade their skills. Typical careers a student could expect to pursue include network technical support staff, network administrators, network designers, network systems engineer, network troubleshooters, and information systems security specialists.

**Core Requirements for Degree 14-15 Units**

BUS 310	Business Communications (3)	3 - 4
or ENGWR 300	College Composition (3)	
or ENGWR 480	Honors College Composition (3)	
or ESLW 340	Advanced Composition (4)	
CISA 315	Introduction to Electronic Spreadsheets	2
CISC 320	Operating Systems	1
CISC 323	Linux Operating System	1
CISC 350	Introduction to Data Communications	1
CISC 361	Microcomputer Support Essentials - Preparation for A+ Certification	3
CISS 310	Network Security Fundamentals	3

**CISCO Concentration 33-35 Units**

Core Requirements		14 - 15
CISC 324	Intermediate Linux Operating System	1
[ CISC 110	Networking Technologies - Preparation for N+ Certification (2)	3 - 4
and CISC 111	Intermediate Networking Technologies - Preparation for N+ Certification (2) ]	
or CISC 119	TCP/IP Protocols (3)	
CISC 140	CISCO Networking Academy (CCNA): Networking Fundamentals	3
CISC 141	CISCO Networking Academy (CCNA): Routing Protocols and Concepts	3
CISC 142	CISCO Networking Academy (CCNA): LAN Switching and Wireless	3
CISC 143	CISCO Networking Academy (CCNA): Accessing the Wide Area Network	3
CISS 325	Network Security and Firewalls	3

**LINUX Concentration 32 - 33 Units**

Core Requirements		14 - 15
CISC 324	Intermediate Linux Operating System	1
CISC 110	Networking Technologies - Preparation for N+ Certification	2
CISC 111	Intermediate Networking Technologies - Preparation for N+ Certification	2
CISC 119	TCP/IP Protocols	3
CISC 120	Beginning Network Administration with Linux	3
CISC 121	Network Administration with Linux: LAN Services	2
CISC 122	Network Administration with Linux: Internet Services	2
<b>And a minimum of 3 units from the following:</b>		3
CISP 400	Object Oriented Programming with C++ (4)	
CISS 342	Implementing Linux Operating System Security (3)	

**WINDOWS Concentration 33 - 34 Units**

Core Requirements		14 - 15
CISC 110	Networking Technologies - Preparation for N+ Certification	2
CISC 111	Intermediate Networking Technologies - Preparation for N+ Certification	2
CISC 300	Network Systems Administration	3
CISC 302	Intermediate Network Systems Administration	3
CISC 307	Windows Active Directory Services	3
CISC 308	Internetworking with TCP/IP (3)	3
or CISC 119	TCP/IP Protocols (3)	
<b>And a minimum of 3 units from the following:</b>		3
CISP 370	Beginning Visual Basic (4)	
CISS 341	Implementing Windows Operating System Security (3)	

**Associate Degree Requirements:** The CIS: Computer Networking Management Associate in Science (A.S.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.

**CIS: Computer Networking Management Certificate**

The CIS: Computer Networking Management certificate provides instruction for entry-level and IT professionals aiming for skill enhancement on the specific knowledge and skills required to master one of three industry standard network technologies:

- Microsoft Windows networking concentration, focusing on preparing for the Microsoft Certified Systems Engineer (MCSE) and/or the Microsoft Certified Systems Administrator (MCSA) certification.
- Linux/Unix networking concentration, focusing on preparing for the administration of commercial Linux/Unix servers and network environments.
- Cisco router and network administration concentration, which covers all the objectives of the Cisco Certified Network Associate (CCNA) certification exam.

**Student Learning Outcomes**

*Upon completion of this program, the student will be able to:*

- demonstrate competency in basic Microsoft Windows and Linux operating system terminology, command line interface commands, account management, and file management and storage.
- define networking terminology, protocols, industry standard models, and best practices for configuring network operating system services.
- configure and implement basic data security methods for protecting servers, workstations and networks from unauthorized access.

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**(CIS: Computer Networking Management Certificate continued)**

- evaluate and demonstrate basic procedures for troubleshooting and replacing field replaceable components in microcomputers.
- implement, evaluate and troubleshoot a transmission control protocol/internet protocol (TCP/IP) addressing scheme.
- define, implement, evaluate and troubleshoot the most common utilities and protocols of the TCP/IP suite.

**CISCO CONCENTRATION:**

- design, evaluate, construct and implement a routed network using TCP/IP and industry standard routing protocols and state of the technology routing equipment, in a wired or wireless configuration.
- design, evaluate, construct and implement a multilayer switching network using switching protocols, such as Ethernet, in a wired or wireless configuration.
- design, install and test Wide Area Network (WAN) connectivity solutions.
- design and evaluate basic security and access solutions in a switched or routed LAN or WAN.
- evaluate, specify, and install various types of network media.

**LINUX/UNIX CONCENTRATION:**

- install, configure, monitor, manage, backup, and customize a Linux server.
- design, evaluate and implement and troubleshoot typical Linux server services in the areas of user accounts and security, printing, web server, telnet server, firewall, email server, domain name service, dynamic host configuration protocol, network file system, and Microsoft Windows compatibility.

**WINDOWS CONCENTRATION:**

- install, configure, monitor, manage, backup, and customize a Microsoft Windows server.
- design, construct and apply group policies and NTFS file system permissions to secure files and network resources.
- design, construct and troubleshoot a Microsoft Active Directory network using Microsoft workstation and server operating systems.

**Core Requirements for Certificate 8 Units**

CISC 323	Linux Operating System .....	1
CISC 350	Introduction to Data Communications .....	1
CISC 361	Microcomputer Support Essentials - Preparation for A+ Certification.....	3
CISS 310	Network Security Fundamentals .....	3

**CISCO Concentration 21 Units**

Core Requirements .....	8	
CISC 324	Intermediate Linux Operating System .....	1
CISN 140	CISCO Networking Academy (CCNA): Networking Fundamentals .....	3
CISN 141	CISCO Networking Academy (CCNA): Routing Protocols and Concepts .....	3
CISN 142	CISCO Networking Academy (CCNA): LAN Switching and Wireless .....	3
CISN 143	CISCO Networking Academy (CCNA): Accessing the Wide Area Network .....	3

**LINUX Concentration 23 Units**

Core Requirements .....	8	
CISC 324	Intermediate Linux Operating System .....	1
CISN 110	Networking Technologies - Preparation for N+ Certification....	2
CISN 111	Intermediate Networking Technologies - Preparation for N+ Certification .....	2

CISN 119	TCP/IP Protocols .....	3
CISN 120	Beginning Network Administration with Linux .....	3
CISN 121	Network Administration with Linux: LAN Services .....	2
CISN 122	Network Administration with Linux: Internet Services ....	2

**WINDOWS Concentration 24 Units**

Core Requirements .....	8	
CISN 110	Networking Technologies - Preparation for N+ Certification ...	2
CISN 111	Intermediate Networking Technologies - Preparation for N+ Certification .....	2
CISN 300	Network Systems Administration .....	3
CISN 302	Intermediate Network Systems Administration .....	3
CISN 307	Windows Active Directory Services .....	3
CISN 308	Internetworking with TCP/IP (3) .....	3
or CISN 119	TCP/IP Protocols (3)	

**CIS: Computer Programming Degree**

This degree includes general topics in the field of computer programming as well as focused topics related to one commonly used programming language. General topics include the use of an operating system, and the translation of a problem statement into a generic program solution. Programming language-specific topics include syntax, program structuring, language constructs and proper programming methods.

**Student Learning Outcomes**

*Upon completion of this program, the student will be able to:*

- describe how programming relates to the development of an information system.
- develop programs using the top-down method.
- apply structured programming techniques.
- translate a detailed design document into a computer programming language solution.
- verify the syntactic correctness of a program.
- verify the logical correctness of a program.
- analyze the behavior of a program and locate defects.

**Career Opportunities**

Upon completion of the computer programming degree, a student has the minimum qualifications as an entry-level programmer/developer.

**Core Requirements for Degree 6 Units**

CISC 310	Introduction to Computer Information Science .....	3
CISP 350	Database Programming .....	3

**C++ Concentration 19-21 Units**

Core Requirements .....	6	
[ CISP 300	Algorithm Design/Problem Solving (3) .....	5 - 7
and CISP 360	Introduction to Structured Programming (4) ]	
or CISP 480	Honors Introduction to Structured Programming (5)	
CISP 400	Object Oriented Programming with C++ .....	4
CISP 430	Data Structures .....	4

**Cobol Concentration 16 Units**

Core Requirements .....	6	
CISA 322	Design and Development of Desktop Database Applications.....	3
CISP 300	Algorithm Design/Problem Solving .....	3
CISP 320	COBOL Programming .....	4

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**(CIS: Computer Programming Degree continued)**

**Java Concentration 15-17 Units**

Core Requirements .....	6
[ CISP 300 Algorithm Design/Problem Solving (3) .....	5 - 7
and CISP 360 Introduction to Structured Programming (4) ]	
or CISP 480 Honors Introduction to Structured Programming (5)	
CISP 401 Object Oriented Programming with Java .....	4

**Visual Basic Concentration 20 Units**

Core Requirements .....	6
CISA 322 Design and Development of Desktop Database Applications.....	3
CISP 300 Algorithm Design/Problem Solving .....	3
CISP 370 Beginning Visual Basic .....	4
CISP 371 Intermediate Visual Basic .....	4

**Associate Degree Requirements:** The CIS: Computer Programming Associate in Science (A.S.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.

**CIS: Computer Programming Certificate**

This certificate includes general topics in the field of computer programming as well as focused topics related to one commonly used programming language. General topics include the use of an operating system, and the translation of a problem statement into a generic program solution. Programming language-specific topics include syntax, program structuring, language constructs and proper programming methods.

**Student Learning Outcomes**

*Upon completion of this program, the student will be able to:*

- apply techniques of structured programming.
- design programs using object-oriented methodology.
- analyze problems related to computer programming.
- design algorithms to solve problems related to programming.
- develop specifications of an information system based on requirements.
- compare alternative implementations of programmed solutions using a variety of criteria.
- describe how programming fits in the context of the development of an information system.

**Career Opportunities**

This programming certificate enables people who are already in the information technology or computer fields to develop or supplement their skills with the experience of an additional programming language.

**Core Requirements for Certificate 4 Units**

CISC 310 Introduction to Computer Information Science.....	3
CISC 320 Operating Systems.....	1

**C++ Concentration Requirements 17-19 Units**

Core Requirements .....	4
[ CISP 300 Algorithm Design/Problem Solving (3) .....	5 - 7
and CISP 360 Introduction to Structured Programming (4) ]	
or CISP 480 Honors Introduction to Structured Programming (5)	
CISP 400 Object Oriented Programming with C++ .....	4
CISP 430 Data Structures .....	4

**Java Concentration Requirements 16-18 Units**

Core Requirements .....	4
[ CISP 300 Algorithm Design/Problem Solving (3) .....	5 - 7
and CISP 360 Introduction to Structured Programming (4) ]	
or CISP 480 Honors Introduction to Structured Programming (5)	
CISP 350 Database Programming .....	3
CISP 401 Object Oriented Programming with Java.....	4

**Visual Basic Concentration Requirements 21 Units**

Core Requirements .....	4
CISA 322 Design and Development of Desktop Database Applications.....	3
CISP 300 Algorithm Design/Problem Solving .....	3
CISP 350 Database Programming .....	3
CISP 370 Beginning Visual Basic .....	4
CISP 371 Intermediate Visual Basic .....	4

**CIS: Database Management Degree**

The CIS: Database Management degree focuses on relational database technology used in the business environment. The emphasis is on selecting the appropriate system platform for database deployment. Course work includes database system design and programming for desktop, enterprise and Internet platforms, structure query language (SQL) programming, introductory principles of modular programming, system design and problem solving, desktop operating systems, electronic spreadsheets and a variety of introductory business courses.

**Student Learning Outcomes**

*Upon completion of this program, the student will be able to:*

- describe relational database technologies for desktop, enterprise and Internet platforms.
- explain and discuss database theory and principles.
- employ relational database technologies for either desktop, enterprise and Internet platforms to solve common business problems using standard database principles and practices.
- assess and document information system requirements.
- employ modular programming concepts in program development.
- design and code elementary programs encountered in business and government.
- identify interactive web publishing situations requiring database solutions.
- create interactive web database.
- analyze practical business problems and utilize critical thinking in the determination of alternative solutions.
- apply communication theory, effective writing techniques, and interpersonal communication skills to business situations.
- analyze and explain the nature and purpose of accounting and its function in business.

**Requirements for Degree 39-40 Units**

ACCT 101 Fundamentals of College Accounting (3) .....	3 - 4
or ACCT 301 Financial Accounting (4)	
BUS 110 Business Economics (3).....	3
or ECON 302 Principles of Macroeconomics (3)	
BUS 300 Introduction to Business .....	3
BUS 310 Business Communications (3) .....	3
or ENGWR 300 College Composition (3)	
CISA 315 Introduction to Electronic Spreadsheets.....	2
CISA 320 Introduction to Database Management .....	1
CISA 322 Design and Development of Desktop Database Applications.....	3

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**(CIS: Database Management Degree continued)**

CISC 310	Introduction to Computer Information Science .....	3
CISC 320	Operating Systems .....	1
CISP 300	Algorithm Design/Problem Solving .....	3
CISP 350	Database Programming .....	3
CISP 370	Beginning Visual Basic .....	4
CISW 300	Web Publishing .....	3
CISW 410	Middleware Web Scripting .....	4

**Associate Degree Requirements:** The CIS: Database Management Associate in Science (A.S.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.

**CIS: Database Management Certificate**

The CIS: Database Management certificate involves the study of relational database technology used in the business environment. The emphasis is on selecting the appropriate system platform for database deployment. Course work includes database system design and programming for desktop, enterprise and Internet platforms, structure query language (SQL) programming, introductory principles of modular programming, system design and problem solving, desktop operating systems, and electronic spreadsheets.

**Student Learning Outcomes**

*Upon completion of this program, the student will be able to:*

- describe relational database technologies for desktop, enterprise and Internet platforms.
- explain and discuss database theory and principles.
- employ relational database technologies for either desktop, enterprise and Internet platforms to solve common business problems using standard database principles and practices.
- assess and document information system requirements.
- employ modular programming concepts in program development.
- design and code elementary programs encountered in business and government.
- identify interactive web publishing situations requiring database solutions.
- create interactive web database applications.

<b>Requirements for Certificate</b>	<b>24 Units</b>	
CISA 315	Introduction to Electronic Spreadsheets .....	2
CISA 320	Introduction to Database Management .....	1
CISA 322	Design and Development of Desktop Database Applications .....	3
CISC 320	Operating Systems .....	1
CISP 300	Algorithm Design/Problem Solving .....	3
CISP 350	Database Programming .....	3
CISP 370	Beginning Visual Basic .....	4
CISW 300	Web Publishing .....	3
CISW 410	Middleware Web Scripting .....	4

**CIS: Microcomputer Applications Degree**

This degree focuses on the use of the microcomputer and current, commonly used software to solve problems in a business environment. Course work includes microcomputer applications in database management, desktop publishing, electronic spreadsheets, presentation graphics, operating systems, word processing, and at least one programming language.

**Student Learning Outcomes**

*Upon completion of this program, the student will be able to:*

- design and manage database tables, queries and forms.
- produce reports for use in a typical business environment.
- evaluate the basic computing needs of a business by developing associated documentation and presentations.
- create spreadsheet formulas and manipulate business data.
- compose and format typical business communications documents according to industry standards.
- combine data from different software applications into one document.
- compose simple computer programs using basic logic.
- apply file management techniques in organizing computer data.

<b>Requirements for Degree</b>	<b>37 Units</b>	
CISA 126	Outlook: Basics (1) .....	1
or BUSTEC 126	Outlook: Basics (1)	
CISA 127	Outlook: Tools (1) .....	1
or BUSTEC 127	Outlook: Tools (1)	
CISA 305	Beginning Word Processing .....	2
CISA 306	Intermediate Word Processing .....	2
CISA 315	Introduction to Electronic Spreadsheets .....	2
CISA 316	Intermediate Electronic Spreadsheets .....	2
CISA 320	Introduction to Database Management .....	1
CISA 322	Design and Development of Desktop Database Applications .....	3
CISA 330	Desktop Publishing .....	2
CISA 340	Presentation Graphics .....	2
CISC 306	Introduction to Web Page Creation .....	1
CISC 310	Introduction to Computer Information Science .....	3
CISC 320	Operating Systems .....	1
CISC 323	Linux Operating System .....	1
CISP 370	Beginning Visual Basic .....	4
<b>And a minimum of 1 unit from the following:</b>		1
BUSTEC 300	Beginning Keyboarding/Applications (1 - 3)	
<b>And a minimum of 5 units from the following:</b>		5
ACCT 341	Computerized Accounting (2)	
BUSTEC 313	Presentations for the Business Professional (2)	
CISA 141	Capturing and Publishing Digital Media (2)	
CISA 160	Project Management Techniques and Software (3)	
CISA 171	Introduction to Adobe Acrobat (1)	
CISC 350	Introduction to Data Communications (1)	
CISC 351	Introduction to Local Area Networks (1)	
CISS 301	Ethical Hacking (2)	
CISW 300	Web Publishing (3)	
CISW 307	Introduction to Web Development and Design (3)	
<b>And a minimum of 3 units from the following:</b>		3
ACCT 343	Computer Spreadsheet Applications for Accounting (2)	
CISA 331	Intermediate Desktop Publishing (2)	
CISC 305	Introduction to the Internet (1)	
CISP 350	Database Programming (3)	
CISP 360	Introduction to Structured Programming (4)	
CISP 371	Intermediate Visual Basic (4)	
CISP 480	Honors Introduction to Structured Programming (5)	
CISS 300	Introduction to Information Systems Security (1)	
CISW 370	Designing Accessible Web Sites (1)	

**Associate Degree Requirements:** The CIS: Microcomputer Applications Associate in Arts (A.A.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.

### CIS: Microcomputer Applications Certificate

This certificate involves the use of the microcomputer and current, commonly used software to solve problems in a business environment. Course work includes microcomputer applications in database management, desktop publishing, electronic spreadsheets, presentation graphics, operating systems, and word processing.

#### Student Learning Outcomes

*Upon completion of this program, the student will be able to:*

- design and manage database tables, queries and forms.
- produce reports for use in a typical business environment.
- evaluate the basic computing needs of a business by developing associated documentation and presentations.
- create spreadsheet formulas and manipulate business data.
- compose and format typical business communications documents according to industry standards.
- combine data from different software applications into one document.
- apply file management techniques in organizing computer data.

#### Requirements for Certificate 21 Units

CISA 305	Beginning Word Processing .....	2
CISA 315	Introduction to Electronic Spreadsheets .....	2
CISA 320	Introduction to Database Management .....	1
CISA 330	Desktop Publishing.....	2
CISA 340	Presentation Graphics.....	2
CISC 305	Introduction to the Internet.....	1
CISC 310	Introduction to Computer Information Science.....	3
CISC 320	Operating Systems.....	1 <sup>1</sup>
CISC 350	Introduction to Data Communications .....	1
<b>A minimum of 6 units from the following:</b> ..... 6		
CISA 306	Intermediate Word Processing (2)	
CISA 316	Intermediate Electronic Spreadsheets (2)	
CISA 322	Design and Development of Desktop Database Applications (3)	
CISC 306	Introduction to Web Page Creation (1)	
CISC 323	Linux Operating System (1)	

<sup>1</sup>Taken on the Windows operating system.

### CIS: PC Support Management Degree

The CIS: PC Support Management degree covers the use and maintenance of a microcomputer’s hardware, software and network connections in today’s business environment. Course work includes learning basic computer skills in configuration, use, and troubleshooting major hardware components, different operating systems, and applications in a standalone and network environment. Additionally, the degree introduces basic business and project management skills. This program covers all the objectives of the Computing Technology Industry Association (CompTIA) A+ certification exam.

#### Student Learning Outcomes

*Upon completion of this program, the student will be able to:*

- identify the names, purpose, and characteristics of system components.
- evaluate and demonstrate basic procedures for adding and removing field replaceable components for desktop computers.
- analyze and demonstrate the installation and troubleshooting of current operating systems, applications and basic networking technology used in industry.

- formulate back-up, recovery, and system protection plans for the operating system in a network environment.
- develop proficiency in customer service skills to effectively diagnose and communicate microcomputer software and hardware-related problems and solutions at the user level.
- demonstrate the techniques to manage a project, control costs, and schedule resources employing management software.
- recognize within the information technology (IT) field the diverse business environment associated with support issues.
- configure and implement data security methods for protecting computers and networks from unauthorized access.

#### Requirements for Degree 31 Units

BUS 300	Introduction to Business .....	3
BUS 310	Business Communications.....	3
CISA 160	Project Management Techniques and Software .....	3
CISC 310	Introduction to Computer Information Science.....	3
CISC 320	Operating Systems.....	1 <sup>1</sup>
CISC 350	Introduction to Data Communications .....	1
CISC 351	Introduction to Local Area Networks .....	1
CISC 361	Microcomputer Support Essentials - Preparation for A+ Certification.....	3
CISC 362	Microcomputer and Applications Support .....	2
CISC 363	Microcomputer Support Technical - Preparation for A+ Certification.....	3
CISS 301	Ethical Hacking .....	2

#### And a minimum of 6 units from the following:.....6

CISA 126	Outlook: Basics (1)	
or [ BUSTEC 126 Outlook: Basics (1)		
and CISA 127 Outlook: Tools (1) ]		
or BUSTEC 127 Outlook: Tools (1)		
CISA 305	Beginning Word Processing (2)	
CISA 315	Introduction to Electronic Spreadsheets (2)	
CISA 320	Introduction to Database Management (1)	
CISA 340	Presentation Graphics (2)	
CISC 306	Introduction to Web Page Creation (1)	
CISC 323	Linux Operating System (1)	

<sup>1</sup>Taken on the Windows operating system.

**Associate Degree Requirements:** The CIS: PC Support Management Associate in Science (A.S.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.

### CIS: PC Support Certificate

The CIS: PC Support certificate covers the use and maintenance of a microcomputer’s hardware, software and network connections in today’s business environment. Course work includes basic computer skills in configuration, use, and troubleshooting major hardware components, different operating systems, and applications in a standalone and network environment. This program covers all the objectives of the Computer Technology Industry Associates (CompTIA) A+ certification exam.

#### Student Learning Outcomes

*Upon completion of this program, the student will be able to:*

- identify and recognize the names, purpose, and characteristics of system components by sight or definition.
- evaluate and demonstrate basic procedures for adding and removing field replaceable components for desktop computers.

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**(CIS: PC Support Certificate continued)**

- analyze and demonstrate understanding for installation and troubleshooting current operating systems, applications and basic networking technology used in industry.
- formulate back-up, recovery, and system protection plans for the operating system in a network environment.
- develop proficiency in customer service skills to effectively diagnose and communicate microcomputer software and hardware-related problems and solutions at the user level.
- configure and implement data security methods for protecting computers and networks from unauthorized access.

Requirements for Certificate	25 Units
BUS 310 Business Communications.....	3
CISC 310 Introduction to Computer Information Science.....	3
CISC 320 Operating Systems.....	1 <sup>1</sup>
CISC 350 Introduction to Data Communications.....	1
CISC 351 Introduction to Local Area Networks .....	1
CISC 361 Microcomputer Support Essentials - Preparation for A+ Certification.....	3
CISC 362 Microcomputer and Applications Support .....	2
CISC 363 Microcomputer Support Technical - Preparation for A+ Certification.....	3
CISS 301 Ethical Hacking .....	2
<b>And a minimum of 6 units from the following:</b> .....	6
CISA 126 Outlook: Basics (1) or [ BUSTEC 126 Outlook: Basics (1) and CISA 127 Outlook: Tools (1) ] or BUSTEC 127 Outlook: Tools (1)	
CISA 305 Beginning Word Processing (2)	
CISA 315 Introduction to Electronic Spreadsheets (2)	
CISA 320 Introduction to Database Management (1)	
CISA 340 Presentation Graphics (2)	
CISC 306 Introduction to Web Page Creation (1)	
CISC 323 Linux Operating System (1)	

<sup>1</sup>Taken on the Windows operating system.

### Computer Information Security Essentials Certificate

This program provides the basic information and skills necessary for network administrators to implement security from internal and external threats to a network. It also provides preparation for the Computing Technology Industry Association (CompTIA) Security+ exam.

#### Student Learning Outcomes

*Upon completion of this program, the student will be able to:*

- construct and apply secure group policy settings at the Organizational Unit (OU), Domain, Site or local machine level.
- explain and configure a network firewall to provide optimum security from external threats and exploits.
- construct Windows NTFS file system permissions and shares to allow only the minimum levels of access needed by users to access network resources.
- compare and contrast the benefits of firewalls vs. intrusion detection devices and software.

Requirements for Certificate	12 Units
CISS 310 Network Security Fundamentals.....	3
CISS 325 Network Security and Firewalls .....	3
CISS 341 Implementing Windows Operating System Security (3)....	3
or CISS 342 Implementing Linux Operating System Security (3)	
CISS 360 Computer Forensics and Investigation .....	3

### Information Systems Security Degree

This program provides the information and skills necessary for network administration professionals to implement security from internal and external threats for an enterprise network. It covers client and server security on different operating systems, disaster recovery planning, and forensics. This program also provides preparation for several computer information security certification exams, including the Computer Technology Industry Association (CompTIA) Security+ exam, Microsoft Certified Systems Engineer (MCSE) exams and several of the Certified Information Systems Security Professional (CISSP) certification exams.

#### Student Learning Outcomes

*Upon completion of this program, the student will be able to:*

- define best practices for configuring network operating system services to provide optimum security.
- compare and contrast the benefits of firewalls vs. intrusion detection devices and software.
- explain and configure a network firewall to provide optimum security from external threats and exploits.
- analyze organizational needs and implement internal security policies for the enterprise.
- evaluate and implement the required security programs and policies to protect the enterprise against viruses, Trojans, worms, rootkits, and spyware.
- assess and configure secure data transfer protocols for internal and external needs, including Windows IP Security (IPSec) and the Virtual Private Network (VPN) tunneling protocols.
- apply Windows group policy to secure the internal network and shared resources.
- construct NTFS file system permissions and shares to allow only the minimum levels of access needed by users to use network resources.
- prioritize and establish a disaster recovery plan for the enterprise.
- construct and apply group policies and NTFS file system permissions to secure files and network resources.

Requirements for Degree	33 Units
BUS 310 Business Communications .....	3
CISC 323 Linux Operating System .....	1
CISC 324 Intermediate Linux Operating System .....	1
CISN 110 Networking Technologies - Preparation for N+ Certification .....	2
CISN 111 Intermediate Networking Technologies - Preparation for N+ Certification .....	2
CISN 300 Network Systems Administration .....	3
CISN 302 Intermediate Network Systems Administration .....	3
CISN 307 Windows Active Directory Services .....	3
CISS 310 Network Security Fundamentals .....	3
CISS 325 Network Security and Firewalls .....	3
CISS 341 Implementing Windows Operating System Security (3) ...	3
or CISS 342 Implementing Linux Operating System Security (3)	
CISS 350 Disaster Recovery .....	3
CISS 360 Computer Forensics and Investigation .....	3

**Associate Degree Requirements:** The Information Systems Security Associate in Science (A.S.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.

## Information Systems Security Certificate

This program provides the information and skills necessary for network administrators to implement security to protect against internal and external threats to an enterprise network, and covers client and server security on different operating systems. This program provides preparation for several certification exams, including the Computer Technology Industry Association (CompTIA) Security+ exam, Microsoft Certified Systems Engineer (MCSE) exams and some of the Certified Information Systems Security Professional (CISSP) certification exams.

### Student Learning Outcomes

*Upon completion of this program, the student will be able to:*

- define best practices for configuring network operating system services to provide optimum security.
- construct and apply secure group policy settings at the Organizational Unit (OU), domain, site or local machine level.
- explain and configure a network firewall to provide optimum security from external threats and exploits.
- analyze organizational needs and implement internal security policies for the enterprise.
- evaluate and implement the required security programs and policies to protect the enterprise against viruses, Trojans, worms, rootkits, and spyware.
- assess and configure secure Internet Protocol (IP) data transfer protocols for internal and external needs, including Internet Protocol Security (IPSec) and the Virtual Private Networking (VPN) tunneling protocols.
- prioritize and establish a disaster recovery plan for the enterprise.
- compare and contrast the benefits of firewalls vs. intrusion detection devices and software.

### Requirements for Certificate 23 Units

CISC 323	Linux Operating System .....	1
CISC 324	Intermediate Linux Operating System .....	1
CISN 300	Network Systems Administration .....	3
CISN 302	Intermediate Network Systems Administration .....	3
CISN 307	Windows Active Directory Services .....	3
CISS 310	Network Security Fundamentals .....	3
CISS 325	Network Security and Firewalls .....	3
CISS 341	Implementing Windows Operating System Security (3) .....	3
or CISS 342	Implementing Linux Operating System Security (3) .....	3
<b>And a minimum of 3 units from the following:</b> .....		
CISN 110	Networking Technologies - Preparation for N+ Certification (2) .....	
CISN 111	Intermediate Networking Technologies - Preparation for N+ Certification (2) .....	
CISN 140	CISCO Networking Academy (CCNA)tm: Networking Fundamentals (3) .....	
CISS 301	Ethical Hacking (2) .....	

## Network Administration Essentials - Windows Certificate

This program provides the information and skills necessary for network administration professionals to administer a Windows Active Directory domain-based enterprise network. It also provides preparation for several Microsoft Certified Systems Engineer (MCSE) certification exams.

## Student Learning Outcomes

*Upon completion of this program, the student will be able to:*

- define best practices for configuring network operating system services.
- construct and apply group policy settings at the Organizational Unit (OU), domain, site or local machine level.
- apply Windows group policy and NTFS file system permissions to secure the workstations, the internal network and shared resources.

### Requirements for Certificate 12 Units

CISN 300	Network Systems Administration .....	3
CISN 302	Intermediate Network Systems Administration .....	3
CISN 307	Windows Active Directory Services .....	3
CISN 308	Internetworking with TCP/IP .....	3

## Web Developer Certificate

This certificate offers a program of study for students seeking jobs in the fields of web-based programming and web application development. It provides opportunities to develop the necessary skills and aptitudes for creating and maintaining interactive, database-driven web applications.

### Student Learning Outcomes

*Upon completion of this program, the student will be able to:*

- analyze how an interactive web application is developed using static web pages, forms, client-side scripts, server-side scripts, subroutine or class libraries, and relational databases.
- evaluate informational or business needs that could benefit from a web application and design an appropriate web application that address those needs.
- create and debug scripts in at least one client-side and at least one server-side scripting language.
- construct embedded Structured Query Language (SQL) commands to access, display, modify, add, and delete information via a web application.
- integrate graphic principles and programming functionality with a web application.
- demonstrate basic use of both Linux and Microsoft Windows Operating System command-line interface.
- devise or choose efficient algorithms for the solution of problems using the control structures of structured programming.
- design software using object-oriented methods to develop event driven programs for both applets and applications.

### Requirements for Certificate 24 - 27 Units

CISC 320	Operating Systems .....	1
CISC 323	Linux Operating System .....	1
CISC 324	Intermediate Linux Operating System .....	1
CISP 300	Algorithm Design/Problem Solving (3) .....	3 - 5
or CISP 360	Introduction to Structured Programming (4) .....	
or CISP 370	Beginning Visual Basic (4) .....	
or CISP 401	Object Oriented Programming with Java (4) .....	
or CISP 480	Honors Introduction to Structured Programming (5) .....	
CISP 350	Database Programming .....	3
CISW 300	Web Publishing .....	3
CISW 310	Advanced Web Publishing (4) .....	3 - 4
or CISW 360	Beginning Flash (3) .....	
or CISW 400	Client-side Web Scripting (4) .....	
CISW 370	Designing Accessible Web Sites .....	1

(continued on next page)

**(Web Developer Certificate continued)**

CISW 410	Middleware Web Scripting (4)	.....4
or CISW 420	Server-side Web Scripting (4)	
<b>A minimum of 4 units from the following:</b>		<b>.....4</b>
CISW 304	Cascading Style Sheets (2)	
CISW 350	Imaging for the Web (1)	
CISW 355	Web Imaging Projects (2)	
CISW 405	ActionScript for Flash (3)	
CISW 410	Middleware Web Scripting (4)	
CISW 411	Middleware Scripting Database Web Applications (2)	
CISW 442	Web Publishing with XML (3)	

**Web Publishing Certificate**

This certificate offers a program of study for students seeking jobs in the fields of web publishing, design, and development. It provides opportunities to develop the necessary skills for creating and maintaining large web sites for industry, government, and nonprofit agencies. General development of web publishing skills, including a thorough grounding in the HyperText Markup Language (HTML), Internet protocols, and web standards, is emphasized.

**Student Learning Outcomes**

*Upon completion of this program, the student will be able to:*

- research the differences in goals, techniques, and costs between traditional print publishing and web publishing.
- create a functional web site using HyperText Markup Language (HTML) and Cascading Style Sheets (CSS).
- incorporate dynamic and interactive features into a web site using client-side or server-side scripting.
- evaluate web accessibility issues when designing web sites.
- integrate graphic principles and programming functionality with a web application.
- demonstrate basic use of both Linux and Microsoft Windows Operating System commands.

**Requirements for Certificate 19 Units**

CISC 310	Introduction to Computer Information Science.....	3
CISC 320	Operating Systems.....	1
CISC 323	Linux Operating System .....	1
CISW 300	Web Publishing .....	3
CISW 304	Cascading Style Sheets .....	2
CISW 350	Imaging for the Web.....	1
CISW 370	Designing Accessible Web Sites.....	1
<b>A minimum of 4 units from the following:</b>		<b>4</b>
CISW 310	Advanced Web Publishing (4)	
CISW 400	Client-side Web Scripting (4)	
CISW 410	Middleware Web Scripting (4)	
CISW 420	Server-side Web Scripting (4)	
<b>A minimum of 3 units from the following:</b>		<b>3</b>
ARTNM 402	Intermediate Web Design (3)	
CISW 321	Web Site Development using Dreamweaver (3)	
CISW 355	Web Imaging Projects (2)	
CISW 360	Beginning Flash (3)	
CISW 442	Web Publishing with XML (3)	

**Technical Communications Degree**

The Technical Communications degree program is an interdisciplinary course of study designed to prepare students for employment as professional writers and communicators in a variety of media intended to instruct and inform audiences. The degree program includes substantial course work in writing, information design, editing, page design, online help development, web site creation, and the use of industry standard applications.

**Career Opportunities**

Technical communicators may be employed in a variety of occupations in government, scientific firms, nonprofits, natural resources, finance, education, and high tech.

**Student Learning Outcomes**

*Upon completion of this program, the student will be able to:*

- analyze audience information needs and propose solutions to aid the audience.
- design technical communication solutions for a variety of industry and government purposes.
- design and create web sites and help systems with effective visual design, navigation, and written content.
- design and publish printed pages with effective design, organization, content, and indexing.
- compose professional prose for a variety of audiences with a variety of purposes.
- compose and edit professional documents in grammatically correct, concise English.
- create and use style templates in a variety of industry standard software.

**Requirements for Degree 32 Units**

CISA 305	Beginning Word Processing .....	2
CISW 300	Web Publishing .....	3
ENGWR 342	Introduction to Technical/Professional Communication.....	3
ENGWR 344	Technical/Professional Communication: Writing Reports ...	1.5
ENGWR 348	Technical/Professional Communication: Plain English...	1.5
ENGWR 350	Technical/Professional Communication: Proposal Writing.....	1.5
ENGWR 352	Technical/Professional Communication: Writing Technical Manuals .....	3
ENGWR 353	Technical/Professional Communication: Developing Help Systems.....	1.5
JOUR 300	Newswriting and Reporting.....	3
<b>And a minimum of 12 units from the following:</b>		<b>12</b>
ARTNM 328	Digital Photo Imagery - PhotoShop Basics (3)	
ARTNM 330	Intermediate Digital Photo Imagery (3)	
ARTNM 352	Design for Publication (3)	
or [ CISA 330	Desktop Publishing (2)	
and CISA 331	Intermediate Desktop Publishing (2) ]	
ARTNM 401	Introduction to Web Development and Design (3)	
or CISW 307	Introduction to Web Development and Design (3)	
ARTNM 402	Intermediate Web Design (3)	
ARTNM 404	Interactive Multimedia Basics (3)	
CISW 310	Advanced Web Publishing (4)	

**Associate Degree Requirements:** The Technical Communications Associate in Arts (A.A.) Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See ARC graduation requirements.

## Technical Communications Certificate

The Technical Communications certificate offers an interdisciplinary program of courses in writing, Art/New Media, and Computer Information Systems to prepare students for a variety of technical writing and professional communication careers. The certificate includes the theory, writing skills, design background, and computer applications knowledge needed for jobs in technical communication.

### Career Opportunities

Technical communicators find employment in medical, scientific, high tech, business, university, and government settings. They may write white papers, tutorials, reference and procedure manuals, help systems, user assistance video scripts, grants and proposals, and more.

### Student Learning Outcomes

Upon completion of this program, the student will be able to:

- analyze audience information needs.
- compose concise, clearly written professional documents organized with the audiences' needs in mind.
- design printed pages and online screens that communicate organizations' values, enhance readability, and are easy to use.
- demonstrate basic skills in the use of key word processing, page design, help development, and web design applications.
- evaluate organizations' communication goals with technical writing ethics in mind.

### Requirements for Certificate 21.5-22.5 Units

ARTNM 352	Design for Publication (3) .....	3- 4
or [ CISA 330	Desktop Publishing (2)	
and CISA 331	Intermediate Desktop Publishing (2) ]	
CISA 305	Beginning Word Processing.....	2
CISW 300	Web Publishing .....	3
ENGWR 342	Introduction to Technical/Professional Communication.....	3
ENGWR 352	Technical/Professional Communication: Writing Technical Manuals .....	3
ENGWR 353	Technical/Professional Communication: Developing Help Systems.....	1.5
<b>And a minimum of 6 units from the following:</b> .....		6
ARTNM 328	Digital Photo Imagery - PhotoShop Basics (3)	
ARTNM 330	Intermediate Digital Photo Imagery (3)	
ARTNM 401	Introduction to Web Development and Design (3)	
ARTNM 402	Intermediate Web Design (3)	
ARTNM 404	Interactive Multimedia Basics (3)	
CISW 307	Introduction to Web Development and Design (3)	
CISW 310	Advanced Web Publishing (4)	

## Computer Information Science - Apps

### CISA 126 Outlook: Basics 1 Unit

*Same As: BUSTEC 126*  
*Advisory: BUSTEC 300*  
*Hours: 18 hours LEC*

This course introduces desktop communication management for users of Microsoft Outlook. Topics include understanding and navigating the Outlook environment, creating and sending e-mail, managing Outlook contacts, using an electronic calendar, and creating tasks and to-do items. BUSTEC 126/CISA 126 and BUSTEC 127/CISA 127 taken together are considered sufficient preparation to pass the Microsoft Office Specialist certification for the Microsoft Outlook application and the communications portion of the International Computer Driver's License (ICDL) Module 7: Information and Communication. This course is not open to students who have taken BUSTEC 126.

### CISA 127 Outlook: Tools 1 Unit

*Same As: BUSTEC 127*  
*Prerequisite: BUSTEC 126 or CISA 126 with a grade of "C" or better*  
*Advisory: BUSTEC 300*  
*Hours: 18 hours LEC*

This Outlook course presents the communication tools beyond basic e-mail. Topics include working with multiple e-mail accounts, using rules and folders, incorporating advanced calendar and contact features, setting up folder sharing and delegates, and customizing Outlook. In addition, the course covers the integration of Outlook with other applications within the Microsoft Office suite. Additionally, BUSTEC 126/CISA 126 and BUSTEC 127/CISA 127 taken together are considered sufficient preparation to pass the Microsoft Office Specialist certification for the Microsoft Outlook application and the communications portion of the International Computer Driver's License (ICDL) Module 7: Information and Communication. This course is not open to students who have taken BUSTEC 127.

### CISA 141 Capturing and Publishing Digital Media 2 Units

*Hours: 27 hours LEC; 27 hours LAB*

This course is an overview of multimedia publishing software and peripherals used to produce digital media. Topics include the function and features of technology devices such as video camcorders, digital cameras, digital music devices, graphic pads and pens, DVD/CD burners, USB drives, and photo/CD/DVD printers. Multimedia publishing software and devices are examined and discussed for advantages and disadvantages. File and equipment management techniques are presented.

### CISA 160 Project Management Techniques and Software 3 Units

*Same As: MGMT 142*  
*Advisory: ENGWR 102 or 103, and ENGRD 116; OR ESLR 320 and ESLW 320; CISC 300*  
*Hours: 54 hours LEC*

This introductory course covers the responsibilities of a project manager. It includes the knowledge needed to manage a project, control costs, and schedule resources. It also introduces the use of project management software to track project resources, tasks, and milestones. This course is not open to students who have taken MGMT 142.

### CISA 171 Introduction to Adobe Acrobat 1 Unit

*Prerequisite: None*  
*Hours: 9 hours LEC; 27 hours LAB*

This course introduces Adobe Acrobat tools for creating, editing, reading, and printing Portable Document Format (PDF) documents. Topics include software navigation, converting other file types to PDF, and customizing output quality. Additional topics include modifying PDF files, placing documents on-line, adding digital signatures and security, creating presentations, manipulating graphics, and managing eBooks.

### CISA 294 Topics in Computer Information Science - Applications .5-5 Units

*Prerequisite: To be determined with each topic.*  
*Hours: 72 hours LEC; 54 hours LAB*

This is an individualized course developed in cooperation with industry and/or government to meet specialized training needs. The course may be taken twice for credit.

**CISA 305 Beginning Word Processing 2 Units***Advisory: CISC 300**General Education: AA/AS Area II(b)**Course Transferable to CSU**Hours: 27 hours LEC; 27 hours LAB*

This course introduces word processing operations, such as creating, editing, file management techniques, and printing text. Emphasis is on formatting and document production techniques to produce professional business documents used in today's workplace.

The course culminates with the study of intermediate level features such as merge, sort, graphics, macros, style, and templates.

This course may be taken four times on a different software package or version.

**CISA 306 Intermediate Word Processing 2 Units***Prerequisite: CISA 305 with a grade of "C" or better**Course Transferable to CSU**Hours: 27 hours LEC; 27 hours LAB*

This course is a continuation of CISA 305 with an emphasis on applications for business documents and reports. In addition, this course includes desktop publishing techniques using word processing software, newsletter production, macro editing, complex document styles and commands, importing, linking and merging data from other applications into a word processing document. This course may be taken four times for credit on a different software or version.

**CISA 308 Exploring Word Processing and Presentation Software 1 Unit***Course Transferable to CSU**Hours: 18 hours LEC*

The course introduces word processing and presentation software. The basic features and skills of creating, editing and formatting documents, inserting tables and graphics and enhancing word processed documents and presentations are covered.

**CISA 315 Introduction to Electronic Spreadsheets 2 Units***Advisory: CISC 100 or 300 ; CISC 100 and the ability to touch type.**General Education: AA/AS Area II(b)**Course Transferable to CSU**Hours: 27 hours LEC; 27 hours LAB*

This course introduces the use of electronic spreadsheet programs. It includes designing spreadsheets, developing formulas and functions for automatic calculations, developing "what if" models, and producing printed reports and charts. In addition, the course introduces 3-D cell referencing, various advanced look up and financial functions, and data filtering, and querying techniques. The course may be taken four times for credit on a different software package or version.

**CISA 316 Intermediate Electronic Spreadsheets 2 Units***Prerequisite: CISA 315 with a grade of "C" or better**Course Transferable to CSU**Hours: 27 hours LEC; 27 hours LAB*

This course is a continuation of electronic worksheets with emphasis on workbook design and integration, template design, use of complex formulas, and built-in financial, logical, and database functions. It also includes look-up tables, the use of worksheet analysis tools, macros, and data integration. The course may be taken four times for credit on a different software package or version.

**CISA 318 Exploring Spreadsheet Software 1 Unit***Course Transferable to CSU**Hours: 18 hours LEC*

The course introduces spreadsheet software. Topics include navigating a spreadsheet, editing and formatting data, using formulas and functions, inserting and formatting charts and graphics, basic database features, and analyzing data.

**CISA 320 Introduction to Database Management 1 Unit***Advisory: BUSTEC 300 and CISC 300**General Education: AA/AS Area II(b)**Course Transferable to CSU**Hours: 9 hours LEC; 27 hours LAB*

This course introduces the use of database management programs on the microcomputer. It includes designing a database; storing, searching, and updating files; and designing and producing printed reports. It may be taken four times for credit on a different software package or version.

**CISA 322 Design and Development of Desktop Database Applications 3 Units***Prerequisite: CISA 320 with a grade of "C" or better**Course Transferable to CSU**Hours: 36 hours LEC; 54 hours LAB*

This course covers strategies for the design and development of desktop database applications. Topics include database objects, data types, data integrity, relational tables, joins, relationships, domain constraints, complex queries, forms, reports, sharing data with other applications, and data maintenance. It may be taken three times for credit with a different version of the software.

**CISA 330 Desktop Publishing 2 Units***Advisory: BUS 100, BUSTEC 100, and CISC 300**Course Transferable to CSU**Hours: 27 hours LEC; 27 hours LAB*

This course provides an overview of desktop publishing (DTP) and a major desktop publishing application program. It includes page layout skills needed to produce newsletters, brochures, flyers, reports, and marketing material on the computer. Additionally it covers importing graphics and text, using palette menus, layers, master pages, and working with graphic and text frames. This course may be taken four times for credit on different software packages or versions.

**CISA 331 Intermediate Desktop Publishing 2 Units***Prerequisite: CISA 330 with a grade of "C" or better**Advisory: BUS 100**Course Transferable to CSU**Hours: 27 hours LEC; 27 hours LAB*

This course builds upon previous desktop publishing software concepts and study. Topics include working with color, applying styles, importing and linking graphics, tabs and tables, and working with transparency effects. It also covers producing long documents and book features, output and exporting to PDF format, and creating interactive documents for online use. This course may be taken four times for credit on a different software package or version.

**CISA 340 Presentation Graphics 2 Units***Advisory: CISC 300**Course Transferable to CSU**Hours: 27 hours LEC; 27 hours LAB*

This course covers an in-depth look at using presentation software in business environments. Topics include elements of good presentation design, slide show techniques, integrating and linking of various software applications and media, animation effects, and the production of presentations using a variety of hardware. This course may be taken four times on a different software package or version.

## Computer Information Science - Core

### **CISC 100 Computer Fundamentals with Hands-on Lab** **2 Units**

*Prerequisite: None*

*Hours: 27 hours LEC; 27 hours LAB*

This introductory course provides general non-technical knowledge combined with a hands-on lab on how computers work including basic computer terminology and concepts. The focus is slower paced instruction with extensive hands-on reinforcement of instructional concepts. Course topics include an introduction to the operating system software and application software focusing on word processing, spreadsheets, the Internet and email.

### **CISC 294 Topics in Computer Information Science - Core** **.5-5 Units**

*Hours: 72 hours LEC; 54 hours LAB*

Current topics in computer science and information systems not covered by regular catalog offerings are examined. Topics and locations vary, including advanced subjects related to computer science, networking, programming, database, applications, PC support, security, communications, and web development and publishing. Field trips may be required. This course may be taken four times for credit on different topics.

### **CISC 300 Computer Familiarization** **1 Unit**

*Advisory: ENGRD 116 or ESLR 320, and the ability to touch type.*

*General Education: AA/AS Area II(b); AA/AS Area III(b)*

*Course Transferable to CSU*

*Hours: 18 hours LEC*

This course provides a general non-technical introduction to how computers work in addition to basic computer terminology and concepts. The focus is hands-on instruction using an operating system, word processing, spreadsheet, and Internet software. The course may be taken twice for credit on different hardware platforms.

### **CISC 305 Introduction to the Internet** **1 Unit**

*Advisory: CISC 300 and 320*

*Course Transferable to CSU*

*Hours: 18 hours LEC; 18 hours LAB*

This course is an introduction to how the Internet works and how to effectively use basic Internet services. Topics include E-mail, E-mail lists, the World Wide Web, search engines, newsgroups, Telnet, File Transfer Protocol (FTP), various forms of asynchronous communications such as Really Simple Syndication (RSS), and Internet security considerations.

### **CISC 306 Introduction to Web Page Creation** **1 Unit**

*Advisory: CISC 305*

*Course Transferable to CSU*

*Hours: 18 hours LEC; 18 hours LAB*

This course covers the production of web pages, including design, layout, construction, and presentation. A web authoring tool is used to format a web page and Extensible Hypertext Markup Language (XHTML) is introduced. This course may be taken four times for credit on a different software package or version.

### **CISC 308 Exploring Computer Environments and the Internet** **1 Unit**

*Course Transferable to CSU*

*Hours: 18 hours LEC*

The course introduces the fundamentals of microcomputer hardware, software, and computer networking, focusing on operating systems. The fundamentals of the Internet and Internet tools are also introduced.

### **CISC 309 Applied Applications Lab** **.5 Unit**

*Corequisite: CISA 305, CISA 306, CISA 315, CISA 316, CISA 320, or CISC 300*

*Advisory: ENGRD 116 or ESLR 320, and the ability to touch type.*

*Course Transferable to CSU*

*Hours: 27 hours LAB*

This course complements CISC 300, CISA 305, CISA 306, CISA 315, CISA 316, and CISA 320 by providing supplemental lab instruction. The material reinforces the concepts and techniques presented in these courses. This course may be taken four times for credit. Pass/No Pass only.

### **CISC 310 Introduction to Computer Information Science** **3 Units**

*Course Transferable to UC/CSU*

*Hours: 54 hours LEC*

This course is a survey of the computer field covering the function and purpose of computer hardware and software, computer programming concepts, productivity software, employment opportunities, and the social impact of the computer.

### **CISC 320 Operating Systems** **1 Unit**

*Course Transferable to CSU*

*Hours: 18 hours LEC; 18 hours LAB*

This course introduces operating systems for the PC. Topics include file systems, operating system services, program management, file and directory organization, and hard drive maintenance. It also includes information on protecting your PC from viruses, Trojans, worms, adware, spyware, and other malicious network exploits. Additional topics are DOS commands and batch files. The course may be taken four times on a different Windows operating system version.

### **CISC 323 Linux Operating System** **1 Unit**

*Advisory: CISC 300 and ability to touch type.*

*Course Transferable to CSU*

*Hours: 18 hours LEC; 18 hours LAB*

This course introduces the Linux operating system for microcomputers. Concepts include the kernel, file structures, daemons, graphical user interfaces (GUI), open source, file security and permissions. Procedures for installing software, basic system administration and utilities, the Bourne again shell (BASH), command line interface utilities, and introduction to scripting topics are also covered.

### **CISC 324 Intermediate Linux Operating System** **1 Unit**

*Prerequisite: CISC 323 with a grade of "C" or better*

*Course Transferable to CSU*

*Hours: 18 hours LEC; 18 hours LAB*

This course is a continuation of CISC 323. Topics include boot loaders, Linux devices, and command line interface (CLI) system management utilities. It covers advanced Bourne Again Shell (BASH) shell scripting, including looping and decision making logic structures. Alternates to the BASH shell and regular expressions and text stream editors are introduced.

### **CISC 350 Introduction to Data Communications** **1 Unit**

*Advisory: CISC 300 and ability to touch type.*

*Course Transferable to CSU*

*Hours: 18 hours LEC*

This course introduces business data communication concepts, systems, technology, protocols, theory, and basic terminology. Specific topics include analog and digital data encoding and transmission; media; interfaces; packet, circuit, and broadcast networks; and data multiplexing.

**CISC 351 Introduction to Local Area Networks 1 Unit**

*Advisory: CISC 320 and 350*

*Course Transferable to CSU*

*Hours: 18 hours LEC; 18 hours LAB*

This course introduces local area networks (LAN) and provides hands-on training in LAN applications and network administration. Topics include planning, installing, and maintaining a LAN, responsibilities of the system administrator, and basic network security principles. The course may be taken for credit four times on a different Windows operating system.

**CISC 361 Microcomputer Support Essentials - Preparation for A+ Certification 3 Units**

*Advisory: CISC 310, 320, and 350*

*Course Transferable to CSU*

*Hours: 42 hours LEC; 36 hours LAB*

This course is the first of two courses covering support and repair for stand-alone personal computers. It includes training to troubleshoot hardware to a field replaceable component. Operating systems installation and simple networking are also covered. The course provides a firm grounding in the supporting software that runs the hardware and in distinguishing hardware from software problems. This course, along with CISC 363, prepares students for the Computing Technology Industry Association (CompTIA) A+ certification.

**CISC 362 Microcomputer and Applications Support 2 Units**

*Corequisite: CISC 361*

*Advisory: CISA 305, 315, and 320*

*Course Transferable to CSU*

*Hours: 24 hours LEC; 36 hours LAB*

This course is an in-depth investigation of the technical, business, soft, and self-management skills technicians need to provide effective customer service and support in an information technology (IT) environment. Customer service and problem solving skills needed for success in a small or large business environment are introduced. Students serve as assistants in computer support in one of the American River College (ARC) computer classrooms/labs.

**CISC 363 Microcomputer Support Technical - Preparation for A+ Certification 3 Units**

*Prerequisite: CISC 361 with a grade of "C" or better*

*Course Transferable to CSU*

*Hours: 42 hours LEC; 36 hours LAB*

This course is the second of two courses providing a foundation in personal computer (PC) support. Hands-on skills include advanced component installation and configuration, troubleshooting component hardware, and configuring and troubleshooting major operating systems and networking hardware. This course along with CISC 361 prepares students for the Computing Technology Industry Association (CompTIA) A+ Certification exam.

**CISC 498 Work Experience in Computer Information Science - Core 1-4 Units**

*Advisory: ENGWR 102 or 103, and ENGRD 116 with a grade of "C" or better; OR ESLR 320 and ESLW 320 with a grade of "C" or better; OR placement through assessment process.*

*Enrollment Limitation: Students must be in a paid or unpaid internship, volunteer position, or job related to computer information science.*

*Students are advised to consult with the Computer Information Science Department faculty to review specific certificate and degree work experience requirements.*

*General Education: AA/AS Area III(b)*

*Course Transferable to CSU*

*Hours: 300 hours LAB*

This course provides students with opportunities to develop marketable skills in preparation for employment or advancement within the field of computer information science. It is designed for students interested in work experience and/or internships in transfer level degree occupational programs. Course content includes understanding the application of education to the workforce; completion of required forms which document the student's progress and hours spent at the work site; and developing workplace skills and competencies. Appropriate level learning objectives are established by the student and the employer. During the semester, the student is required to attend a weekly orientation and 75 hours of related paid work experience, or 60 hours of unpaid work experience for one unit. An additional 75 or 60 hours of related work experience is required for each additional unit. The weekly orientation is required for first time participants; returning participants are not required to attend the orientation weekly but are required to meet with the instructor as needed to complete all program forms and assignments. Work Experience may be taken for a total of 16 units when there are new or expanded learning objectives.

**Computer Information Science - Network****CISN 110 Networking Technologies - Preparation for N+ Certification 2 Units**

*Hours: 36 hours LEC*

This is an introductory course in networking software and hardware. Topics include modems, communication protocols, local and wide area networks, intra- and inter-networks, network architectures, topologies, and the Open Systems Interconnect (OSI) model. This course, along with CISN 111, provides preparation for the Computer Technology Industry Association N+ certification test.

**CISN 111 Intermediate Networking Technologies - Preparation for N+ Certification 2 Units**

*Prerequisite: CISN 110 with a grade of "C" or better*

*Hours: 36 hours LEC*

This is an intermediate course in networking software and hardware. Topics include network operating systems setup, analyzing network performance, diagnosing and repairing of network problems, and network security techniques. This course, along with CISN 110, provides preparation for the Computer Technology Industry Association N+ certification test.

**CISN 118 Internet Protocol Subnetting 1 Unit**

*Advisory: CISN 110 and MATH 25*

*Hours: 18 hours LEC*

This course introduces Transmission Control Protocol/Internet Protocol (TCP/IP) address assigning and subnetting. Topics include a review of binary, hexadecimal, and decimal numbering systems, classes of Internet Protocol (IP) addresses, Classless Inter-domain Routing (CIDR), and Variable Length Subnet Masks (VLSM). The future of IP addressing, version 4 (IPV4) and version 6 (IPV6), is covered.

**CISN 119 TCP/IP Protocols****3 Units**

*Advisory: CISC 350*  
*Hours: 54 hours LEC*

This course covers the TCP/IP protocol suite for the Internet. Information to support and manage TCP/IP is provided. Additional topics include routing; tunneling; IP addressing and subnetting; IP version 4 and IP version 6; virtual private networks; network address translation; ports and sockets; and many other individual protocols.

**CISN 120 Beginning Network Administration with Linux****3 Units**

*Prerequisite: CISC 323 with a grade of "C" or better*  
*Advisory: CISC 324*  
*Hours: 45 hours LEC; 27 hours LAB*

This course covers the basics of installation and administration of the Linux Network Operating System. Topics include installation of the Linux server, connecting to a network, how to utilize network utilities, administer and maintain network printing, protect network data, and install network applications. This course also covers how to plan, access, and manage file systems. Also included are how to plan and implement login and file system security, administer and maintain user accounts, upgrade the kernel, and back up servers.

**CISN 121 Network Administration with Linux: LAN Services****2 Units**

*Prerequisite: CISN 120 with a grade of "C" or better*  
*Advisory: CISN 119*  
*Hours: 27 hours LEC; 27 hours LAB*

This course covers Linux network administration of local area network (LAN) services. Topics focus on server and LAN services including the network file system (NFS), share resources between Linux and Microsoft Windows using Server Message Block (SaMBA), network information service (NIS), virtual network computing (VNC), remote network access, the secure shell (SSH) vs. telnet, X-windows as a network service, and dynamic host configuration protocol (DHCP). The course also covers the command scheduler (cron), monitoring and logging system activities and system events (syslog), as well as installing and configuring MySQL Structured Query Language (SQL) database management service.

**CISN 122 Network Administration with Linux: Internet Services****2 Units**

*Prerequisite: CISN 120 with a grade of "C" or better*  
*Advisory: CISN 119*  
*Hours: 27 hours LEC; 27 hours LAB*

This course covers Linux network administration of Internet services. Topics focus on server and TCP/IP services including the internet services daemon (XINETD), file transfer protocol (FTP), email, domain name service (DNS), firewall, secure shell, and proxy services. Installing and configuring the Apache Web Server and Webmin (the Linux web based administration tool) are introduced.

**CISN 140 CISCO Networking Academy (CCNA)tm: Networking Fundamentals****3 Units**

*Advisory: CISC 310, 320, or 350*  
*Hours: 54 hours LEC; 18 hours LAB*

This course introduces the architecture, structure, functions, components, and models of the Internet and other computer networks. It surveys data communication protocols, standards, hardware and software components and basic networking concepts. Topics include the Open Systems Interconnection (OSI) and TCP/IP models, IP addressing and subnetting, routing concepts, LAN media, Ethernet, and network configuration, troubleshooting and analysis. This is the first course in preparation for Cisco CCNA certification examination. ARC is a certified Cisco Networking Academy and all courses are taught by Cisco Certified Academy Instructors (CCAI). This course may be taken two times for credit for recertification due to updates to industry standards.

**CISN 141 CISCO Networking Academy (CCNA)tm: Routing Protocols and Concepts****3 Units**

*Prerequisite: CISN 140 with a grade of "C" or better*  
*Hours: 54 hours LEC; 18 hours LAB*

This course describes the architecture, components, and operation of routers, and explains the principles of routing and routing protocols. Topics include configuring, verifying, and troubleshooting Routing Information Protocol (RIP) version 1 and 2, Enhanced Interior Gateway Routing Protocol (EIGRP), and Open Shortest Path First (OSPF) routing protocols. Basic router configuration and troubleshooting, networking theory, and IP addressing are also covered. This is the second course in preparation for Cisco CCNA certification examination. ARC is a certified Cisco Networking Academy and all courses are taught by Cisco Certified Academy Instructors (CCAI). This course may be taken two times for credit for recertification due to updates to industry standards.

**CISN 142 CISCO Networking Academy (CCNA)tm: LAN Switching and Wireless****3 Units**

*Prerequisite: CISN 140 with a grade of "C" or better*  
*Hours: 54 hours LEC; 18 hours LAB*

This course focuses on Layer 2 switching protocols, concepts and technologies. Topic include hierarchy LAN design, basic switch concepts and configuration, Virtual LANs (VLANs), Virtual Trunking Protocol (VTP), Spanning Tree Protocol (STP), Inter-VLAN routing, basic wireless concepts and configuration. Implementing, verifying, securing and troubleshooting converged switching technologies in a small-to-medium network, including integrating wireless devices into a LAN, are also covered. This is the third course in preparation for Cisco CCNA certification examination. ARC is a certified Cisco Networking Academy and all courses are taught by Cisco Certified Academy Instructors (CCAI). This course may be taken two times for credit for recertification due to updates to industry standards.

**CISN 143 CISCO Networking Academy (CCNA)™:  
Accessing the Wide Area Network 3 Units**

*Prerequisite: CISN 141 and 142 with grades of "C" or better*  
*Hours: 54 hours LEC; 18 hours LAB*

This course covers wide area networks (WAN) technologies to connect small-to medium-sized business networks. It focuses on Point to Point Protocol (PPP), Frame Relay, and broadband links. Topics include network security, traffic control and access control lists (ACLs), Virtual Private Networks (VPN) and network troubleshooting. IP addressing services Network Address Translation (NAT) and Dynamic Host Configuration Protocol (DHCP) are covered, and IPv6 is introduced. This is the fourth course in preparation for Cisco CCNA certification examination. ARC is a certified Cisco Networking Academy and all courses are taught by Cisco Certified Academy Instructors (CCAI). This course may be taken two times for credit for recertification due to updates to industry standards.

**CISN 300 Network Systems Administration 3 Units**

*Advisory: CISC 320, 350, and 351*

*Course Transferable to CSU*  
*Hours: 45 hours LEC; 27 hours LAB*

This course covers the administration of a server in a client/server network. Topics include designing a basic network, installing and configuring a network operating system, and managing network security with user and group accounts. Additional topics are creating network shares, setting up and managing network printers, backing up servers, monitoring and setting access permissions on network resources, and establishing policies and procedures for network operations. This course may be taken four times on a different Windows version.

**CISN 302 Intermediate Network Systems  
Administration 3 Units**

*Prerequisite: CISN 300 with a grade of "C" or better*

*Course Transferable to CSU*  
*Hours: 45 hours LEC; 27 hours LAB*

This course covers advanced system administration in a client/server network. Topics include configuring the server environment, implementing system policies, implementing and managing fault-tolerant disk volumes, and managing applications. Additional topics covered are managing connectivity for different network and client operating systems, as well as managing and implementing remote servers. This course covers material required for one of the Microsoft MCSE Networking certification examinations. This course may be taken four times on a different Windows software version.

**CISN 307 Windows Active Directory Services 3 Units**

*Prerequisite: CISN 302 with a grade of "C" or better*

*Course Transferable to CSU*  
*Hours: 45 hours LEC; 27 hours LAB*

This course covers how to install, configure, and administer Microsoft Windows Active Directory services. It also focuses on implementing Group Policy and understanding the Group Policy tasks required to manage users and computers. Group Policies are used to configure and manage the user desktop environment, configure and manage software, and implement and manage security settings. Installation and configuration of Domain Naming System (DNS) and Windows Internet Naming System (WINS) are covered, as well as publishing, replication and the backup of the directory services data base. This course may be taken four times for credit on different Windows operating system versions.

**CISN 308 Internetworking with TCP/IP 3 Units**

*Prerequisite: CISN 302 with a grade of "C" or better*  
*Course Transferable to CSU*

*Hours: 45 hours LEC; 27 hours LAB*

This course covers how to install, configure, manage, and support a network infrastructure using the Microsoft Windows Server products. It focuses on TCP/IP and related services, including Dynamic Host Configuration Protocol (DHCP), Domain Naming System (DNS), Windows Internet Naming Service (WINS), Internet Information Server (IIS), Public Key Infrastructure (PKI) and certificate service, Internet protocol security (IPSec), Network Address Translation (NAT), and remote access. It also covers configuring Windows as a network router, Virtual Private Network (VPN) connectivity and managing a Windows deployment using Remote Installation Services (RIS). This course may be taken four times for credit on different Windows operating system versions.

**Computer Information Science - Programming****CISP 300 Algorithm Design/Problem Solving 3 Units**

*Advisory: CISC 310*

*General Education: AA/AS Area II(b)*

*Course Transferable to CSU*  
*Hours: 54 hours LEC*

This course introduces methods for solving typical computer problems through algorithm design. Topics include assessing and analyzing computer problems in a top-down, divide-and-conquer approach that leads to a programming solution. It also covers programming plans and detailed design documents from which source code versions of programs are created.

**CISP 310 Assembly Language Programming  
for Microcomputers 4 Units**

*Prerequisite: CISP 360 with a grade of "C" or better.*

*Course Transferable to UC/CSU*  
*Hours: 54 hours LEC; 54 hours LAB*

This course is an introduction to the architecture of microcomputers that use the Intel microprocessor. Topics include machine and assembly language, keyboard and screen manipulation, binary and binary coded decimal (BCD) arithmetic, American Standard Code for Information Interchange (ASCII) and binary conversion, table processing, macros, and subroutines. Machine language programs are traced as an aid to debugging.

**CISP 315 Introduction to Computer  
Architecture and Design 4 Units**

*Prerequisite: CISP 310 with a grade of "C" or better*

*General Education: AA/AS Area II(b)*

*Course Transferable to UC/CSU*  
*Hours: 54 hours LEC; 54 hours LAB*

This course is an introduction to the fundamental theories of, and their applications in, digital computer design. Topics include machine code decoding, memory bus cycles, memory, arithmetic and logic unit, registers, latches, Boolean algebra, logic gates, state machines, binary representation, pipelining and Boolean equation optimization. Synthesis of the design of a computer in a hardware description language (HDL) is stressed. All topics are related to programming and overall computer system operations.

**CISP 320 COBOL Programming 4 Units**

*Prerequisite: CISP 300 or 370 with a grade of "C" or better*  
*General Education: AA/AS Area II(b)*  
*Course Transferable to CSU*  
*Hours: 54 hours LEC; 54 hours LAB*

This course is an introduction to the COBOL programming language. Course elements include top-down design, modular programming methods, and structured programming methods to analyze and solve problems found in business and government. Laboratory assignments cover a variety of input/output techniques including data validation, report formatting, arithmetic operations, output editing, single and double array processing, control-break concepts, and the creation and update of sequential files.

**CISP 350 Database Programming 3 Units**

*Advisory: CISA 320 and CISC 310*  
*General Education: AA/AS Area II(b)*  
*Course Transferable to CSU*  
*Hours: 36 hours LEC; 54 hours LAB*

This is an introductory course in Structured Query Language (SQL) database programming. Topics include database normalization, subqueries, joins, import/export, privileges, and Procedural Language (PL)/SQL programming.

**CISP 360 Introduction to Structured Programming 4 Units**

*Prerequisite: CISP 300, 320, or 370 with a grade of "C" or better*  
*General Education: AA/AS Area II(b)*  
*Course Transferable to UC/CSU*  
*Hours: 54 hours LEC; 54 hours LAB*

This course is an introduction to structured programming and objects. Topics include program design, documentation, testing, and debugging, as well as data representation, data types, variables, constants, and operators. It also includes control structures, interactive and file input/output, standard libraries, arrays, pointers, methods (functions), classes and objects.

**CISP 370 Beginning Visual Basic 4 Units**

*Advisory: CISC 310 and CISP 300*  
*Course Transferable to CSU*  
*Hours: 54 hours LEC; 54 hours LAB*

This is an introductory programming course covering the development of Windows-based desktop applications using Visual Basic .NET (VB .Net). Topics include best practices for Graphical User Interface (GUI) design, use of the Visual Studio .NET development software, organizing code into procedures and modules, calculation techniques, input data validation, file input and output, variable scope, arrays, and multiple-window applications. This course is designed for those who want a strong foundation in building GUI applications. It may be taken four times for credit with different versions of the VB .Net language.

**CISP 371 Intermediate Visual Basic 4 Units**

*Prerequisite: CISP 370 with a grade of "C" or better*  
*Course Transferable to CSU*  
*Hours: 54 hours LEC; 54 hours LAB*

This intermediate course in Visual Basic programming further examines data and its relationship to the functions that operate on data. Topics include multiple forms, components, properties, classes, objects, static and dynamic relationships, databases, data sets, queries, hierarchies, inheritance, associations, testing, and debugging. This course may be taken four times for credit using a different version of the Visual Basic language.

**CISP 372 Beginning Visual Basic for Applications Programming 1 Unit**

*Prerequisite: None*  
*Course Transferable to CSU*  
*Hours: 15 hours LEC; 9 hours LAB*

This course introduces Visual Basic for Applications (VBA) programming for the purposes of application automation and customization. It includes basic programming concepts such as variables, control structures and subroutines. The use of elementary user interface controls are also included in this course.

**CISP 400 Object Oriented Programming with C++ 4 Units**

*Prerequisite: CISP 360 with a grade of "C" or better*  
*Advisory: CISC 323*  
*General Education: AA/AS Area II(b)*  
*Course Transferable to UC/CSU*  
*Hours: 54 hours LEC; 54 hours LAB*

This course is an introduction to the C++ programming language and object-oriented programming in the Linux/UNIX environment. Topics include program analysis and design, encapsulation, overloading, classes, inheritance, virtual functions, polymorphism, templates, exception handling, and the standard template library. In addition, basic Linux/UNIX commands and make files are covered.

**CISP 401 Object Oriented Programming with Java 4 Units**

*Prerequisite: CISP 360 with a grade of "C" or better*  
*Course Transferable to UC/CSU*  
*Hours: 54 hours LEC; 54 hours LAB*

This course introduces object oriented programming using the Java programming language. Topics include objects, inheritance, polymorphism, interfaces, abstract classes, inner classes, error handling, graphical user interfaces (GUI), applets, threads, files, databases, and packages.

**CISP 430 Data Structures 4 Units**

*Prerequisite: CISP 400 or 401 with a grade of "C" or better*  
*Course Transferable to UC/CSU*  
*Hours: 54 hours LEC; 54 hours LAB*

This course applies object-oriented techniques for systematic problem analysis and the managing of program complexity using abstraction. Specifications, design, coding, testing, and documentation of large multi-file programs are covered. It uses advanced language features such as classes, strings, non-text files, pointers, and recursion. Abstract data types such as stacks, queues, lists, binary trees, heaps/priority queues, hash tables, and graphs are examined. Various sorting and searching algorithms are presented and analyzed using Big-O notation.

**CISP 440 Discrete Structures for Computer Science 3 Units**

*Prerequisite: MATH 370 with a grade of "C" or better*  
*Corequisite: CISP 430*  
*General Education: AA/AS Area II(b); CSU Area B4*  
*Course Transferable to UC/CSU*  
*Hours: 54 hours LEC*

This course is an introduction to the essential discrete structures used in Computer Science, with emphasis on their applications. Topics covered include elementary formal logic and set theory, elementary combinatorics, recursive programming and algorithm analysis, finite state machines and formal languages, digital logic and switching, combinatorial circuits, and computer arithmetic.

**CISP 480 Honors Introduction to Structured Programming 5 Units**

*Prerequisite:* Placement into ENGWR 480 through the assessment process.

*Advisory:* CISC 310

*Course Transferable to CSU*

*Hours:* 72 hours LEC; 54 hours LAB

This honors course combines the content of both CISP 300 and CISP 360 and presents it in an accelerated fashion emphasizing projects and collaborative work. It introduces methods for solving typical computer problems through algorithm design, continuing with implementation through structured programming and objects, as well as documentation, testing, and debugging. Topics include assessing and analyzing computer problems and requirements documents, and developing programming plans from which source code versions of programs are created. Additionally, data representation, data types, variables, constants, operators, and expression evaluation are covered, along with control structures, interactive and file input/output, standard libraries, arrays, pointers, methods (functions), classes, and objects. Pseudocode and an object-oriented language are used to create program solutions.

**Computer Information Science - Security****CISS 300 Introduction to Information Systems Security 1 Unit**

*Prerequisite:* None

*Advisory:* CISC 320, 350, or 351

*Course Transferable to CSU*

*Hours:* 18 hours LEC; 18 hours LAB

This course provides an introduction to network-based and Internet-based security applications and standards. Topics include encryption, security protocols, network security applications, digital signatures, protecting computers and the network from viruses, Trojans, spyware, unsolicited E-mail and public and private key exchange.

**CISS 301 Ethical Hacking 2 Units**

*Advisory:* CISC 320, 323, 350, and 351

*Course Transferable to CSU*

*Hours:* 27 hours LEC; 27 hours LAB

This course explores ways in which security for a stand-alone PC and a network-connected PC can be compromised. It introduces basic security concepts, principles and "best practices." It also explores ways in which the security of a PC can be checked and evaluated. Principles of ethical hacking are discussed. Internal and external security threats are discussed, including viruses, worms, Trojans, scripts, and other malicious e-mail content. Network vulnerabilities, common exploits, and basic countermeasures are also covered.

**CISS 310 Network Security Fundamentals 3 Units**

*Advisory:* CISN 119, 140, and 302

*Course Transferable to CSU*

*Hours:* 45 hours LEC; 27 hours LAB

This course provides the information and skills required to analyze security risks from potential network intrusions to organizations' network information systems. Topics cover the required content of the Computing Technology Industry Association (CompTIA) Security+ certification exam.

**CISS 325 Network Security and Firewalls 3 Units**

*Prerequisite:* CISS 310 with a grade of "C" or better

*Course Transferable to CSU*

*Hours:* 45 hours LEC; 27 hours LAB

This course covers network and Internet security and deployment of industry standard countermeasures, including configuring Virtual Private Network (VPN) connections. Topics include the evaluation, implementation, and management of secure remote-access technologies. Also covered is the configuration of network firewalls, and allowing access to key services while maintaining security. This course provides preparation for the Check Point Security's "Check Point Certified Security Administrator" (CCSA) certification exam. This course is not open to students who have completed CISS 320 and CISS 330 at any other campus within the Los Rios District.

**CISS 341 Implementing Windows Operating System Security 3 Units**

*Advisory:* CISC 320, CISC 351, and CISS 310

*Course Transferable to CSU*

*Hours:* 45 hours LEC; 27 hours LAB

This course provides in-depth information on the Microsoft Windows desktop operating system security features, as well as step-by-step configuration for most effective operating system security. The techniques needed in order to maintain the integrity, authenticity, availability, and privacy of the system and user data are covered. This course may be taken 4 times for credit on different versions of the Windows operating system.

**CISS 342 Implementing Linux Operating System Security 3 Units**

*Advisory:* CISC 323 and CISS 310

*Course Transferable to CSU*

*Hours:* 45 hours LEC; 27 hours LAB

This course provides in-depth information on Linux/UNIX operating system security features, as well as step-by-step configuration for most effective operating system security. The techniques needed in order to maintain the integrity, authenticity, availability, and privacy of the system and user data are covered. This course may be taken 4 times for credit on different versions of the Linux or UNIX operating systems.

**CISS 350 Disaster Recovery 3 Units**

*Advisory:* CISS 310

*Course Transferable to CSU*

*Hours:* 54 hours LEC

This course provides methods for identifying vulnerabilities and implementing countermeasures to prevent and mitigate failure risks in the information technology infrastructure for the business enterprise. Topics include disaster recovery, development of a disaster recovery plan, and development and implementation of disaster recovery policies and procedures.

**CISS 360 Computer Forensics and Investigation 3 Units**

*Advisory:* CISC 324, CISS 310, and CISS 350

*Course Transferable to CSU*

*Hours:* 45 hours LEC; 27 hours LAB

This course introduces the methods used to conduct a computer forensics investigation. Topics include an overview of computer forensics as a profession, the computer investigation process, operating systems' boot processes and disk structures, data acquisition and analysis, ethics, and a review of standard computer forensic tools. The course topics map to the objectives of the International Association of Computer Investigative Specialists (IACIS) certification.

**Computer Information Science - Web****CISW 300 Web Publishing 3 Units***Advisory: CISC 300 and 305**Course Transferable to CSU**Hours: 36 hours LEC; 54 hours LAB*

This course is an introduction to publishing on the World Wide Web. Topics include creating web pages with the Hyper Text Markup Languages (HTML), organizing a series of pages into a web site, and uploading web pages to a server. The course makes extensive use of the computer tools necessary to insert HTML tags, create images, and view web documents. It takes beginning web designers through the process of designing, building, and publishing a working web site.

**CISW 304 Cascading Style Sheets 2 Units***Prerequisite: CISW 300 with a grade of "C" or better**Course Transferable to CSU**Hours: 27 hours LEC; 27 hours LAB*

This course continues the study of technical aspects of standards-based Web design for experienced students and Web professionals. Topics include the separation of content from presentation, dynamic user interaction, and designing for alternative devices using Cascading Style Sheets (CSS) in combination with Extensible Hypertext Markup Language (XHTML).

**CISW 307 Introduction to Web Development and Design 3 Units***Same As: ARTNM 401**Course Transferable to CSU**Hours: 36 hours LEC; 54 hours LAB*

This course covers strategies for the development and design of Web sites. Using an industry-standard Web authoring tool, the course integrates both artistic and technical concepts. Topics include assembling, designing, and publishing Web pages using strategies, principles, and processes universally practiced by professionals in this field. CISW 307 and/or ARTNM 401 may be taken a total of 4 times on different platforms or software versions.

**CISW 310 Advanced Web Publishing 4 Units***Prerequisite: CISW 300 with a grade of "C" or better**Course Transferable to CSU**Hours: 54 hours LEC; 54 hours LAB*

This course builds upon previous web publishing concepts and study. The primary focus of this course is the systematic development of interactive web sites. Topics include cascading style sheets, dynamic HTML, forms, client-side scripting with JavaScript, Common Gateway Interface (CGI) scripting with Perl, and web-database interactivity.

**CISW 321 Web Site Development using Dreamweaver 3 Units***Advisory: CISC 305 and CISW 300**Course Transferable to CSU**Hours: 36 hours LEC; 54 hours LAB*

This course covers the use of Dreamweaver, a visual Web-authoring tool, to develop and implement Web sites. The topics covered include creating Web pages that contain text, images, links, tables, forms, Cascading Style Sheets, and image maps, as well as how to enhance Web pages with Flash elements and built-in scripting languages. Additional topics include developing effective Web site structures, using Web site management tools, Web site documentation, making global updates to a Web site, and using advanced Dreamweaver features. This course can be taken for credit a total of 4 times on different platforms or software versions.

**CISW 350 Imaging for the Web 1 Unit***Advisory: CISC 306 or CISW 300**Course Transferable to CSU**Hours: 18 hours LEC; 18 hours LAB*

This course takes an in-depth look at graphics for the Web. Industry standard graphic software is used to technically develop original graphics as well as to manipulate found imagery. Topics include understanding Web file formats, compressing graphics for use on the Web, editing and enhancing graphics, extracting elements, and using layers. It also covers creating buttons and intuitive navigational elements, making background textures and images, and simple animation/video. It may be taken two times for credit on different platforms or software versions.

**CISW 355 Web Imaging Projects 2 Units***Prerequisite: ARTNM 402 or CISW 350 with a grade of "C" or better**Course Transferable to CSU**Hours: 27 hours LEC; 27 hours LAB*

This course is a continuation of CISW 350. Projects and simulations developing graphics for the Web are created for the purpose of marketing and advertising on the Web. The steps, procedures, and common problems encountered when producing quality graphics for professional websites are discussed and practiced. Real and simulated projects include the following: compressing and uploading times, cropping and resizing, digital camera imaging, retouching and fixing photographs, photographic special effects and filters, rasterizing text, implementing backgrounds, buttons, themes, image maps, slicing, and simple animations.

**CISW 360 Beginning Flash 3 Units***Advisory: ARTNM 324, CISW 300, and CISW 350**Course Transferable to CSU**Hours: 36 hours LEC; 54 hours LAB*

This course introduces the design and the development of Flash-based interactive web sites and applications. Topics include the creation of simple vector-based graphics, buttons, animation and movies, and the integration of sound, raster graphics, and video. This course can be taken for credit a total of 4 times on different platforms or software versions.

**CISW 365 Interactive Multimedia Basics 3 Units***Same As: ARTNM 404**Advisory: ARTNM 324, ARTNM 402, CISW 300, or CISW 310**Course Transferable to CSU**Hours: 36 hours LEC; 54 hours LAB*

This course introduces the design and the development of Flash-based interactive web sites, and its unique design workflow. Topics include the creation of simple vector-based graphics, buttons, animation and movies, and the integration of sound, raster graphics, and video. Visual design principles and interface design concepts are integrated into making portfolio-quality rich media projects. CISW 365 and/or ARTNM 404 may be taken a total of 4 times on different platforms or software versions.

**CISW 370 Designing Accessible Web Sites 1 Unit***Prerequisite: CISW 300 with a grade of "C" or better**Course Transferable to CSU**Hours: 18 hours LEC*

This course provides an overview of the methods that are used to design web sites for people with disabilities. Current legal requirements for accessible web sites, especially the Americans with Disabilities Act (ADA), are emphasized.

**CISW 400 Client-side Web Scripting 4 Units**

*Prerequisite: CISW 300 with a grade of "C" or better*

*Advisory: CISP 300 and CISW 310*

*Course Transferable to CSU*

*Hours: 54 hours LEC; 54 hours LAB*

This course emphasizes the creation of dynamic and interactive web sites using a client-side scripting language such as JavaScript. Topics include the Document Object Model of web pages, core features of the client-side scripting language, event handling, control of windows and frames, functions, and form validation. This course may be taken twice using a different client-side scripting language.

**CISW 405 ActionScript for Flash 3 Units**

*Prerequisite: ARTNM 404 or CISW 365 with a grade of "C" or better*

*Advisory: CISP 300 or CISW 400*

*Course Transferable to CSU*

*Hours: 36 hours LEC; 54 hours LAB*

This course introduces Adobe Flash users to programming with ActionScript to animate, process data, and create dynamic content. It emphasizes the object-oriented capabilities of Adobe Flash, and instructs how to use ActionScript objects, methods, events, properties, and functions, with an eye toward ActionScript best practices.

**CISW 410 Middleware Web Scripting 4 Units**

*Prerequisite: CISW 300 with a grade of "C" or better*

*Advisory: CISP 300 and CISW 310*

*Course Transferable to CSU*

*Hours: 54 hours LEC; 54 hours LAB*

This course emphasizes the creation of interactive web sites using a middleware scripting environment such as PHP or Active Server Pages (ASP). Topics include core features of the middleware scripting language, embedding server commands in HTML pages, control structures, functions, arrays, form validations, cookies, environmental variables, email applications, and database-driven web applications. This course may be taken twice using different middleware web scripting environment.

**CISW 411 Middleware Scripting Database Web Applications 2 Units**

*Prerequisite: CISW 410 with a grade of "C" or better*

*Advisory: CISW 310*

*Course Transferable to CSU*

*Hours: 27 hours LEC; 27 hours LAB*

This course covers interactive database applications for the Web using a database and middleware scripting language. Topics include organizing data, developing tables for databases, and creating middleware scripts that add, delete, sort, edit, and merge the data in the database. Maintaining database integrity and using DHTML (Dynamic Hypertext Mark-up Language) to streamline certain client side functions, such as form validation, are also covered.

**CISW 420 Server-side Web Scripting 4 Units**

*Prerequisite: CISW 300 with a grade of "C" or better*

*Advisory: CISP 300 and CISW 310*

*Course Transferable to CSU*

*Hours: 54 hours LEC; 54 hours LAB*

This course emphasizes the creation of interactive web sites using a server-side scripting language such as a Perl or Java. Topics include core features of the server-side web scripting language, control structures, functions, arrays, form validation, regular expressions, cookies, environmental variables, email applications, and database-driven web applications. This course may be taken twice using a different server-side web scripting language.

**CISW 442 Web Publishing with XML 3 Units**

*Prerequisite: CISW 300 with a grade of "C" or better*

*Course Transferable to CSU*

*Hours: 36 hours LEC; 54 hours LAB*

This course describes how to create well-formed and valid Extensible Markup Language (XML) documents, which are later used in conjunction with Extensible Style Sheet Language (XSL) to produce Web pages and other result documents. Topics include formatting XML documents with Cascading Style Sheets (CSS), Document Type Definitions (DTD), XML Namespaces and Schemas, XPATH, and Extensible Style Sheet Language Transforms (XSLT).