

# Computer Information Science




## | American River College

Computer Information Science Department courses at American River College are broken down into categories including:

- CISA - Computer Applications
- CISC - Computer Core Classes
- CISN - Computer Networking
- CISP - Computer Programming
- CISS - Computer Security
- CISW - Web

Certificates and degree programs pull from multiple categories to make up a concentration of courses designed to help you succeed.

[\(/academics/arc-program-road-maps\)](/academics/arc-program-road-maps)

DIVISION DEAN	<a href="/about-us/faculty-and-staff-directory/kirsten-corbin">Kirsten Corbin (/about-us/faculty-and-staff-directory/kirsten-corbin)</a>	 <a href="/academics/arc-business-and-computer-science-division-office">Business &amp; Computer Science Division Office (/academics/arc-business-and-computer-science-division-office)</a>
DEPARTMENT CHAIR	<a href="/about-us/faculty-and-staff-directory/damon-antos">Damon Antos (/about-us/faculty-and-staff-directory/damon-antos)</a>	 (916) 484-8361
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## Associate Degrees

### A.S. in CIS: Computer Networking Management

This 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:

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

#### Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
BUS 310	Business Communications (3)	3 - 4
or ENGWR 300	College Composition (3)	
or ENGWR 480	Honors College Composition (3)	

COURSE CODE	COURSE TITLE	UNITS
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
Subtotal Units:		14 - 15

### CISCO Concentration

COURSE CODE	COURSE TITLE	UNITS
CISC 324	Intermediate Linux Operating System	1
[ CISC 110	Networking Technologies - Preparation for N+ Certification (2)	3 - 4
and CISC 111 ]	Intermediate Networking Technologies (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 330	Implementing Internet Security and Firewalls	3
CISCO Concentration Units:		19 - 20
Total Units:		33 - 35

### Linux Concentration

COURSE CODE	COURSE TITLE	UNITS
CISC 324	Intermediate Linux Operating System	1
CISC 110	Networking Technologies - Preparation for N+ Certification	2
CISC 111	Intermediate Networking Technologies	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
A minimum of 3 units from the following:		3
CISP 400	Object Oriented Programming with C++ (4)	
CISS 342	Implementing Linux Operating System Security (3)	

COURSE CODE	COURSE TITLE	UNITS
Linux Concentration Units:		18
Total Units:		32 - 33

## Windows Concentration

COURSE CODE	COURSE TITLE	UNITS
CISN 110	Networking Technologies - Preparation for N+ Certification	2
CISN 111	Intermediate Networking Technologies	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)	
A minimum of 3 units from the following:		3
CISP 370	Beginning Visual Basic (4)	
CISS 341	Implementing Windows Operating System Security (3)	
Windows Concentration Units:		19
Total Units:		33 - 34

*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.*

## 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.
- 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 Information

This 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.

## A.S. in CIS: Computer Programming

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.

### Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
CISC 310	Introduction to Computer Information Science	3
CISP 350	Database Programming	3
Subtotal Units:		6

### C++ concentration

COURSE CODE	COURSE TITLE	UNITS
[ CISP 300 and CISP 360 ]	Algorithm Design/Problem Solving (3)	5 - 7
or CISP 480	Honors Introduction to Structured Programming (5)	
CISP 400	Object Oriented Programming with C++	4
CISP 430	Data Structures	4
C++ concentration Units:		13 - 15
Total Units:		19 - 21

### Java concentration

COURSE CODE	COURSE TITLE	UNITS
[ CISP 300 and CISP 360 ]	Algorithm Design/Problem Solving (3)	5 - 7
or CISP 480	Honors Introduction to Structured Programming (5)	
CISP 401	Object Oriented Programming with Java	4
A minimum of 3 units from the following:		3

COURSE CODE	COURSE TITLE	UNITS
CISC 320	Operating Systems (1)	
CISC 323	Linux Operating System (1)	
CISC 324	Intermediate Linux Operating System (1)	
CISP 310	Assembly Language Programming for Microcomputers (4)	
CISP 362	Programming for Mobile Devices I (4)	
CISP 363	Programming for Mobile Devices II (4)	
Java concentration Units:		12 - 14
Total Units:		18 - 20

### Visual Basic concentration

COURSE CODE	COURSE TITLE	UNITS
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
Visual Basic concentration Units:		14
Total Units:		20

*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.*

### 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 Information

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

# A.S. in CIS: Database Management

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.

## Degree Requirements

COURSE CODE	COURSE TITLE	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
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
Total Units:		39 - 40

*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.*

## 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.

## A.A. in CIS: Microcomputer Applications

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.

### Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
BUSTEC 300.1	Keyboarding/Applications: Beginning	1
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
A minimum of 5 units from the following:		5
ACCT 341	Computerized Accounting (3)	
BUSTEC 313	Web-based Conferencing and Presentations for the Business Professional (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 315	Ethical Hacking (3)	
CISW 300	Web Publishing (3)	
A minimum of 3 units from the following:		3

COURSE CODE	COURSE TITLE	UNITS
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 Websites (1)	
Total Units:		37

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.

## 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.

## A.S. in CIS: PC Support Management

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.

## Degree Requirements

COURSE CODE	COURSE TITLE	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>



COURSE CODE	COURSE TITLE	UNITS
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 315	Ethical Hacking	3
A minimum of 6 units from the following:		6
CISA 126	Outlook: Basics (1)	
or BUSTEC 126	Outlook: Basics (1)	
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)	
Total Units:		32

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

*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.*

## 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.

This degree provides 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 required by most university computer science programs.

## Degree Requirements

COURSE CODE	COURSE TITLE	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
Total Units:		30 - 32

*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.*

## 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.

## A.S. in Information Systems Security

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.

## Degree Requirements

COURSE CODE	COURSE TITLE	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)	3
or CISN 140	CISCO Networking Academy (CCNA)tm: Networking Fundamentals (3)	
CISS 300	Introduction to Information Systems Security	1

COURSE CODE	COURSE TITLE	UNITS
CISS 310	Network Security Fundamentals	3
CISS 315	Ethical Hacking	3
CISS 330	Implementing Internet Security and Firewalls	3
CISS 341	Implementing Windows Operating System Security	3
CISS 342	Implementing Linux Operating System Security	3
CISS 350	Disaster Recovery	3
CISS 360	Computer Forensics and Investigation	3
CISW 300	Web Publishing	3
Total Units:		33

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.

## 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.

## A.A. in Technical Communications

This 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.

### Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
BUS 100	English for the Professional	3
CISA 305	Beginning Word Processing	2
CISW 300	Web Publishing	3

COURSE CODE	COURSE TITLE	UNITS
JOUR 300	Newswriting and Reporting	3
TECCOM 300	Introduction to Technical/Professional Communication	3
TECCOM 310	Technical/Professional Communication: Writing Reports	3
TECCOM 320	Technical/Professional Communication: Proposal Writing	3
TECCOM 330	Technical/Professional Communication: Writing Technical Manuals	3
TECCOM 340	Technical/Professional Communication: Developing Help Systems	1.5
A minimum of 12 units from the following:		12
ARTNM 328	Beginning Digital Photo Imagery (3)	
ARTNM 330	Intermediate Digital Photo Imagery (3)	
ARTNM 352	Design for Publication (3)	
CISA 331	Intermediate Desktop Publishing (2)	
CISW 310	Advanced Web Publishing (4)	
CISW 321	Web Site Development using Dreamweaver (3)	
CISW 400	Client-side Web Scripting (4)	
CISW 410	Middleware Web Scripting (4)	
ENGWR 301	College Composition and Literature (3)	
Total Units:		36.5

*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.*

## 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.

## Career Information

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

# Certificates of Achievement

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.

### Certificate Requirements

COURSE CODE	COURSE TITLE	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
Subtotal Units:		8

### CISCO Concentration

COURSE CODE	COURSE TITLE	UNITS
CISC 324	Intermediate Linux Operating System	1
CISN 140	CISCO Networking Academy (CCNA)tm: Networking Fundamentals	3
CISN 141	CISCO Networking Academy (CCNA)tm: Routing Protocols and Concepts	3
CISN 142	CISCO Networking Academy (CCNA)tm: LAN Switching and Wireless	3
CISN 143	CISCO Networking Academy (CCNA)tm: Accessing the Wide Area Network	3
CISCO Concentration Units:		13
Total Units:		21

### Linux Concentration

COURSE CODE	COURSE TITLE	UNITS
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
Linux Concentration Units:		15
Total Units:		23

### Windows Concentration

COURSE CODE	COURSE TITLE	UNITS
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)	
Windows Concentration Units:		16
Total Units:		24

## 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.
- 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.

## 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.

### Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
CISC 310	Introduction to Computer Information Science	3
CISC 320	Operating Systems	1
Subtotal Units:		4

### C++ concentration

COURSE CODE	COURSE TITLE	UNITS
[ CISP 300 and CISP 360 ]	Algorithm Design/Problem Solving (3) Introduction to Structured Programming (4)	5 - 7
or CISP 480	Honors Introduction to Structured Programming (5)	
CISP 400	Object Oriented Programming with C++	4
CISP 430	Data Structures	4
A minimum of 1 unit from the following:		1
CISC 323	Linux Operating System (1)	
CISC 324	Intermediate Linux Operating System (1)	
C++ concentration Units:		14 - 16
Total Units:		18 - 20

### Java concentration

COURSE CODE	COURSE TITLE	UNITS
[ CISP 300 and CISP 360 ]	Algorithm Design/Problem Solving (3) Introduction to Structured Programming (4)	5 - 7
or CISP 480	Honors Introduction to Structured Programming (5)	
CISP 350	Database Programming	3
CISP 401	Object Oriented Programming with Java	4
A minimum of 2 units from the following:		2
CISC 323	Linux Operating System (1)	
CISC 324	Intermediate Linux Operating System (1)	
CISP 310	Assembly Language Programming for Microcomputers (4)	

COURSE CODE	COURSE TITLE	UNITS
CISP 362	Programming for Mobile Devices I (4)	
CISP 363	Programming for Mobile Devices II (4)	
Java concentration Units:		14 - 16
Total Units:		18 - 20

### Visual Basic concentration

COURSE CODE	COURSE TITLE	UNITS
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
Visual Basic concentration Units:		17
Total Units:		21

### 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 Information

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.

### 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.



## Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
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
Total Units:		24

## 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.

## Gainful Employment

The US Department of Education requires colleges to disclose a variety of information for any program that is eligible for financial aid that "prepares students for gainful employment in a recognized occupation." The following link provides Gainful Employment Disclosure information for this certificate program:

[Gainful Employment Information for CIS: Database Management Certificate of Achievement \(https://web.losrios.edu/gainful-emp-info/arc/30633/30633.htm\)](https://web.losrios.edu/gainful-emp-info/arc/30633/30633.htm)

## 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.

## Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
CISA 305	Beginning Word Processing	2

COURSE CODE	COURSE TITLE	UNITS
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
CISC 350	Introduction to Data Communications	1
A minimum of 6 units from the following:		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)	
Total Units:		21

## 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.

## Gainful Employment

The US Department of Education requires colleges to disclose a variety of information for any program that is eligible for financial aid that "prepares students for gainful employment in a recognized occupation." The following link provides Gainful Employment Disclosure information for this certificate program:

[Gainful Employment Information for CIS: Microcomputer Applications Certificate of Achievement \(https://web.losrios.edu/gainful-emp-info/arc/30634/30634.htm\)](https://web.losrios.edu/gainful-emp-info/arc/30634/30634.htm)

## 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.

## Certificate Requirements

COURSE CODE	COURSE TITLE	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 315	Ethical Hacking	3
A minimum of 6 units from the following:		6
CISA 126	Outlook: Basics (1)	
or BUSTEC 126	Outlook: Basics (1)	
BUSTEC 127	Outlook: Tools (1)	
or CISA 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)	
Total Units:		26

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

## 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.
- 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.

## 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.

## Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
CISS 310	Network Security Fundamentals	3
CISS 330	Implementing Internet 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
Total Units:		12

## 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.

## 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.

## Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
CISC 323	Linux Operating System	1
CISC 324	Intermediate Linux Operating System	1
CISS 300	Introduction to Information Systems Security	1
CISS 310	Network Security Fundamentals	3
CISS 315	Ethical Hacking	3
CISS 330	Implementing Internet Security and Firewalls	3
CISS 341	Implementing Windows Operating System Security	3
CISS 342	Implementing Linux Operating System Security	3
CISS 360	Computer Forensics and Investigation	3
CISN 140	CISCO Networking Academy (CCNA)™: Networking Fundamentals (3)	3
or CISN 300	Network Systems Administration (3)	
or CISN 302	Intermediate Network Systems Administration (3)	
Total Units:		24

## 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.

## Gainful Employment

The US Department of Education requires colleges to disclose a variety of information for any program that is eligible for financial aid that "prepares students for gainful employment in a recognized occupation." The following link provides Gainful Employment Disclosure information for this certificate program:

[Gainful Employment Information for Information Systems Security Certificate of Achievement \(https://web.losrios.edu/gainful-emp-info/arc/30404/30404.htm\)](https://web.losrios.edu/gainful-emp-info/arc/30404/30404.htm)

## Internet Marketing Certificate

This certificate offers a program of study for students seeking jobs that require skills in technical marketing applications. It provides opportunities to combine traditional marketing theory with the technical skills needed in today's business environment. Courses address current technology-based business communications, marketing, Internet strategies, applications, and trends.

### Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
BUS 310	Business Communications	3
CISA 330	Desktop Publishing	2
CISA 340	Presentation Graphics	2
CISA 345	Technical Marketing Applications	2
CISA 346	Social Media Applications	1
CISW 350	Imaging for the Web	1
MKT 330	Internet Marketing	3
Total Units:		14

## Student Learning Outcomes

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

- identify and create effective Internet marketing strategies that enhance business relationships with present and future customers.

- apply communication theory, effective writing techniques, and presentation skills to business situations.
- utilize software applications designed to present and promote business in print and visual media.
- devise a marketing plan using social media applications and content platforms for marketing both small and large businesses.
- analyze various software applications for Search Engine Optimization (SEO), analytic tools, web-building and blog applications, email marketing, and other technical marketing tools.

## Career Information

Career opportunities include titles such as social media administrator, digital marketing director, campaign specialist, marketing/events coordinator, media marketing, social media squad, Internet marketing communications, and communications and social media coordinator.

## 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.

### Certificate Requirements

COURSE CODE	COURSE TITLE	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
Total Units:		12

### 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.

### Gainful Employment

The US Department of Education requires colleges to disclose a variety of information for any program that is eligible for financial aid that "prepares students for gainful employment in a recognized occupation." The following link provides Gainful Employment Disclosure information for this certificate program:

[Gainful Employment Information for Network Administration Essentials - Windows Certificate of Achievement \(https://web.losrios.edu/gainful-emp-info/arc/31220/31220.htm\)](https://web.losrios.edu/gainful-emp-info/arc/31220/31220.htm)

## Technical Communications Certificate

This 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.

## Certificate Requirements

COURSE CODE	COURSE TITLE	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
TECCOM 300	Introduction to Technical/Professional Communication	3
TECCOM 330	Technical/Professional Communication: Writing Technical Manuals	3
TECCOM 340	Technical/Professional Communication: Developing Help Systems	1.5
A minimum of 6 units from the following:		6
BUS 100	English for the Professional (3)	
CISW 321	Web Site Development using Dreamweaver (3)	
CISW 400	Client-side Web Scripting (4)	
CISW 410	Middleware Web Scripting (4)	
TECCOM 310	Technical/Professional Communication: Writing Reports (3)	
TECCOM 320	Technical/Professional Communication: Proposal Writing (3)	
Total Units:		21.5 - 22.5

## 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 word processing, page design, help systems development, and web design applications.
- evaluate organizations' communication goals with technical writing ethics in mind.

## Gainful Employment

The US Department of Education requires colleges to disclose a variety of information for any program that is eligible for financial aid that "prepares students for gainful employment in a recognized occupation." The following link provides Gainful Employment Disclosure information for this certificate program:

[Gainful Employment Information for Technical Communications Certificate of Achievement \(https://web.losrios.edu/gainful-emp-info/arc/30454/30454.htm\)](https://web.losrios.edu/gainful-emp-info/arc/30454/30454.htm)

## Career Information

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.

## 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.

## Certificate Requirements

COURSE CODE	COURSE TITLE	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 Websites	1
CISW 410	Middleware Web Scripting	4
A minimum of 4 units from the following:		4
CISW 304	Cascading Style Sheets (2)	
CISW 350	Imaging for the Web (1)	
CISW 355	Web Imaging Projects (2)	
CISW 410	Middleware Web Scripting (4)	
Total Units:		24 - 27

## 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 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.

## Gainful Employment



The US Department of Education requires colleges to disclose a variety of information for any program that is eligible for financial aid that "prepares students for gainful employment in a recognized occupation." The following link provides Gainful Employment Disclosure information for this certificate program:

[Gainful Employment Information for Web Developer Certificate of Achievement \(https://web.losrios.edu/gainful-emp-info/arc/31178/31178.htm\)](https://web.losrios.edu/gainful-emp-info/arc/31178/31178.htm)

## 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.

### Certificate Requirements

COURSE CODE	COURSE TITLE	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 Websites	1
A minimum of 4 units from the following:		4
CISW 310	Advanced Web Publishing (4)	
CISW 400	Client-side Web Scripting (4)	
CISW 410	Middleware Web Scripting (4)	
A minimum of 3 units from the following:		3
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)	
Total Units:		19

### 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.

### Gainful Employment

The US Department of Education requires colleges to disclose a variety of information for any program that is eligible for financial aid that "prepares students for gainful employment in a recognized occupation." The following link provides Gainful Employment Disclosure information for this certificate program:

[Gainful Employment Information for Web Publishing Certificate of Achievement \(https://web.losrios.edu/gainful-emp-info/arc/31181/31181.htm\)](https://web.losrios.edu/gainful-emp-info/arc/31181/31181.htm)

## Certificate

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### CIS: Mobile Programming Certificate

This certificate offers a program of study for students seeking jobs in the fields of mobile application development. It provides opportunities to develop the necessary skills and aptitudes for designing, developing, and testing a variety of application programs for mobile devices.

#### Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
CISP 300	Algorithm Design/Problem Solving (3)	3 - 4
or CISP 370	Beginning Visual Basic (4)	
CISP 362	Programming for Mobile Devices I	4
CISP 360	Introduction to Structured Programming	4
CISP 363	Programming for Mobile Devices II	4
Total Units:		15 - 16

#### Student Learning Outcomes

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

- develop a mobile application program using tools included in a software development kit.
- design software using object-oriented methods to develop event-driven programs for mobile application programs.
- publish mobile applications in an application marketplace.

#### Career Information

Mobile devices such as tablets and smart phones continue to be more cost effective and versatile. Due to the portability, cost, built-in devices and user-friendliness, mobile devices gain much popularity in end-user and commercial markets. As a result, there is a great demand for developers and software engineers who can write application programs for mobile devices. A developer with this certificate can work as an independent mobile application developer or join a team of developers in software firms that specialize in mobile application development.

## Computer Information Science - Applications (CISA)



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Same As:	BUSTEC 126
Units:	1
Hours:	18 hours LEC
Prerequisite:	None.
Advisory:	BUSTEC 300.1

This course introduces Microsoft Outlook, the industry-leading personal information management software. Topics include understanding and navigating the Outlook environment, creating and sending email, using email special features, 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 completed BUSTEC 126.

## Student Learning Outcomes

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

- send and receive email utilizing the special features of Outlook.
- create and modify contacts in an address book.
- create and organize Outlook calendar items.
- create and modify contacts in an address book.
- create and organize Outlook calendar items.
- incorporate tasks and to-do items into the personal information management software.
- distinguish between Outlook in an Exchange environment and a stand-alone environment.
- identify the potential risks associated with the use of email.

## CISA 127 Outlook: Tools

Same As:	BUSTEC 127
Units:	1
Hours:	18 hours LEC
Prerequisite:	BUSTEC 126 or CISA 126 with a grade of "C" or better
Advisory:	BUSTEC 300.1 with a grade of "C" or better

This course presents the advanced personal information management tools in Outlook. Topics include working with multiple email accounts, using rules and folders, incorporating advanced calendar and contact features, collaborating using sharing and delegate features, and customizing the Outlook user interface. In addition, the course covers the integration of Outlook with other applications in 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 completed BUSTEC 127.

## Student Learning Outcomes

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

- incorporate multiple email accounts into Outlook.
- integrate rules and folders into communication management.
- apply Outlook features to find, manage, and archive information.
- collaborate with other Outlook users by using sharing and delegates.
- customize contacts and calendars using advanced Outlook features.
- revise the Outlook user environment.

# CISA 160 Project Management Techniques and Software

Same As:	MGMT 142
Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	ENGWR 102 or 103, and ENGRD 116; OR ESLR 320 and ESLW 320; CISC 300

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.

## Student Learning Outcomes

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

- construct a basic plan of action utilizing project management software.
- compare and contrast various theories of leadership and motivation.
- explain the principles of project management with regard to case studies.
- demonstrate the ability to formulate a project plan, given specific scenarios.
- assess the inherent advantages and shortcomings in various software packages.

# CISA 171 Introduction to Adobe Acrobat

Units:	1
Hours:	9 hours LEC; 27 hours LAB
Prerequisite:	None.

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, creating dynamic forms, manipulating graphics, and using Acrobat in a review cycle.

## Student Learning Outcomes

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

- create and enhance Adobe Portable Document File(s)(PDF).
- convert images, emails and non-PDF file types to a PDF file and evaluate the optimum balance between file size and quality for specific needs.
- formulate a document review cycle, using different levels of document security to limit users' ability to manipulate the contents.
- produce dynamic forms that capture and share information electronically.
- analyze documents for user accessibility and flexibility.
- effectively use Adobe Acrobat Help.
- scan a paper document to a PDF file.

# CISA 305 Beginning Word Processing

Units:	2
Hours:	27 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 300
Transferable:	CSU
General Education:	AA/AS Area II(b)

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.

### Student Learning Outcomes

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

- analyze document requirements
- create business documents that require the integration of text, charts, and/or graphics for distribution or presentation
- design strategies for merging and integrating source data from different applications
- plan and execute strategies for working with multiple documents, templates, macros, and techniques for using and editing pre-designed styles from the Style Gallery
- analyze appropriate layout and design of documents for specific audiences
- solve errors in document formatting and printer faults by changing options and preferences

## CISA 306 Intermediate Word Processing

Units:	2
Hours:	27 hours LEC; 27 hours LAB
Prerequisite:	CISA 305 with a grade of "C" or better
Transferable:	CSU

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.

### Student Learning Outcomes

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

- analyze document layouts to determine page formatting features to be used for multi-column formats which include graphics
- arrange files by utilizing procedures for creating and using folders, customizing environments and using advanced file management options for copying, sorting, and selecting specific files
- create, edit, and apply customized styles to enhance document display
- plan and create online forms and tables for efficient data display and input data into customized forms
- edit and customize macros
- apply desktop publishing features found in word processing packages and apply desktop publishing rules in producing professional business documents
- import spreadsheet and database files into word processing applications

- link and manage linked spreadsheet and database files
- import and edit clip art and scanned images to produce newsletters, single-, or multi-column layout documents

## CISA 308 Exploring Word Processing and Presentation Software

Units:	1
Hours:	18 hours LEC
Prerequisite:	None.
Transferable:	CSU

This 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.

### Student Learning Outcomes

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

- evaluate efficient techniques in creating and formatting typical business documents
- analyze document requirements and use correct features when creating business documents that require the integration of text, charts, and/or graphics for distribution or presentation
- compare various data manipulation features such as cut/copy/paste, sort, and merge
- choose from among various formatting options such as: margins, headers/footers, and page orientation
- create and format tables for efficient data display utilizing options in table properties
- evaluate and analyze appropriate layout and design for specific audiences
- design a basic presentation

## CISA 315 Introduction to Electronic Spreadsheets

Units:	2
Hours:	27 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 100 or 300
Transferable:	CSU
General Education:	AA/AS Area II(b)

This course introduces the basic concepts and applications of an electronic spreadsheet program, including organizing, creating, and modifying a spreadsheet. It presents the basics of entering data in a worksheet using columns and rows, labels, and values; completing worksheet calculations using formulas and functions; and producing professional looking charts. In addition, the course introduces formatting, sorting, querying, and multi-sheet management. It also introduces 3-D cell referencing, financial functions, "Goal Seek", "VLOOKUP", "What If", and decision-making.

### Student Learning Outcomes

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

- navigate to and from storage locations, open and close a spreadsheet application, and recognize window components
- plan, construct, and edit worksheets that are efficient, accurate, and professional

- perform an array of basic worksheet tasks such as analyzing worksheet data using “Goal Seek”, “IF”, “Subtotaling”, “What If”, and “VLOOKUP” procedures
- format all or portions of a worksheet using standard layouts, formats, styles, and themes; as well as special number formats and conditional formatting
- apply advanced worksheet features such as aggregate and financial functions, tables, templates, as well as multiple worksheet consolidation and 3-D cell referencing procedures
- design, create, and revise embedded as well as stand-alone charts based on commonly used standards
- perform basic chart tasks such as selecting labels and values, choosing a chart type, moving and resizing a chart, applying a design and format, as well as annotating and drawing on a chart
- apply advanced spreadsheet features such as a data table and list features to worksheets

## CISA 316 Intermediate Electronic Spreadsheets

Units:	2
Hours:	27 hours LEC; 27 hours LAB
Prerequisite:	CISA 315 with a grade of "C" or better
Transferable:	CSU

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.

### Student Learning Outcomes

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

- apply conditional formatting by entering parameters for rules, utilizing predefined rules and constructing new rules for individual or grouped worksheets.
- restrict data entry and ensure data integrity by creating validation criteria and rules.
- create and edit links to external references and other workbooks.
- construct formulas using named ranges and advanced features of financial, logical, lookup, and database functions.
- produce a worksheet database and manipulate, extract, and analyze data by applying advanced math functions and data filtering options.
- integrate data from various computer applications and web sites into a workbook using consolidation techniques and prepare workbook data for distribution to other applications.
- create, edit, and format a PivotTable and PivotChart.
- audit a worksheet using auditing tools to trace precedents, troubleshoot, and resolve errors in formulas.
- create, edit, and run macros using shortcut key combinations.

## CISA 318 Exploring Spreadsheet Software

Units:	1
Hours:	18 hours LEC

Prerequisite:	None.
Transferable:	CSU

This 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.

### Student Learning Outcomes

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

- plan, build, test, and document worksheets
- create formulas and manipulate data using mathematical operators in addition to financial, statistical, and logical functions
- design spreadsheet formatting using colors, patterns, and borders
- design worksheet entries with relative, mixed, and absolute cell references
- plan and construct various types of charts based on the most effective and appropriate display of data
- analyze worksheet data using "what-if" scenarios and "Goal Seek"
- evaluate basic database sorting and filtering techniques
- assess data from the Internet using a browser, search, and hyperlink capabilities
- create web queries to get real-time spreadsheet data from web sites
- design headers, footers, annotations, and other documentation
- analyze data using subtotals, pivot tables, and pivot charts
- create standardized workbooks using templates, styles, and macros

## CISA 320 Introduction to Database Management

Units:	1
Hours:	9 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	BUSTEC 300.1 and CISC 300
Transferable:	CSU
General Education:	AA/AS Area II(b)

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.

### Student Learning Outcomes

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

- describe basic database functions, such as developing a query, and sorting, searching, filtering, and calculating data
- create database structures, and import and export data
- design and create database tables, queries, joins, forms, and reports
- use database functions, such as filing, retrieving, updating, and calculating



# CISA 322 Design and Development of Desktop Database Applications

Units:	3
Hours:	36 hours LEC; 54 hours LAB
Prerequisite:	CISA 320 with a grade of "C" or better
Transferable:	CSU

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.

## Student Learning Outcomes

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

- analyze needs and determine appropriate data structures and solutions.
- create tables, queries, forms, and reports.
- formulate multiple table queries with complex criteria.
- design forms for data entry and data views.
- interpret data with crosstab queries, pivot tables, and reports.
- build tables by importing delimited data and exporting data to spreadsheet applications.
- design and implement multiple table data management systems involving custom forms, reports, and labels.
- manage, backup, and repair database objects.

# CISA 330 Desktop Publishing

Units:	2
Hours:	27 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	BUSTEC 100.1 and CISC 300
Transferable:	CSU

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 other marketing material. Additionally, it covers importing and placing graphics and text, using layers, master pages, frames, creating graphics using the pen tool, and working with color both digitally and in print.

## Student Learning Outcomes

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

- develop settings and preferences to create single and multi-page documents.
- apply the vocabulary and tools associated with navigating the desktop publishing work area.
- define the proper use of text tools, such as leading, tracking, and kerning.
- create and apply styles to format text.
- assemble, import, and arrange text and graphics working with frames and layers.
- create, set up, apply, and modify master pages.

- prioritize layers, and stack, align, and distribute frames/objects on a page.
- apply colors to objects and text.
- create graphics using the Pen tool.
- originate commonly used printed marketing documents using desktop publishing software.
- analyze the potential for desktop publishing use in business and organizational communications.

## CISA 331 Intermediate Desktop Publishing

Units:	2
Hours:	27 hours LEC; 27 hours LAB
Prerequisite:	CISA 330 with a grade of "C" or better
Advisory:	BUS 100
Transferable:	CSU

This course builds upon previous desktop publishing software concepts and study. Topics include working with effects and advanced techniques, 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.

### Student Learning Outcomes

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

- assemble text using formatting styles and grids.
- apply styles, tabs, and rules to paragraphs and long text.
- create complicated printed documents.
- create or import, modify, and enhance tables.
- apply opacity, effects, color blends, and object styles to visually enhance documents.
- create book files, table of contents, and indexes.
- combine multiple documents into a book file.
- export and generate an Adobe PDF file.
- convert a print document for online use.

## CISA 340 Presentation Graphics

Units:	2
Hours:	27 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 300
Transferable:	CSU

This course provides 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 software and hardware.

## Student Learning Outcomes

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

- demonstrate effective design principles and concepts when preparing presentations.
- apply audience analysis techniques to establish criteria for the presentation approach.
- evaluate visual presentations by utilizing standard guidelines, tools, and techniques used in today's business world.
- integrate graphics, word processing and spreadsheet information, and sound in the development of a presentation.
- create visual appeal through custom animation, transitions, and motion paths.
- create hyperlinks, and also embed and link objects and files.
- create and edit tables, charts, diagrams, templates, and custom photo album presentations.
- plan and publish presentations for the Web.

## CISA 345 Technical Marketing Applications

Units:	2
Hours:	27 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 305
Transferable:	CSU

This course provides an overview of online marketing applications. It includes creating websites using cloud based software, building media-rich content for blogs, and developing marketing strategies using Search Engine Optimization (SEO) tools such as Google Analytics. It also covers email marketing software to create and manage mailing lists, newsletters, and automated campaigns. Additionally, it covers audience building with other cloud based marketing tools such as podcasts, ebooks, webinars, and more. All software used in this course is free, cloud based, and mobile.

## Student Learning Outcomes

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

- develop a website using online template tools
- create a blog and connect it with a website
- evaluate and prepare Search Engine Optimization (SEO) and Inbound Marketing tactics
- create SEO content types (content marketing) to include text, images, video, graphics, and presentations
- assess and set up webmaster tool applications and measurement techniques used to evaluate digital marketing (analytics)
- examine paid search marketing pay-per-click (PPC)
- utilize an online application to set up an email marketing campaign
- research other internet marketing platforms such as podcasts, ebooks, and webinars

## CISA 346 Social Media Applications

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Units:	1
Hours:	18 hours LEC; 18 hours LAB
Prerequisite:	None.
Advisory:	CISC 305
Transferable:	CSU

This course introduces a variety of social media applications and content platforms for marketing both small and large businesses. It includes popular applications for online social networking services (Facebook Pages for business), microblogging (Twitter), visual bookmark boards (Pinterest), video-sharing websites and YouTube channels, Internet based photo and video sharing apps (Instagram and Snapchat), and image editing mobile apps specifically for marketing. It also includes tracking social media, apps and integration, link building, and monetization.

## Student Learning Outcomes

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

- analyze various forms of social media technology used in marketing
- create a business platform using online social networking services
- set up and use a microblogging application
- create and add content to a visual bookmark board application
- create and use Internet based photo and video sharing applications
- edit, compress, and create graphics using online photo editing and graphic marketing design applications
- originate, edit, and post video for marketing purposes using online video editing and hosting sites
- combine and set up links for all media to connect and promote for business
- critique social media for marketing using analytic tools and applications

## CISA 348 Exploring Presentation Graphics

Units:	1
Hours:	18 hours LEC
Prerequisite:	None.
Transferable:	CSU

This course provides students with sufficient knowledge and skills to prepare presentations in a variety of courses. Topics include planning, designing, and preparing presentations; enhancing presentations with media; creating posters, tables, and statistical charts; interactivity, advanced animation, and hyperlinks; customizing a slide show; and collaborating, securing, and sharing a presentation.

## Student Learning Outcomes

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

- plan, design, and prepare a presentation.
- incorporate media into a digital presentation.
- create posters, tables, and statistical charts with presentation graphics software.
- incorporate interactivity, advanced animation, and hyperlinks into a digital presentation.
- adapt a digital slide show.
- develop a digital presentation collaboratively.

- construct, secure, and share a digital presentation.

## Computer Information Science - Core (CISC)

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### CISC 100 Computer Fundamentals with Hands-on Lab

Units:	2
Hours:	27 hours LEC; 27 hours LAB
Prerequisite:	None.

This introductory course develops basic computer skills needed for college-level courses, workplace productivity, and personal enrichment. It provides individuals who are new to computing or who have very little computing experience with slower paced, general, non-technical information as well as in-class hands-on instruction reinforcement. This course introduces common computer terminology and concepts, file management, electronic mail, online course management, productivity application software, and the Internet.

#### Student Learning Outcomes

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

- identify and name the most common digital computing devices
- identify and name basic operating system commands, tasks, and primary user interface components
- identify and name the basic components of a desktop computer system including most common interactive devices
- identify and name differences and similarities between system software and application software
- manage files and documents using file management system procedures
- use contemporary business productivity software
- use Internet and educational technologies
- use an electronic mail system
- define common computer terms

### CISC 294 Topics in Computer Information Science - Core

Units:	0.5 - 5
Hours:	9 - 72 hours LEC
Prerequisite:	None.

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.

#### Student Learning Outcomes

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

- evaluate current issues and emerging technologies in computer science and information technology.
- apply hands-on experience using current techniques of computer science and information technology.

- examine computer science and information technology issues that affect daily lives.

## CISC 295 Independent Studies in Computer Information Science - Core

Units:	1 - 3
Hours:	54 - 162 hours LAB
Prerequisite:	None.

Independent Study is an opportunity for the student to extend classroom experience in this subject, while working independently of a formal classroom situation. Independent study is an extension of work offered in a specific class in the college catalog. To be eligible for independent study, students must have completed the basic regular catalog course at American River College. They must also discuss the study with a professor in this subject and secure approval. Only one independent study for each catalog course will be allowed.

## CISC 300 Computer Familiarization

Units:	1
Hours:	18 hours LEC
Prerequisite:	None.
Advisory:	ENGRD 116 or ESLR 320, and the ability to touch type.
Transferable:	CSU
General Education:	AA/AS Area II(b); AA/AS Area III(b)

This introductory course develops and improves the basic computer skills necessary for college-level courses, workplace productivity, and personal enrichment. It introduces common computer terminology and concepts, file management, electronic mail, online learning, productivity application software, and the Internet.

### Student Learning Outcomes

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

- identify and name the most common digital computing devices.
- identify and name basic operating system commands, tasks, and primary user interface components.
- employ the mouse as a navigational tool to select ribbon tabs, icons, text, and screen options.
- manage stored files using file management procedures.
- create, save, and print word processing documents using basic editing and formatting techniques.
- create, preview, save, and print spreadsheets using basic data entry, editing, and formatting techniques.
- employ Internet and educational technologies.
- employ an electronic mail system.
- define common computer terms.

## CISC 305 Introduction to the Internet

Units:	1
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Hours:	18 hours LEC; 18 hours LAB
Prerequisite:	None.
Advisory:	CISC 300 and 320
Transferable:	CSU

This course introduces how the Internet works and how to effectively use basic Internet services. Topics include browser basics, search engines and search techniques, e-mail, the World Wide Web, Internet security, Internet resources, the Cloud, social networking, and building basic web pages using Hypertext Markup Language (HTML).

## Student Learning Outcomes

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

- describe the structure of the Internet, the World Wide Web, the Internet browser, and a web page.
- evaluate and critique various types of information sources on the Internet.
- apply and effectively use the World Wide Web and a web browser to search for and locate specific information on the Internet.
- research how technology can help with life skills, including local and world news, finding health services, educational resources, travel, and banking online.
- create professional email accounts, including using address and mailing lists, attaching files, learning proper etiquette, and identifying security risks.
- analyze Internet security risks and explain how to protect a PC from viruses, trojans, spam, spyware, rootkits, and keyloggers.
- define different types of cloud computing and explain the benefits and security risks.
- utilize social networking sites such as Facebook, Twitter, LinkedIn, photoshare, and other popular sites. Explain the marketing value and the risks with each.
- construct a basic web page using plain HTML code.

## CISC 306 Introduction to Web Page Creation

Units:	1
Hours:	18 hours LEC; 18 hours LAB
Prerequisite:	None.
Advisory:	CISC 305
Transferable:	CSU

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.

## Student Learning Outcomes

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

- evaluate content needs for a web page.
- design a web page.
- create and format web pages using a web authoring tool.
- publish web pages to a web server.
- apply industry standard web design techniques.

## CISC 308 Exploring Computer Environments and the Internet

Units:	1
Hours:	18 hours LEC
Prerequisite:	None.
Transferable:	CSU

This 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.

### Student Learning Outcomes

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

- classify various types of computers and how they work
- distinguish the basic components of a computer
- evaluate effective procedures for creating and managing folders
- design custom computer settings utilizing the control panel and other accessories
- create effective operating system searches to locate files, folders, and data stored within folders using various filenames and wildcards
- choose the correct commands to capture and print screens
- evaluate operating system commands required to store, manage, back-up, access, and maintain files stored on various drives and other storage devices
- create, modify, and delete files using Windows Explorer
- compare and contrast basic operating system and Internet terminology and concepts
- design efficient Internet search techniques using search engines and subject directories

## CISC 310 Introduction to Computer Information Science

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Transferable:	CSU; UC
C-ID:	C-ID BUS 140; C-ID ITIS 120

This course examines information technology and its role in solving business problems. Topics include information systems, database management systems, networking, e-commerce, ethics and security, and computer systems hardware and software components. These concepts and related methods are applied through hands-on projects to develop computer-based solutions to business problems.

### Student Learning Outcomes

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

- explain how a computer system works.
- differentiate between the hardware and software components of a computer network.
- differentiate between the hardware components of a computer system.



- differentiate between system software and application software.
- differentiate between the most commonly used computer operating systems.
- explain the basic operation of networks.
- differentiate the types of computer networks.
- demonstrate the secure utilization of Internet resources.
- propose methods for insuring the security of business information systems.
- discuss and relate the different phases of the System Development Cycle.
- demonstrate an understanding of the development and use of information systems in business.
- recommend methods of assessing business information systems.
- solve common business problems using appropriate information technologies.
- manipulate databases using database management software.
- build software solutions to business problems using Internet technologies.
- evaluate the impact of information and computer technology on organizations and society including e-commerce, ethics, copyright, privacy, and security.

## CISC 320 Operating Systems

Units:	1
Hours:	18 hours LEC; 18 hours LAB
Prerequisite:	None.
Transferable:	CSU

This course introduces the basic features of the Windows operating system for the PC. Topics include managing files, folders, and libraries, operating system services, program management, maintenance of disks and storage media, Windows desktop, browser basics, and the Windows help system. A brief introduction to security and the command prompt is also covered.

### Student Learning Outcomes

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

- analyze proper file naming conventions and explain file extensions and program associations.
- apply built-in file management utilities to create, organize, copy, move, rename, and delete files, folders, shortcuts, and libraries on storage devices or media.
- explain the purpose of and use the Windows Task Manager.
- explain the purpose of and use the Windows Print manager. describe the properties of Windows objects: desktop, icons, menu structure, tool-bars, windows, dialog boxes, controls, settings, and views.
- utilize the Control Panel to configure and/or customize the properties of the desktop, taskbar, display, keyboard, mouse, and other peripheral devices.
- utilize the various types of help available by using menus, keywords, or the Internet.
- apply basic Windows maintenance utilities.
- apply basic security including anti-virus use.

- use commands at the command prompt.
- use accessory and utility programs that are installed with Windows to accomplish tasks such as write memos, edit clip art, check disk drives, play audio and video files, and burn CDs or DVDs.
- describe the properties of Windows objects: desktop, icons, menu structure, tool-bars, windows, dialog boxes, controls, settings, and views.

## CISC 323 Linux Operating System

Units:	1
Hours:	18 hours LEC; 18 hours LAB
Prerequisite:	None.
Advisory:	CISC 300 and ability to touch type.
Transferable:	CSU

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.

### Student Learning Outcomes

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

- analyze the relationship of the operating system kernel, shell interface, windowing system, applications programs and the user to each other.
- utilize a command line interface (CLI) and GUI text editor to create and edit files in the Linux file system.
- employ the use of basic Linux GUI applets and CLI commands in file, disk, video and printer management.
- formulate CLI commands with correct syntax.
- compare Linux with other operating systems.
- utilize the Linux file system and apply industry standard file security.
- explain and define open-source theory, jargon, practice, and licensing.
- utilize a GUI and/or CLI to complete basic system administration and day-to-day tasks on the computer.

## CISC 324 Intermediate Linux Operating System

Units:	1
Hours:	18 hours LEC; 18 hours LAB
Prerequisite:	CISC 323 with a grade of "C" or better
Transferable:	CSU

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.

### Student Learning Outcomes

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

- set up a Linux and Microsoft Windows dual booting system.

- set up, configure, and troubleshoot a boot loader.
- utilize advanced BASH CLI utilities to inspect and maintain the system and its hardware.
- compare C shell, K shell, and BASH.
- create BASH script files utilizing looping structures: do, while, until.
- create BASH script files implementing decision making logic using: if, for, case and nesting.
- describe the use of text stream editor and filters such as awk and sed.
- compose a regular expression for use by the grep utility.

## CISC 350 Introduction to Data Communications

Units:	1
Hours:	18 hours LEC
Prerequisite:	None.
Advisory:	CISC 300 and ability to touch type.
Transferable:	CSU

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.

### Student Learning Outcomes

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

- Explain the evolution of data communications and the impact of technology on communication methods in business and the home.
- Define data communications terminology.
- Analyze the hardware and software needed to communicate using a standalone computer or a local area network.
- Evaluate different methods used for data communications applications.
- Design and select the equipment specifications for a small home or office network.
- Explain the primary differences between various types of data communication technologies.

## CISC 351 Introduction to Local Area Networks

Units:	1
Hours:	18 hours LEC; 18 hours LAB
Prerequisite:	None.
Advisory:	CISC 320 and 350
Transferable:	CSU

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.

### Student Learning Outcomes

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

- describe the functions of a LAN and the devices that may reside on a LAN.
- examine the advantages and disadvantages of peer-to-peer LANs vs. domain-based LANs.
- explain LAN topologies, types of cabling, standards, media and access methods.
- perform the basic functions required for day-to-day LAN administration, such as: creating a directory structure and network shares, creating users and groups, defining user rights, setting access permissions, and configuring user profiles.
- analyze the advantages and disadvantages of resource sharing on a LAN and the factors to be considered when planning and implementing a LAN.
- analyze the security implications of peer-to-peer vs. centralized LAN administration.
- evaluate the security implications of a user being a member of multiple groups and the potential impacts on the effective permissions for the user.
- analyze best practices for sharing file resources and configure the Microsoft New Technology File System (NTFS) permissions for group and user needs.
- evaluate LAN security and configure shares, permissions and authentication security in accordance with best practices.
- create a plan to combat viruses, Trojans, network worms, spyware and adware as it relates to LAN security and file integrity.

## CISC 361 Microcomputer Support Essentials - Preparation for A+ Certification

Units:	3
Hours:	42 hours LEC; 36 hours LAB
Prerequisite:	None.
Advisory:	CISC 310, 320, and 350
Transferable:	CSU

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.

### Student Learning Outcomes

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

- Identify the names, purpose, and characteristics of typical microcomputer system components.
- Install, configure, optimize and upgrade personal computer components for desktop computers.
- Identify tools, diagnostic procedures and troubleshooting techniques for personal computer components.
- Diagnose common problems associated with components based upon the symptoms.
- Define the types of random access memory (RAM), form factors, and operational characteristics.
- Distinguish between popular central processing unit (CPU) chips in terms of their basic characteristics and performance.
- Assemble and disassemble microcomputers to the component level.
- Perform preventative maintenance on personal computer components.

# CISC 362 Microcomputer and Applications Support

Units:	2
Hours:	24 hours LEC; 36 hours LAB
Prerequisite:	None.
Corequisite:	CISC 361
Advisory:	CISA 305, 315, and 320
Transferable:	CSU

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.

## Student Learning Outcomes

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

- demonstrate proficiency in customer service skills in the areas of active listening, and written and oral communication.
- diagnose, document, and communicate microcomputer problems and solutions using acceptable terminology.
- analyze and troubleshoot hardware and software problems in a variety of multi-user computer lab environments.
- apply business and team building skills for technical professionals.
- identify the causes of stress in computer support and apply stress reduction coping skills.

# CISC 363 Microcomputer Support Technical - Preparation for A+ Certification

Units:	3
Hours:	42 hours LEC; 36 hours LAB
Prerequisite:	CISC 361 with a grade of "C" or better
Transferable:	CSU

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.

## Student Learning Outcomes

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

- Set up, demonstrate, and troubleshoot the three most commonly used PC operating systems.
- Assemble, administer, and troubleshoot a basic networking system.
- Demonstrate the installation, configuration, and troubleshooting of advanced computer devices.
- Differentiate types of physical network architectures.
- Explain disaster recovery procedures.
- Support, upgrade, and add peripheral devices to notebook computers.
- Identify and recover from viruses.
- Identify the fundamental principles of security.

## CISC 495 Independent Studies in Computer Information Science - Core

Units:	1 - 3
Hours:	54 - 162 hours LAB
Prerequisite:	None.
Transferable:	CSU

Independent Study is an opportunity for the student to extend classroom experience in this subject, while working independently of a formal classroom situation. Independent study is an extension of work offered in a specific class in the college catalog. To be eligible for independent study, students must have completed the basic regular catalog course at American River College. They must also discuss the study with a professor in this subject and secure approval. Only one independent study for each catalog course will be allowed.

## CISC 498 Work Experience in Computer Information Science - Core

Units:	1 - 4
Hours:	60 - 300 hours LAB
Prerequisite:	None.
Enrollment Limitation:	Students must be in a paid or unpaid internship, volunteer position, or job related to computer information science with a cooperating site supervisor. Students are advised to consult with the Computer Information Science Department faculty to review specific certificate and degree work experience requirements.
Advisory:	Eligible for ENGRD 310 or ENGRD 312 AND ENGWR 300; OR ESLR 340 AND ESLW 340.
Transferable:	CSU
General Education:	AA/AS Area III(b)

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 Title 5 required forms which document the student's progress and hours spent at the work site, and developing workplace skills and competencies.

During the semester, the student is required to complete 75 hours of related paid work experience, or 60 hours of related unpaid work experience for one unit. An additional 75 or 60 hours of related work experience is required for each additional unit. All students are required to attend the first class meeting, a mid-semester meeting, and a final meeting. Additionally, students who have not already successfully completed a Work Experience course will be required to attend weekly orientations while returning participants may meet individually with the instructor as needed. Students may take up to 16 units total across all Work Experience course offerings. This course may be taken up to four times when there are new or expanded learning objectives. Only one Work Experience course may be taken per semester.

### Student Learning Outcomes

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

- demonstrate application of industry knowledge and theoretical concepts in computer information science related to a transfer degree level career as written in the minimum three (3) learning objectives created by the student and his/her employer or work site supervisor at the start of the course.
- make effective decisions, use workforce information, and manage his/her personal career plans.
- behave professionally, ethically, and legally at work, consistent with applicable laws, regulations, and organizational norms.
- behave responsibly at work, exhibiting initiative and self-management in situations where it is needed.
- apply effective leadership styles at work, with consideration to group dynamics, team and individual decision making, and workforce diversity.
- communicate in oral, written, and other formats, as needed, in a variety of contexts at work.
- locate, organize, evaluate, and reference information at work.

- demonstrate originality and inventiveness at work by combining ideas or information in new ways, making connections between seemingly unrelated ideas, and reshaping goals in ways that reveal new possibilities using critical and creative thinking skills such as logical reasoning, analytical thinking, and problem-solving.

## Computer Information Science - Networking (CISN)

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### CISN 110 Networking Technologies - Preparation for N+ Certification

Units:	2
Hours:	36 hours LEC
Prerequisite:	None.

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.

#### Student Learning Outcomes

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

- describe the function and responsibility of each of the seven layers of the OSI model.
- identify industry standards, protocols, and network connection devices.
- demonstrate knowledge of network architectures, topology, protocols, hardware and software.
- identify and test network cables.
- identify a variety of media types and their key characteristics, including cost, speed and capacity, resistance to interface, and ease of installation.

### CISN 111 Intermediate Networking Technologies - Preparation for N+ Certification

Units:	2
Hours:	36 hours LEC
Prerequisite:	CISN 110 with a grade of "C" or better

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.

#### Student Learning Outcomes

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

- Apply, install, and administer several industry standard vendor network operating systems.
- Analyze network performance bottlenecks and provide problem resolution.
- Analyze network performance with monitoring and troubleshooting tools.
- Create peer-to-peer and simple client-server networks.
- Create network resources across Local Area Network (LAN) and Wide Area Network (WAN) links.
- Employ rudimentary network security.

## CISN 118 Internet Protocol Subnetting

Units:	1
Hours:	18 hours LEC
Prerequisite:	None.
Advisory:	CISN 110; and MATH 25 OR Math 41

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.

### Student Learning Outcomes

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

- Describe number system structures.
- Perform calculations using different number systems, especially adding and subtracting binary and hexadecimal numbers.
- Classify IP addresses.
- Convert binary number values to decimal number values, and decimal number values to binary number values.
- Evaluate a custom subnet mask for effectiveness in a given scenario.
- Evaluate solutions to problems using VLSMs.
- Analyze solutions to problems using CIDR.
- Explain the need for IPV6.
- Compare and contrast IPV6 and IPV4.

## CISN 119 TCP/IP Protocols

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	CISC 350

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.

### Student Learning Outcomes

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

- compare the Open Systems Interconnection (OSI) model to the TCP/IP model
- construct valid IP addresses
- compare and contrast routing and tunneling
- demonstrate IP subnetting for IPv4



- compare IPV4/IPV6
- explain virtual private networks
- explain network address translation
- explain Requests for Comments (RFCs)

## CISN 120 Beginning Network Administration with Linux

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	CISC 323 with a grade of "C" or better
Advisory:	CISC 324

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.

### Student Learning Outcomes

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

- describe the major components of a Linux network operating system.
- discuss Linux licensing and copyright issues in layman's terms.
- design, build, and maintain a logical and organized electronic file system.
- analyze and construct user accounts and groups using best practices for security.
- utilize the basic Linux network utilities to troubleshoot network connectivity.
- install and configure network printing resources.
- install and configure network/server applications.
- analyze system backup methodologies and best practices for scheduling backups and restoring files and system state data.
- plan and implement a recompile of the Linux kernel.
- research and identify good Internet resources for obtaining answers to common problems, network anomalies and Linux server problems.

## CISN 121 Network Administration with Linux: LAN Services

Units:	2
Hours:	27 hours LEC; 27 hours LAB
Prerequisite:	CISN 120 with a grade of "C" or better
Advisory:	CISN 119

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.

## Student Learning Outcomes

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

- discuss core Linux intranet services and daemons.
- configure and troubleshoot core Linux intranet services and daemons.
- install and configure services to allow a Linux system to share network resources with other Linux systems and Microsoft Windows systems.
- customize and maintain auditing and system logs.
- analyze auditing and system event logs.
- install and use a MySQL SQL Server.

## CISN 122 Network Administration with Linux: Internet Services

Units:	2
Hours:	27 hours LEC; 27 hours LAB
Prerequisite:	CISN 120 with a grade of "C" or better
Advisory:	CISN 119

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.

## Student Learning Outcomes

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

- discuss core Linux Internet services and daemons.
- customize and troubleshoot core Linux Internet services and daemons.
- define and discuss key concepts related to email, web services, and firewalls.
- install, configure and use the major Linux daemons for Internet services such as email, firewall, etc.
- install, configure and use the Apache Web Server.
- install, configure and use the Webmin Linux web-based administration tool.

## CISN 140 CISCO Networking Academy (CCNA)™: Networking Fundamentals

Units:	3
Hours:	54 hours LEC; 18 hours LAB
Prerequisite:	None.
Advisory:	CISC 310, 320, or 350

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).

## Student Learning Outcomes

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

- explain the importance of data networks and the Internet in supporting business communications and everyday activities.
- explain how communication works in data networks and the Internet.
- recognize the devices and services that are used to support communications across an Internetwork.
- use network protocol models to explain the layers of communications in data networks.
- describe the importance of addressing and naming schemes at various layers of data networks.
- describe the protocols and services provided by the application layer in the OSI and TCP/IP models and describe how this layer operates in various networks.
- analyze the operations and features of transport layer protocols and services.
- analyze the operations and feature of network layer protocols and services and explain the fundamental concepts of routing.
- design, calculate, and apply subnet masks and addresses to fulfill given requirements.
- describe the operation of protocols at the OSI data link layer and explain how they support communications.
- explain the role of physical layer protocols and services in supporting communications across data networks.
- explain fundamental Ethernet concepts such as media, services, and operation.
- employ basic cabling and network designs to connect devices in accordance with stated objectives.
- build a simple Ethernet network using routers and switches.
- use Cisco command-line interface (CLI) commands to perform basic router and switch configuration and verification.
- analyze the operations and features of common application layer protocols such as Hypertext Transfer Protocol (HTTP), Domain Name System (DNS), Dynamic Host Configuration Protocol (DHCP), Simple Mail Transfer Protocol (SMTP), Telnet, and File Transfer Protocol (FTP).
- utilize common network utilities to verify small network operations and analyze data traffic.

## CISN 141 CISCO Networking Academy (CCNA)™: Routing Protocols and Concepts

Units:	3
Hours:	54 hours LEC; 18 hours LAB
Prerequisite:	CISN 140 with a grade of "C" or better

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).

## Student Learning Outcomes

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

- describe the purpose, nature, and operations of a router.
- explain the critical role routers play in enabling communications across multiple networks.
- describe the purpose and nature of routing tables.
- describe how a router determines a path and switches packets.
- explain the route look up process and determine the path packets will take in a network.
- configure and verify basic operations for a newly-installed router.
- describe, configure, and certify router interfaces.
- describe the purpose of static routes and the procedure for configuring them.
- configure and verify static and default routing.
- describe the role of dynamic routing protocols and place these protocols in the context of modern network design.
- describe how metrics are used by routing protocols and identify the metric types used by dynamic routing protocols.

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- identify the characteristics of distance vector routing protocols.
- describe the network discovery process of distance vector routing protocols using Routing Information Protocol (RIP).
- describe the functions, characteristics, and operations of the RIPv1 protocol.
- compare and contrast classful and classless IP addressing.
- describe classful and classless routing behaviors in routed networks.
- design and implement a classless IP addressing scheme for a given network.
- describe the main features and operations of the Enhanced Interior Gateway Routing Protocol (EIGRP).
- use advanced configuration commands with routers implementing EIGRP and OSPF.
- describe the basic features and concepts of link-state routing protocols.
- describe the purpose, nature, and operations of the Open Shortest Path First (OSPF) Protocol.
- configure and verify basic RIPv1, RIPv2, single area OSPF, and EIGRP operations in a small routed network.
- demonstrate comprehensive RIPv1 configuration skills.
- use router show and debug commands to troubleshoot common errors that occur in small routed networks.

## CISN 142 CISCO Networking Academy (CCNA)™: LAN Switching and Wireless

Units:	3
Hours:	54 hours LEC; 18 hours LAB
Prerequisite:	CISN 140 with a grade of "C" or better

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).

## Student Learning Outcomes

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

- identify and correct common network problems at layers 1, 2, 3, and 7 using a layered model approach.
- interpret network diagrams.
- select the appropriate media, cables, ports, and connectors to connect switches to other network devices and hosts.
- explain the technology and media access control method for Ethernet networks.
- explain basic switching concepts and the operation of Cisco switches.
- perform and verify initial switch configuration tasks including remote access management.
- describe enhanced switching technologies such as VLANs, VLAN Trunking Protocol (VTP), Rapid Spanning Tree Protocol (RSTP), Per VLAN Spanning Tree Protocol (PVSTP), and 802.1 q.
- describe how VLANs create logically separate networks and how routing occurs between them.
- configure, verify, and troubleshoot VLANs, trunking on Cisco switches, interVLAN routing, VTP, and RSTP.
- interpret the output of various show and debug commands to verify the operational status of a Cisco switched network.
- verify network status and switch operation using basic utilities such as ping, traceroute, Telnet, Secure Shell (SSH), Address Resolution Protocol (ARP), and ipconfig, as well as the show and debug commands.
- identify, prescribe, and resolve common switched network media issues, configuration issues, autonegotiation, and switch hardware failures.
- manage Cisco IOS software.
- manage Cisco IOS configuration files (save, edit, upgrade, and restore).
- describe standards associated with wireless media, such as IEEE WI-FI Alliance and ITU/FCC.
- identify and describe the purpose of the components in a small wireless network, such as Service Set Identification (SSID), Basic Service Set (BSS), and Extended Service Set (ESS).
- identify basic configuration parameters on a wireless network to ensure that devices connect to the correct access points.
- compare and contrast Wi-Fi Protected Access (WPA) security features and capabilities of open, Wired Equivalent Privacy (WEP), and WPA-1/2 networks.
- describe common wireless-network implementation issues such as interference and misconfiguration.

## CISN 143 CISCO Networking Academy (CCNA)™: Accessing the Wide Area Network

Units:	3
Hours:	54 hours LEC; 18 hours LAB
Prerequisite:	CISN 141 and 142 with grades of "C" or better

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).

## Student Learning Outcomes

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

- describe the impact of Voice Over IP and Video Over IP applications on a network.
- identify and correct common network problems at layers 1, 2, 3, and 7 using a layered model approach.
- interpret network diagrams.
- describe the components required for network and Internet communications.
- implement basic switch security measures such as port security, trunk access, and management VLANs.
- explain the operation and benefits of DHCP and DNS.
- configure, verify, and troubleshoot DHCP and DNS operations on a router.
- describe current network security threats and explain how to implement a comprehensive security policy to mitigate common threats to network devices, hosts, and applications.
- describe the functions of common security appliances and applications.
- describe recommended security practices to secure network devices.
- describe the purpose and types of access control lists (ACLs).
- configure and apply ACLs based on network filtering requirements.
- configure and apply an ACLs to limit Telnet and SSH access to the router using the Security Device Manager command-line interface (SDM/CLI).
- verify, monitor, and troubleshoot ACLs in a network environment.
- explain the basic operation of Network Address Translation (NAT).
- configure NAT for given network requirements using SDM/CLI.
- troubleshoot NAT issues.
- describe different methods for connecting to a WAN.
- configure and verify a basic WAN serial connection.
- configure and verify a Point-to-Point Protocol (PPP) connection between Cisco routers.
- configure and verify Frame Relay on Cisco routers.
- troubleshoot WAN implementation issues.
- describe the importance, benefits, role, impact, and components of VPN technology.

## CISN 300 Network Systems Administration

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 320, 350, and 351
Transferable:	CSU

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.

## Student Learning Outcomes

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

- create, configure and implement a workgroup and a domain-based network using a Windows Network Operating System.
- examine and explain the administrative tools of a Windows server network operating system.
- formulate and configure resource sharing including printers.
- analyze and construct user accounts and groups using best practices for security.
- analyze and evaluate network security for file and user access permissions.
- compare and contrast system backup methodologies and best practices for scheduling backups and restoring files and system state data.
- analyze and explain network resource utilization using Windows performance monitor, including performance counters and their implications.
- implement and define the Windows Active Directory and its main features and uses.
- research and identify good Internet resources for obtaining answers to common problems, network anomalies and Windows server problems.
- define and demonstrate the functions and configuration of Windows clients and servers in an Active Directory Domain environment.

## CISN 302 Intermediate Network Systems Administration

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	CISN 300 with a grade of "C" or better
Transferable:	CSU

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.

## Student Learning Outcomes

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

- examine and configure a client-server network operating system.
- evaluate and apply best practices for domain controller security policies.
- compare and contrast supported file systems.
- create and configure disk partitions.
- compare and contrast the methods of fault tolerance that can be applied on network servers.
- define, differentiate and configure supported network protocols.
- plan and implement interoperation with different network and client operating systems.
- configure and implement directory replication and file synchronization.

- define and explain the network server boot process and optimize disks, partitions and pagefiles.
- differentiate and apply the network troubleshooting tools used to solve advanced network problems.
- apply and demonstrate network troubleshooting methodologies.
- explain and differentiate client and server backup methodologies.

## CISN 307 Windows Active Directory Services

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	CISN 302 with a grade of "C" or better
Transferable:	CSU

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.

### Student Learning Outcomes

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

- design network architecture, topology, interdependence, and constraints in relation to an Active Directory domain.
- evaluate a plan to install, configure, and administer an Active Directory domain controller.
- analyze a plan to install, configure, administer, and evaluate Group Policy in an Active Directory environment.
- design Active Directory forests, trees, domains, and operational units.
- explain a plan to install, configure, and administer Windows Internet Naming System (WINS) services and settings.
- describe a plan to install, configure, and administer Domain Naming System (DNS) services and settings.
- formulate a plan to publish, backup, and replicate the Active Directory database.

## CISN 308 Internetworking with TCP/IP

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	CISN 302 with a grade of "C" or better
Transferable:	CSU

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).

### Student Learning Outcomes

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



- design an overall integration plan for implementing a network services infrastructure using TCP/IP, with connectivity to Netware, Macintosh and UNIX systems.
- evaluate a plan for workstation and server deployment using remote installation services.
- formulate a plan deploying the DHCP server service.
- analyze a plan deploying the DNS and WINS server services.
- explain a plan deploying network security using IPSec, PKI and certificate server services.
- describe a plan for Internet connectivity using NAT and Windows router.
- design a plan deploying the IIS server service.
- formulate a plan for deploying a Virtual Private Network.

## Computer Information Science - Programming (CISP)

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### CISP 300 Algorithm Design/Problem Solving

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	CISC 310
Transferable:	CSU; UC
General Education:	AA/AS Area II(b)

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.

### Student Learning Outcomes

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

- define operators, including arithmetic, comparison, and logical operators.
- differentiate control structures, including branches (conditional statements) and loops (pre-checking and post-checking loops).
- deduce post-condition from pre-condition for control structures, including assignment statements, branches, and loops.
- construct a trace table to emulate the execution of a program that utilizes variables, various control structures, data organizations, subroutines, and parameters.
- contrast the lifespan limits and behaviors of local variables, by-value parameters, and by-reference parameters.
- compare the two methods of passing results: by-reference parameters and return value.
- compare in-line copy-and-paste coding with structured subroutines in terms of maintainability, defect containment, testability, and other metrics.
- create a subroutine to abstract one or more similar blocks of in-line code using local variables, parameters, and return values.
- differentiate roles involved in software development, including developers, analysts, and test engineers.

# CISP 310 Assembly Language Programming for Microcomputers

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CISP 360 or 480 with a grade of "C" or better
Transferable:	CSU; UC ((CISP 310 & 319 combined: maximum credit - one course))
C-ID:	C-ID COMP 142

This course covers the organization and behavior of real computer systems at the assembly-language level. Topics include the mapping of statements and constructs in a high-level language onto sequences of machine instructions, as well as the internal representation of simple data types and structures. Numerical computation is examined, noting the various data representation errors and potential procedural errors.

## Student Learning Outcomes

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

- write simple assembly language program segments.
- demonstrate how fundamental high-level programming constructs are implemented at the machine-language level.
- compare Reduced Instruction Set Computer (RISC) versus Complex Instruction Set Computer (CISC) architectures.
- diagnose assembly language programs with common and not-so-common defects.
- structure complex logic into well defined assembly language instruction sequences and subroutines.
- evaluate common coding mistakes in C/C++ in the context of the underlying assembly language implementation.
- describe von Neumann architecture and how its components interact.

# CISP 350 Database Programming

Units:	3
Hours:	36 hours LEC; 54 hours LAB
Prerequisite:	None.
Advisory:	CISA 320 and CISC 310
Transferable:	CSU
General Education:	AA/AS Area II(b)

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.

## Student Learning Outcomes

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

- compare and contrast different database implementations.
- design databases conforming to normalization guidelines.
- create and maintain relational databases.
- construct subqueries and table joins.
- construct small programs using PL/SQL.
- import/export data.

## CISP 360 Introduction to Structured Programming

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CISP 300 or 370 with a grade of "C" or better
Transferable:	CSU; UC
General Education:	AA/AS Area II(b)
C-ID:	C-ID COMP 112

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, functions, interactive and file input/output, standard libraries, arrays, pointers, structures, classes, and objects.

### Student Learning Outcomes

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

- develop efficient algorithms for the solution of problems using the control structures of structured programming
- implement suitable data structures to support a given algorithm
- formulate and implement algorithms to solve complex problems using a high-level language
- use the top-down development approach to implement modular, maintainable programs
- apply the software development life-cycle for program design, development, coding style, documentation, and testing
- assess the efficiency of differing solutions to a problem
- analyze an existing algorithm implementation for errors, then develop solution program code to correct the errors
- design and use classes and objects
- compare procedural and object-oriented approaches to problem solving

## CISP 362 Programming for Mobile Devices I

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	None.
Corequisite:	CISP 300 or 370
Transferable:	CSU

This course introduces mobile device programming, including devices such as cell phones and tablets. Topics include development tools, user interface design, documentation, testing, debugging, and publishing.

### Student Learning Outcomes

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

- acquire and install the necessary development tools for mobile device software development.
- develop basic programs with a graphical user interface.
- test and debug programs with a graphical user interface.

- publish mobile device programs.

## CISP 363 Programming for Mobile Devices II

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CISP 362 with a grade of "C" or better
Corequisite:	CISP 360
Transferable:	CSU

This course introduces intermediate level programming for mobile devices such as cell phones and tablets. Topics include the syntax of Java, object oriented programming, and mobile-specific techniques and considerations.

### Student Learning Outcomes

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

- develop procedural logic for mobile applications.
- synthesize object-oriented class structure to organize components of mobile applications.
- evaluate correctness and efficiency of mobile applications.
- analyze programming problems.
- formulate object-oriented solutions to mobile programming problems.
- identify various types of processes on a mobile platform.
- design mobile applications that utilize the user interface.

## CISP 370 Beginning Visual Basic

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	None.
Advisory:	CISC 310 and CISP 300
Transferable:	CSU

This introductory programming course covers the development of Windows-based desktop applications using Visual Basic (VB). Topics include best practices for Graphical User Interface (GUI) design, use of the VB application development software, organizing code into procedures and functions, variable scope, structures, arrays, input data validation, calculation, file input and output, and multiple-window applications. This course is designed for those who want a strong foundation in basic programming and building GUI applications.

### Student Learning Outcomes

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

- using the VB Integrated Development Environment, design and implement a GUI application using single or multiple windows.
- design and implement variables at the class level and the procedure level.
- design and implement data storage strategies for text files and databases.
- design and implement structure data types.

- design and implement programming logic using conditional execution structures and looping structures.
- design and implement programming logic using VB procedures and functions and developer defined procedures and functions, and correctly pass parameters to the procedures and functions both by value and by reference.
- design and implement input data validation and calculation.
- organize data in single dimension and multi-dimension arrays.
- build, compile, execute, test, and debug applications.

## CISP 371 Intermediate Visual Basic

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CISP 370 with a grade of "C" or better
Transferable:	CSU

This course in intermediate Visual Basic (VB) programming further examines techniques to solve programming problems. Topics include classes, objects, properties, methods, procedures, functions, hierarchies, inheritance, multiple forms, components, tables, databases, datasets, queries, menus, toolbars, report creation, testing, and debugging.

### Student Learning Outcomes

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

- create a plan and a program that provides a solution to a well-defined programming problem.
- using tables and datasets, create programs that use text files and database files by linking, importing, exporting, and querying with emphasis on SQL.
- create user interfaces which use multiple forms, classes, objects, properties, methods, procedures, functions, hierarchies, inheritance, components, tables, menus, and toolbars.
- create event code for objects.
- create reports using Crystal Reports.
- build, compile, execute, test, and debug programs.

## CISP 400 Object Oriented Programming with C++

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CISP 360 or 480 with a grade of "C" or better
Advisory:	CISC 323
Transferable:	CSU; UC
General Education:	AA/AS Area II(b)
C-ID:	C-ID COMP 122

This course is an introduction to the C++ programming language and object-oriented programming in the Linux/UNIX environment. Topics include a programming languages overview, 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.

## Student Learning Outcomes

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

- summarize the evolution of programming paradigms and identify the characteristics of each style.
- choose Linux/UNIX commands to perform various tasks.
- create Linux/UNIX make files to automate the compilation and linking of multi-file C++ programs.
- differentiate between what is done by the preprocessor, the compiler, and the linker.
- design C++ classes that follow given specifications.
- evaluate different object-oriented solutions to programming problems.
- analyze programming problems.
- formulate object-oriented solutions to programming problems.

## CISP 401 Object Oriented Programming with Java

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CISP 360 with a grade of "C" or better
Transferable:	CSU; UC

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.

## Student Learning Outcomes

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

- manipulate Java language syntax.
- develop event driven programs for both applets and applications.
- compare the Java language to other programming languages.
- design software using object-oriented methods.
- develop programs using inheritance and polymorphism.
- write database applications using embedded Structured Query Language (SQL).
- develop multi-threaded applications.
- use Java to create graphical user interfaces.

## CISP 430 Data Structures

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CISP 400 or 401 with a grade of "C" or better
Transferable:	CSU; UC

C-ID:

C-ID COMP 132

This course applies object-oriented techniques for systematic problem analysis and the managing of program complexity using abstraction. Specification, 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.

### Student Learning Outcomes

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

- propose solutions to complex programming problems and create code to implement these solutions.
- implement singly linked lists, doubly linked lists, circular linked lists, stacks, queues, trees, and graphs.
- implement recursive modules.
- implement various sorting and searching techniques.
- estimate the efficiency of various sorting and searching algorithms using Big-O notation.

## CISP 440 Discrete Structures for Computer Science

Units:	3
Hours:	54 hours LEC
Prerequisite:	CISP 360 and MATH 370 with grades of "C" or better
Corequisite:	CISP 430
Transferable:	CSU; UC
General Education:	AA/AS Area II(b); CSU Area B4
C-ID:	C-ID COMP 152

This course is an introduction to the discrete structures used in computer science with an emphasis on their applications. Topics include functions, relations, and sets; basic logic; proof techniques; basics of counting; graphs and trees; and discrete probability.

### Student Learning Outcomes

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

- analyze how formal tools of symbolic logic are used to model real-life situations, including those arising in computing contexts such as program correctness, database queries, and algorithms.
- compare the ideas of mathematical induction to recursion and recursively defined structures.
- analyze a problem to create relevant recurrence equations.
- design different traversal methods for trees and graphs.
- choose between the binomial theorem for independent events and Bayes' theorem for dependent events.

## CISP 480 Honors Introduction to Structured Programming

Units:	5
Hours:	72 hours LEC; 54 hours LAB
Prerequisite:	Placement into ENGWR 480 through the assessment process.
Advisory:	CISC 310

Transferable:
General Education:

CSU; UC  
AA/AS Area II(b)

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 by assessing and analyzing computing problems, performing algorithm design using a top-down, divide and conquer approach, and continues with implementation, documentation, testing, and debugging. Topics include structured programming, data representation, data types, variables, constants, operators, and expression evaluation. It also includes control structures, functions, interactive and file input/output, standard libraries, arrays, pointers, structures, classes, and objects. Pseudocode and an object-oriented programming language are used to create program solutions. This course is not open to students who have completed CISP 300 or CISP 360.

## Student Learning Outcomes

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

- develop, implement, and evaluate expressions using the operators prevalent in most programming languages including arithmetic, comparison, and logical operators
- develop and implement basic algorithms using sequence, selection, and repetition
- deduce pre- and post-conditions for control structures and modules
- construct a trace table to emulate the execution of a program that utilizes variables, various control structures, data organizations, modules, and parameters
- differentiate roles involved in software development, including developers, analysts, and test engineers
- develop efficient algorithms for the solution of problems using structured programming techniques
- implement suitable data structures to support a given algorithm
- formulate and implement algorithms to solve complex problems using a high-level language
- use the top-down, divide and conquer development approach to implement modular, maintainable programs
- assess the efficiency of differing solutions to a problem
- analyze an existing algorithm implementation for errors, then develop solution program code to correct the errors
- utilize standard libraries for common tasks such as file input/output and mathematical operations
- design and use classes and objects
- compare procedural and object-oriented approaches to problem solving
- apply the software development life-cycle for program design, development, coding style, documentation, and testing

# Computer Information Science - Security (CISS)

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## CISS 300 Introduction to Information Systems Security

Units:
Hours:
Prerequisite:
Advisory:
Transferable:

1  
18 hours LEC; 18 hours LAB  
None.  
CISC 320, 350, and 351  
CSU

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.

## Student Learning Outcomes

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

- Differentiate the various aspects of internal Local Area Network (LAN) and Internet security.
- Analyze the potential effects of network intruders and viruses.
- Compare Pretty Good Privacy (PGP) and Secure Multimedia Internet Mail Extensions (S/MIME) for use in electronic mail security.
- Examine the use and importance of firewalls.
- Analyze the use and function of cryptography, authentication, and digital signatures in network security.
- Assess the current information on TCP/IP security.
- Evaluate potential network security problems.

## CISS 310 Network Security Fundamentals

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISN 119, 140, and 302
Transferable:	CSU

This course is an introduction to the fundamental principles and skills of Information Technology security and risk management at the organizational level. Topics include network security, compliance and operational security, threats and vulnerabilities, application and data security, host security, access control and identity management, and cryptography. The required content of the Computing Technology Industry Association (CompTIA) Security+ certification exam is covered.

## Student Learning Outcomes

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

- describe and explain various types of attacks including malware, social engineering, and types of wireless attacks.
- examine criteria to measure the exposure and risk of internal and external security threats to the network, system infrastructure, and resources.
- examine the tangible and intangible costs of breaches to an organization's security, network resources, and proprietary information.
- analyze a given scenario, then select and configure the appropriate solution to establish host, application, and data security.
- analyze the benefits of secure authentication and complex password techniques vs. the costs of administration and system complexity.
- configure secure remote access to network information and resources utilizing several different methods.
- implement protective measures and evaluate the adequacy of physical site security relative to risk.
- configure operating system security and evaluate its effectiveness.
- compare and contrast different intrusion detection procedures, software programs, and methodologies.
- analyze a given scenario and select appropriate tools and techniques to discover security threats and vulnerabilities, and then select appropriate tools and techniques to mitigate and deter.
- analyze a given a scenario and select the appropriate authentication, authorization, or access control.

- install and configure security controls when performing account management, based on best practices.
- explain general cryptography concepts.
- utilize standard PKI, certificate management, and associated components, given a specific scenario.

## CISS 315 Ethical Hacking

Units:	3
Hours:	48 hours LEC; 28 hours LAB
Prerequisite:	None.
Advisory:	CISC 300 and CISS 310
Transferable:	CSU

This course introduces the network security specialist to the various methodologies for attacking a network. Topics include the concepts, principles, and techniques necessary to attack and disable a network within the context of properly securing a network. It emphasizes network attack techniques and methodologies, and appropriate defenses and countermeasures. Supplementary hardware and software may be required.

### Student Learning Outcomes

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

- describe the tools and methods a "hacker" uses to break into a computer or network.
- practice and use safe techniques on the World Wide Web.
- defend a computer and a LAN against a variety of different types of security attacks using a number of hands-on techniques.
- identify ports, protocols, and services.
- construct software configuration settings that will assist in protecting the PC.
- describe what an ethical hacker can and cannot do legally.

## CISS 325 Network Security and Firewalls

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	CISS 310 with a grade of "C" or better
Transferable:	CSU

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.

### Student Learning Outcomes

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

- construct and demonstrate virtual private networks (VPN)
- define and apply other forms of secure remote access

- differentiate the different types of intrusion detection systems (IDS)
- evaluate and apply methods to protect a network from distributed denial of service (DDoS) attacks
- demonstrate the installation and configuration of a firewall
- construct a firewall for secure remote access and explain the methodology used
- define and describe the use of firewalls in network security
- demonstrate a firewall design for internal as well as external network security
- assess common security risks and apply industry standard countermeasures to protect the network

## CISS 341 Implementing Windows Operating System Security

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 320, CISC 351, and CISS 310
Transferable:	CSU

This course provides in-depth information on the Microsoft Windows desktop operating system security features, as well as step-by-step configuration for 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.

### Student Learning Outcomes

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

- evaluate network security from the perspective of the Microsoft Windows client operating system.
- assess how to secure data using a Microsoft Windows operating system.
- demonstrate use of the tools required to configure client operating system services.
- examine and configure network services in accordance with best current security practices.
- differentiate, describe, and configure file sharing services and file system security permissions in accordance with best security practices.
- evaluate and describe the relationships between major network services.
- compare and contrast the roles of security, ethics, and privacy management issues regarding data storage.
- define and differentiate user rights and file permissions in terms of security.
- set up an appropriate file encryption method to optimize security on a multi-user workstation.

## CISS 342 Implementing Linux Operating System Security

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 323 and CISS 310
Transferable:	CSU

This course provides in-depth information on Linux/UNIX operating system security features, as well as step-by-step configuration for 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.

## Student Learning Outcomes

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

- evaluate network security from the perspective of a Linux/UNIX client operating system.
- assess how to secure data using a Linux/UNIX operating system.
- demonstrate use of the tools required to configure client operating system services.
- examine and configure network services in accordance with best current security practices.
- differentiate and describe file sharing services and file system security permissions.
- configure file sharing services and file system security permissions in accordance with industry standard security practices.
- evaluate and describe the relationships between major network services.
- compare and contrast the roles of security, ethics, and privacy management issues regarding data storage.
- define and differentiate user rights and file permissions in terms of security.
- configure an appropriate file encryption method to optimize security on a multi-user workstation.

## CISS 350 Disaster Recovery

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	CISS 310
Transferable:	CSU

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.

## Student Learning Outcomes

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

- Analyze and discuss standard techniques for data recovery after a disaster.
- Assess risks in the enterprise computing environment and prioritize their importance to business operations.
- Plan and compose an enterprise-scale disaster recovery system, with priorities and timelines for critical events.
- Create business management policies and procedures for disaster recovery.
- Formulate roles and responsibilities across all departments' management for disaster recovery.
- Prepare inter-organizational management relationships for disaster recovery procedures.
- Create company-wide emergency communications policies and procedures for disaster recovery.
- Assess and formulate data recovery procedures and prepare estimates for when each business unit will be back in operation following a disaster.
- Describe disaster recovery policies and procedures to comply with all applicable Federal, State and local laws and regulations.

- Construct a mock data recovery disaster scenario.
- Define and prioritize business and operational needs, threats, and solutions.
- Compose comprehensive data recovery disaster procedures to support business operations.

## CISS 360 Computer Forensics and Investigation

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 324, CISS 310, and CISS 350
Transferable:	CSU

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.

### Student Learning Outcomes

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

- define computer forensics concepts as a profession.
- plan and prioritize computing investigation and forensic analysis procedures to be employed.
- describe different versions of Microsoft operating systems' boot procedures and disk structures.
- differentiate common operating systems' boot procedures and disk structures.
- assess and compare computer forensic tools used in investigations.
- construct and employ digital evidence controls to safeguard the results of the forensic investigation.
- create and prepare detailed procedures for crime scene incident processing.
- demonstrate forensic investigation data acquisition procedures.
- critique a forensic analysis and prepare reports for private-sector management and/or law enforcement.
- prepare and describe email investigation methods for a forensic analysis.
- describe and compare graphic image recovery methods.
- compose forensic analysis reports using technical jargon and non-technical terms.

## Computer Information Science - Web (CISW)

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### CISW 300 Web Publishing

Units:	3
Hours:	36 hours LEC; 54 hours LAB
Prerequisite:	None.

Advisory:
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CISC 300 and 305

Transferable:
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CSU

This course is an introduction to publishing on the World Wide Web. Topics include creating web pages with the Hyper Text Markup Language (HTML), organizing a series of pages into a web site, and uploading web pages to a server. This 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.

### Student Learning Outcomes

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

- develop web pages applying structured design principles using current standards of Hyper Text Markup Language (HTML)
- publish documents on the World Wide Web using File Transfer Protocol (FTP) software and Secure Shell (SSH/Telnet) software
- build, maintain, and organize a working web account on a web server
- develop web site design concepts using both Cascading Style Sheet (CSS) structures and table structures
- develop web site navigation using links, buttons, and menu options
- create web forms using standard HTML form tags
- produce basic web graphics and incorporate them on a web page using HTML and CSS

## CISW 304 Cascading Style Sheets

Units:
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2

Hours:
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27 hours LEC; 27 hours LAB

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

Transferable:
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CSU

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 Hypertext Markup Language (HTML).

### Student Learning Outcomes

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

- describe the differences among versions of CSS, including issues of cross-platform compatibility.
- utilize proper CSS syntax for developing internal and external style sheets.
- differentiate between the class and id attributes, determine which should be used for a specific situation, and apply it using industry standards.
- combine selectors to refine style definitions for a group of elements and/or contextually to one or more elements when used together.
- apply CSS Positioning (CSS-P) to position and layer objects on multiple web pages.

## CISW 310 Advanced Web Publishing

Units:
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4

Hours:
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54 hours LEC; 54 hours LAB

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

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.

### Student Learning Outcomes

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

- develop web pages using advanced design concepts with Cascading Style Sheets (CSS)
- apply the basic concepts and syntax of JavaScript
- construct web pages with structured HTML that incorporate basic JavaScript functions such as mouse rollovers, window popups, slideshows, and form validation
- produce basic web pages using a server-side scripting language such as Perl
- develop a simple server side database using database software such as MySQL and integrate it into a web page using a server-side scripting language
- incorporate JavaScript with the server-side scripting language and database software

## CISW 321 Web Site Development using Dreamweaver

Units:	3
Hours:	36 hours LEC; 54 hours LAB
Prerequisite:	None.
Advisory:	CISC 305 and CISW 300
Transferable:	CSU

This course covers the use of Dreamweaver, a visual web-authoring tool, to develop and publish websites. Topics 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 website structures, using website management tools, website documentation, making global updates to a website, and using advanced Dreamweaver features.

### Student Learning Outcomes

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

- utilize web authoring software to create, manage, and maintain websites.
- develop and manage effective website file structures.
- design and create websites that have effective information design and site navigation.
- develop standards for website consistency.
- utilize built-in scripting languages to industry standard for web page enhancements.
- create documentation for web pages, websites, and website project work flow.
- plan and construct websites.

# CISW 350 Imaging for the Web

Units:	1
Hours:	18 hours LEC; 18 hours LAB
Prerequisite:	None.
Advisory:	CISC 306 or CISW 300
Transferable:	CSU

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. This course also covers creating buttons and intuitive navigational elements, making background textures and images, and creating simple animation/video.

## Student Learning Outcomes

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

- identify the various graphics file formats and select when to use one format over the other
- compress and optimize graphics for quick uploading on Web pages
- edit and enhance photos using graphic software tools
- select specific areas of an image to extract, copy, combine, or reposition
- create, view, hide, arrange, and select layers
- create buttons, banners and navigation icons for Web pages
- assemble and manipulate background images and textures
- compose simple compressed animations and videos for use in Web pages

# CISW 355 Web Imaging Projects

Units:	2
Hours:	27 hours LEC; 27 hours LAB
Prerequisite:	ARTNM 402 or CISW 350 with a grade of "C" or better
Transferable:	CSU

This course is a continuation of CISW 350. It covers the creation of graphics for the Web for marketing and advertising. It introduces the steps, procedures, and common problems encountered when producing quality graphics for professional websites. Topics include compressing and upload times, cropping and resizing, digital camera imaging, retouching and fixing photographs, photographic special effects and filters, rasterizing text, and implementing backgrounds, buttons, themes, image maps, and videos. Industry photo editing applications are utilized.

## Student Learning Outcomes

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

- generate and manipulate graphics from a variety of graphics software
- appraise and implement graphics for client and client base
- compare different technologies that can be used to capture and acquire digital images
- examine how color and image resolution affect image quality
- differentiate among Web graphic file formats and determine when to use them



- analyze website concepts and marketing techniques
- evaluate a user's short-term and long-term goals
- collect information, such as photos or existing logos, from users in a non-technical environment

## CISW 360 Beginning Flash

Units:	3
Hours:	36 hours LEC; 54 hours LAB
Prerequisite:	None.
Advisory:	ARTNM 324, CISW 300, and CISW 350
Transferable:	CSU

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.

### Student Learning Outcomes

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

- create and modify simple Flash objects
- create images and animation using the basic features of Flash
- incorporate simple images on layers to form successful composition
- integrate sound, video, and animation into a web page
- produce interactive interface elements that utilize basic scripting capabilities
- publish multimedia web projects to the Internet

## CISW 370 Designing Accessible Websites

Units:	1
Hours:	18 hours LEC
Prerequisite:	CISW 300 with a grade of "C" or better
Transferable:	CSU

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

### Student Learning Outcomes

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

- describe the current legal requirements for designing websites for people with disabilities.
- compare various tools for the assessment of accessibility of web pages.
- formulate coding strategies for generating accessible websites.
- assess the accessibility levels of various types of websites.
- locate disability and web accessibility resources.

- test specialized browsers and other Internet software for people with disabilities.

## CISW 400 Client-side Web Scripting

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CISW 300 with a grade of "C" or better
Advisory:	CISP 300 and CISW 310
Transferable:	CSU

This course emphasizes the creation of dynamic and interactive web sites using a client-side scripting language such as JavaScript/Ajax. 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.

### Student Learning Outcomes

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

- develop web pages using advanced design concepts with Cascading Style Sheets (CSS) and JavaScript.
- analyze the Document Object Model and the concepts behind asynchronous JavaScript and XML (Ajax).
- define the core structures, statements, and syntax of the JavaScript language.
- construct web pages with structured HTML that incorporates basic JavaScript functions such as mouse rollovers, window popups, slideshows, and form validation.
- develop web pages that use the Ajax Engine.
- produce scripts that integrate the Ajax Engine with server-side scripts written in Php or Perl.
- develop database tables using a web database software such as MySQL.
- integrate server-side scripts with Php or Perl using the Ajax Engine.
- write Ajax scripts that incorporate the canvas element and cookies.

## CISW 410 Middleware Web Scripting

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CISW 300 with a grade of "C" or better
Advisory:	CISP 300 and CISW 310
Transferable:	CSU

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.

### Student Learning Outcomes

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

- compare server-side and client-side scripting languages for the web.

- apply the core structures, statements, and syntax of the middleware scripting language.
- write functions using the middleware web scripting language.
- process form data using the middleware scripting language.
- develop web page navigation using the middleware scripting language.
- produce a web-server based database and apply the basic query structure and table joins.
- develop web pages that use session storage or session cookies.
- apply web page design concepts using the middleware scripting language.

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