

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

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

DEGREES AND CERTIFICATES

Computer Science Degree

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.

Student Learning Outcomes

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

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

Requirements for Degree 30-32 Units

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

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

CIS: Computer Networking Management Degree

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

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

Student Learning Outcomes

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

WINDOWS CONCENTRATION:

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

CISCO CONCENTRATION:

- design, evaluate, construct and implement a routed IP network using industry standard routing protocols and routing equipment, in a wired or wireless configuration.

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(CIS: Computer Networking Management Degree continued)

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

LINUX/UNIX CONCENTRATION:

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

Career Opportunities

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

Core Requirements for Degree 14-15 Units

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

CISCO Concentration 33-35 Units

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

LINUX Concentration 32 - 33 Units

Core Requirements		14 - 15
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
And 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)	

WINDOWS Concentration 33 - 34 Units

Core Requirements		14 - 15
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)	
And a minimum of 3 units from the following:		3
CISP 370	Beginning Visual Basic (4)	
CISS 341	Implementing Windows Operating System Security (3)	

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

CIS: Computer Networking Management Certificate

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

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

Student Learning Outcomes

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

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

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(CIS: Computer Networking Management Certificate continued)

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

CISCO CONCENTRATION:

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

LINUX/UNIX CONCENTRATION:

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

WINDOWS CONCENTRATION:

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

See losrios.edu/gainful-emp-info/gedt.php?major=011427C01 for Gainful Employment Disclosure.

Core Requirements for Certificate 8 Units

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

CISCO Concentration 21 Units

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

LINUX Concentration 23 Units

Core Requirements	8	
CISC 324	Intermediate Linux Operating System	1
CISN 110	Networking Technologies - Preparation for N+ Certification....	2
CISN 111	Intermediate Networking Technologies - Preparation for N+ Certification	2
CISN 119	TCP/IP Protocols	3
CISN 120	Beginning Network Administration with Linux	3
CISN 121	Network Administration with Linux: LAN Services	2
CISN 122	Network Administration with Linux: Internet Services	2

WINDOWS Concentration 24 Units

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

CIS: Computer Programming Degree

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

Student Learning Outcomes

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

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

Career Opportunities

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

Core Requirements for Degree 6 Units

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

C++ Concentration 19-21 Units

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

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(CIS: Computer Programming Degree continued)

Java Concentration		18-20 Units
Core Requirements		6
[CISP 300 Algorithm Design/Problem Solving (3) and CISP 360 Introduction to Structured Programming (4)]	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:		
CISC 320 Operating Systems (1)		3
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)		

Visual Basic Concentration		20 Units
Core Requirements		6
CISA 322 Design and Development of Desktop Database Applications		3
CISP 300 Algorithm Design/Problem Solving		3
CISP 370 Beginning Visual Basic		4
CISP 371 Intermediate Visual Basic		4

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

CIS: Computer Programming Certificate

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

Student Learning Outcomes

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

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

Career Opportunities

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

See losrios.edu/gainful-emp-info/gedt.php?major=011326C05 for Gainful Employment Disclosure.

Core Requirements for Certificate		4 Units
CISC 310 Introduction to Computer Information Science		3
CISC 320 Operating Systems		1

C++ Concentration Requirements		18-20 Units
Core Requirements		4
[CISP 300 Algorithm Design/Problem Solving (3) and CISP 360 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:		
CISC 323 Linux Operating System (1)		1
CISC 324 Intermediate Linux Operating System (1)		

Java Concentration Requirements		18-20 Units
Core Requirements		4
[CISP 300 Algorithm Design/Problem Solving (3) and CISP 360 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:		
CISC 323 Linux Operating System (1)		2
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)		

Visual Basic Concentration Requirements		21 Units
Core Requirements		4
CISA 322 Design and Development of Desktop Database Applications		3
CISP 300 Algorithm Design/Problem Solving		3
CISP 350 Database Programming		3
CISP 370 Beginning Visual Basic		4
CISP 371 Intermediate Visual Basic		4

CIS: Database Management Degree

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

Student Learning Outcomes

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

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

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(CIS: Database Management Degree continued)

- identify interactive web publishing situations requiring database solutions.
- create interactive web database.
- analyze practical business problems and utilize critical thinking in the determination of alternative solutions.
- apply communication theory, effective writing techniques, and interpersonal communication skills to business situations.
- analyze and explain the nature and purpose of accounting and its function in business.

Requirements for Degree 39-40 Units

ACCT 101	Fundamentals of College Accounting (3)	3 - 4
or ACCT 301	Financial Accounting (4)	
BUS 110	Business Economics (3).....	3
or ECON 302	Principles of Macroeconomics (3)	
BUS 300	Introduction to Business	3
BUS 310	Business Communications (3)	3
or ENGWR 300	College Composition (3)	
CISA 315	Introduction to Electronic Spreadsheets	2
CISA 320	Introduction to Database Management	1
CISA 322	Design and Development of Desktop Database Applications.....	3
CISC 310	Introduction to Computer Information Science	3
CISC 320	Operating Systems.....	1
CISP 300	Algorithm Design/Problem Solving	3
CISP 350	Database Programming	3
CISP 370	Beginning Visual Basic.....	4
CISW 300	Web Publishing	3
CISW 410	Middleware Web Scripting	4

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

CIS: Database Management Certificate

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

Student Learning Outcomes

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

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

See losrios.edu/gainful-emp-info/gedt.php?major=011324C01 for Gainful Employment Disclosure.

Requirements for Certificate 24 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

CIS: Microcomputer Applications Degree

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

Student Learning Outcomes

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

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

Requirements for Degree 37 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
And a minimum of 5 units from the following:		5
ACCT 341	Computerized Accounting (2)	
BUSTEC 313	Presentations for the Business Professional (2)	
CISA 141	Capturing and Publishing Digital Media (2)	
CISA 160	Project Management Techniques and Software (3)	
CISA 171	Introduction to Adobe Acrobat (1)	
CISC 350	Introduction to Data Communications (1)	
CISC 351	Introduction to Local Area Networks (1)	

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(CIS: Microcomputer Applications Degree continued)

CISS 301	Ethical Hacking (2)
CISW 300	Web Publishing (3)
And a minimum of 3 units from the following:3	
ACCT 343	Computer Spreadsheet Applications for Accounting (2)
CISA 331	Intermediate Desktop Publishing (2)
CISC 305	Introduction to the Internet (1)
CISP 350	Database Programming (3)
CISP 360	Introduction to Structured Programming (4)
CISP 371	Intermediate Visual Basic (4)
CISP 480	Honors Introduction to Structured Programming (5)
CISS 300	Introduction to Information Systems Security (1)
CISW 370	Designing Accessible Web Sites (1)

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

CIS: Microcomputer Applications Certificate

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

Student Learning Outcomes

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

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

See losrios.edu/gainful-emp-info/gedt.php?major=011327C01 for Gainful Employment Disclosure.

Requirements for Certificate		21 Units
CISA 305	Beginning Word Processing	2
CISA 315	Introduction to Electronic Spreadsheets.....	2
CISA 320	Introduction to Database Management	1
CISA 330	Desktop Publishing.....	2
CISA 340	Presentation Graphics.....	2
CISC 305	Introduction to the Internet.....	1
CISC 310	Introduction to Computer Information Science.....	3
CISC 320	Operating Systems.....	1 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)	

¹Taken on the Windows operating system.

CIS: PC Support Management Degree

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

Student Learning Outcomes

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

- identify the names, purpose, and characteristics of system components.
- evaluate and demonstrate basic procedures for adding and removing field replaceable components for desktop computers.
- analyze and demonstrate the installation and troubleshooting of current operating systems, applications and basic networking technology used in industry.
- formulate back-up, recovery, and system protection plans for the operating system in a network environment.
- develop proficiency in customer service skills to effectively diagnose and communicate microcomputer software and hardware-related problems and solutions at the user level.
- demonstrate the techniques to manage a project, control costs, and schedule resources employing management software.
- recognize within the information technology (IT) field the diverse business environment associated with support issues.
- configure and implement data security methods for protecting computers and networks from unauthorized access.

Requirements for Degree		31 Units
BUS 300	Introduction to Business	3
BUS 310	Business Communications.....	3
CISA 160	Project Management Techniques and Software	3
CISC 310	Introduction to Computer Information Science.....	3
CISC 320	Operating Systems.....	1 ¹
CISC 350	Introduction to Data Communications	1
CISC 351	Introduction to Local Area Networks	1
CISC 361	Microcomputer Support Essentials - Preparation for A+ Certification.....	3
CISC 362	Microcomputer and Applications Support	2
CISC 363	Microcomputer Support Technical - Preparation for A+ Certification.....	3
CISS 301	Ethical Hacking	2
And a minimum of 6 units from the following:.....		6
CISA 126	Outlook: Basics (1)	
or [BUSTEC 126 Outlook: Basics (1)		
and CISA 127 Outlook: Tools (1)]		
or BUSTEC 127 Outlook: Tools (1)		
CISA 305	Beginning Word Processing (2)	
CISA 315	Introduction to Electronic Spreadsheets (2)	
CISA 320	Introduction to Database Management (1)	
CISA 340	Presentation Graphics (2)	
CISC 306	Introduction to Web Page Creation (1)	
CISC 323	Linux Operating System (1)	

¹Taken on the Windows operating system.

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

CIS: PC Support Certificate

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

Student Learning Outcomes

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

- identify and recognize the names, purpose, and characteristics of system components by sight or definition.
- evaluate and demonstrate basic procedures for adding and removing field replaceable components for desktop computers.
- analyze and demonstrate understanding for installation and troubleshooting current operating systems, applications and basic networking technology used in industry.
- formulate back-up, recovery, and system protection plans for the operating system in a network environment.
- develop proficiency in customer service skills to effectively diagnose and communicate microcomputer software and hardware-related problems and solutions at the user level.
- configure and implement data security methods for protecting computers and networks from unauthorized access.

Requirements for Certificate	25 Units
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BUS 310	Business Communications.....	3
CISC 310	Introduction to Computer Information Science.....	3
CISC 320	Operating Systems.....	1 ¹
CISC 350	Introduction to Data Communications.....	1
CISC 351	Introduction to Local Area Networks.....	1
CISC 361	Microcomputer Support Essentials - Preparation for A+ Certification.....	3
CISC 362	Microcomputer and Applications Support.....	2
CISC 363	Microcomputer Support Technical - Preparation for A+ Certification.....	3
CISS 301	Ethical Hacking.....	2

And a minimum of 6 units from the following:6

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

¹Taken on the Windows operating system.

Computer Information Security Essentials Certificate

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

Student Learning Outcomes

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

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

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

Information Systems Security Degree

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

Student Learning Outcomes

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

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

(continued on next page)

(Information Systems Security Degree continued)

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

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

Information Systems Security Certificate

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

Student Learning Outcomes

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

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

See losrios.edu/gainful-emp-info/gedt.php?major=011554C01 for Gainful Employment Disclosure.

Requirements for Certificate **23 Units**

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

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.

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 Opportunities

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.

Requirements for Certificate **15 - 16 Units**

1st semester:		
CISP 300	Algorithm Design/Problem Solving (3)	3 - 4
or CISP 370	Beginning Visual Basic (4)	
CISP 362	Programming for Mobile Devices I	4
2nd semester:		
CISP 360	Introduction to Structured Programming	4
CISP 363	Programming for Mobile Devices II	4

Network Administration Essentials - Windows Certificate

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

Student Learning Outcomes

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

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

Requirements for Certificate		12 Units
CISN 300	Network Systems Administration	3
CISN 302	Intermediate Network Systems Administration	3
CISN 307	Windows Active Directory Services	3
CISN 308	Internetworking with TCP/IP	3

Web Developer Certificate

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

Student Learning Outcomes

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

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

Requirements for Certificate		24 - 27 Units
CISC 320	Operating Systems	1
CISC 323	Linux Operating System	1
CISC 324	Intermediate Linux Operating System	1
CISP 300	Algorithm Design/Problem Solving (3)	3 - 5
or CISP 360	Introduction to Structured Programming (4)	
or CISP 370	Beginning Visual Basic (4)	
or CISP 401	Object Oriented Programming with Java (4)	
or CISP 480	Honors Introduction to Structured Programming (5)	
CISP 350	Database Programming	3

CISW 300	Web Publishing	3
CISW 310	Advanced Web Publishing (4)	3 - 4
or CISW 360	Beginning Flash (3)	
or CISW 400	Client-side Web Scripting (4)	
CISW 370	Designing Accessible Web Sites	1
CISW 410	Middleware Web Scripting (4)	4
or CISW 420	Server-side 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)	
CISW 442	Web Publishing with XML (3)	

Web Publishing Certificate

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

Student Learning Outcomes

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

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

See losrios.edu/gainful-emp-info/gedt.php?major=011424C01 for Gainful Employment Disclosure.

Requirements for Certificate		19 Units
CISC 310	Introduction to Computer Information Science	3
CISC 320	Operating Systems	1
CISC 323	Linux Operating System	1
CISW 300	Web Publishing	3
CISW 304	Cascading Style Sheets	2
CISW 350	Imaging for the Web	1
CISW 370	Designing Accessible Web Sites	1
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)	
CISW 420	Server-side 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)	
CISW 442	Web Publishing with XML (3)	

Technical Communications Degree

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.

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 Opportunities

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

Requirements for Degree	36.5 Units
BUS 100 English for the Professional.....	3
CISA 305 Beginning Word Processing.....	2
CISW 300 Web Publishing	3
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
And 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)	

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

Technical Communications Certificate

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

Student Learning Outcomes

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

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

Career Opportunities

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

See losrios.edu/gainful-emp-info/gedt.php?major=011222C01 for Gainful Employment Disclosure.

Requirements for Certificate	21.5-22.5 Units
ARTNM 352 Design for Publication (3)	3- 4
or CISA 330 Desktop Publishing (2)	
and CISA 331 Intermediate Desktop Publishing (2)	
CISA 305 Beginning Word Processing.....	2
CISW 300 Web Publishing	3
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
And 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)	

Computer Information Science - Apps**CISA 126 Outlook: Basics 1 Unit***Same As: BUSTEC 126**Advisory: BUSTEC 300**Hours: 18 hours LEC*

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

CISA 127 Outlook: Tools 1 Unit*Same As: BUSTEC 127**Prerequisite: BUSTEC 126 or CISA 126 with a grade of "C" or better**Advisory: BUSTEC 300**Hours: 18 hours LEC*

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

CISA 141 Capturing and Publishing Digital Media 2 Units*Hours: 27 hours LEC; 27 hours LAB*

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

CISA 160 Project Management Techniques and Software 3 Units*Same As: MGMT 142**Advisory: ENGR 102 or 103, and ENGRD 116; OR ESLR 320 and ESLW 320; CISC 300**Hours: 54 hours LEC*

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

CISA 171 Introduction to Adobe Acrobat 1 Unit*Hours: 9 hours LEC; 27 hours LAB*

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

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

This course introduces word processing operations, such as creating, editing, file management techniques, and printing text. Emphasis is on formatting and document production techniques to produce professional business documents used in today's workplace. The course culminates with the study of intermediate level features such as merge, sort, graphics, macros, style, and templates.

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

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

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

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

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

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.

CISA 316 Intermediate Electronic Spreadsheets 2 Units

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

This course is a continuation of electronic worksheets with emphasis on workbook design and integration, template design, use of complex formulas, and built-in financial, logical, and database functions. It also includes look-up tables, the use of worksheet analysis tools, macros, and data integration.

CISA 318 Exploring Spreadsheet Software 1 Unit

Course Transferable to CSU
Hours: 18 hours LEC

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

CISA 320 Introduction to Database Management 1 Unit

Advisory: BUSTEC 300 and CISC 300
General Education: AA/AS Area II(b)
Course Transferable to CSU
Hours: 9 hours LEC; 27 hours LAB

This course introduces the use of database management programs on the microcomputer. It includes designing a database; storing, searching, and updating files; and designing and producing printed reports.

CISA 322 Design and Development of Desktop Database Applications 3 Units

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

This course covers strategies for the design and development of desktop database applications. Topics include database objects, data types, data integrity, relational tables, joins, relationships, domain constraints, complex queries, forms, reports, sharing data with other applications, and data maintenance.

CISA 330 Desktop Publishing 2 Units

Advisory: BUSTEC 100.1 and CISC 300
Course Transferable to CSU
Hours: 27 hours LEC; 27 hours LAB

This course provides an overview of desktop publishing (DTP) and a major desktop publishing application program. It includes page layout skills needed to produce newsletters, brochures, flyers, reports, and 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.

CISA 331 Intermediate Desktop Publishing 2 Units

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

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

CISA 340 Presentation Graphics 2 Units

Advisory: CISC 300
Course Transferable to CSU
Hours: 27 hours LEC; 27 hours LAB

This course covers an in-depth look at using presentation software in business environments. Topics include elements of good presentation design, slide show techniques, integrating and linking of various software applications and media, animation effects, and the production of presentations using a variety of hardware.

CISA 345 Technical Marketing Applications 2 Units

Advisory: CISC 305
Course Transferable to CSU
Hours: 27 hours LEC; 27 hours LAB

This course provides an overview of online tactical marketing tools. It includes Search Engine Optimization (SEO), analytic tools, web building and blog applications, email marketing, and other technical marketing tools.

CISA 346 Social Media Applications 1 Unit

Advisory: CISC 305
Course Transferable to CSU
Hours: 18 hours LEC; 18 hours LAB

This course introduces using 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, microblogging, visual bookmark boards, video-sharing websites, photoshare sites, and online image editing. It also includes tracking social media, apps and integration, link building and monetization.

Computer Information Science - Core**CISC 100 Computer Fundamentals with Hands-on Lab 2 Units**

Hours: 27 hours LEC; 27 hours LAB

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.

CISC 295 Independent Studies in Computer Information Science - Core 1-3 Units

Hours: 54-162 hours LAB

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 1 Unit

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

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

Course Transferable to CSU

Hours: 18 hours LEC

This 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.

CISC 305 Introduction to the Internet 1 Unit

Advisory: CISC 300 and 320

Course Transferable to CSU

Hours: 18 hours LEC; 18 hours LAB

This course 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).

CISC 306 Introduction to Web Page Creation 1 Unit

Advisory: CISC 305

Course Transferable to CSU

Hours: 18 hours LEC; 18 hours LAB

This course covers the production of web pages, including design, layout, construction, and presentation. A web authoring tool is used to format a web page and Extensible Hypertext Markup Language (XHTML) is introduced.

CISC 308 Exploring Computer Environments and the Internet 1 Unit

Course Transferable to CSU

Hours: 18 hours LEC

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

CISC 309 Applied Applications Lab .5 Unit

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

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

Course Transferable to CSU

Hours: 27 hours LAB

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

CISC 310 Introduction to Computer Information Science 3 Units

Course Transferable to UC/CSU

Hours: 54 hours LEC

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. (C-ID ITIS 120)

CISC 320 Operating Systems 1 Unit

Course Transferable to CSU

Hours: 18 hours LEC; 18 hours LAB

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

CISC 323 Linux Operating System 1 Unit

Advisory: CISC 300 and ability to touch type.

Course Transferable to CSU

Hours: 18 hours LEC; 18 hours LAB

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

CISC 324 Intermediate Linux Operating System 1 Unit

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

Course Transferable to CSU

Hours: 18 hours LEC; 18 hours LAB

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

CISC 350 Introduction to Data Communications 1 Unit

Advisory: CISC 300 and ability to touch type.

Course Transferable to CSU

Hours: 18 hours LEC

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

CISC 351 Introduction to Local Area Networks 1 Unit

Advisory: CISC 320 and 350

Course Transferable to CSU

Hours: 18 hours LEC; 18 hours LAB

This course introduces local area networks (LAN) and provides hands-on training in LAN applications and network administration. Topics include planning, installing, and maintaining a LAN, responsibilities of the system administrator, and basic network security principles.

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

Advisory: CISC 310, 320, and 350

Course Transferable to CSU

Hours: 42 hours LEC; 36 hours LAB

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

CISC 362 Microcomputer and Applications Support 2 Units

Corequisite: CISC 361

Advisory: CISA 305, 315, and 320

Course Transferable to CSU

Hours: 24 hours LEC; 36 hours LAB

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

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

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

Course Transferable to CSU

Hours: 42 hours LEC; 36 hours LAB

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

CISC 495 Independent Studies in Computer Information Science - Core 1-3 Units

Course Transferable to CSU

Hours: 54-162 hours LAB

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 1-4 Units

Advisory: Eligible for ENGRD 310 or ENGRD 312 AND

ENGWR 300; OR ESLR 340 AND ESLW 340.

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.

General Education: AAIAS Area III(b)

Course Transferable to CSU

Hours: 60-300 hours LAB

This course provides students with opportunities to develop marketable skills in preparation for employment or advancement within the field of computer information science. It is designed for students interested in work experience and/or internships in transfer-level degree occupational programs. Course content includes understanding the application of education to the workforce, completion of 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 attend a weekly orientation and 75 hours of related paid work experience, or 60 hours of unpaid work experience for one unit. An additional 75 or 60 hours of related work experience is required for each additional unit. First-time participants are required to attend a weekly orientation and a final meeting. Returning participants are required to attend the first class meeting, a mid-semester meeting, and a final meeting and may meet individually with the instructor as needed to complete a work site observation and all program forms, receive updates, and assignments. 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.

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

Hours: 36 hours LEC

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

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

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

Hours: 36 hours LEC

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

CISN 118 Internet Protocol Subnetting 1 Unit

Advisory: CISN 110; and MATH 25 OR Math 41
Hours: 18 hours LEC

This course introduces Transmission Control Protocol/Internet Protocol (TCP/IP) address assigning and subnetting. Topics include a review of binary, hexadecimal, and decimal numbering systems, classes of Internet Protocol (IP) addresses, Classless Inter-domain Routing (CIDR), and Variable Length Subnet Masks (VLSM). The future of IP addressing, version 4 (IPv4) and version 6 (IPv6), is covered.

CISN 119 TCP/IP Protocols 3 Units

Advisory: CISC 350
Hours: 54 hours LEC

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

CISN 120 Beginning Network Administration with Linux 3 Units

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

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

CISN 121 Network Administration with Linux: LAN Services 2 Units

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

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

CISN 122 Network Administration with Linux: Internet Services 2 Units

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

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

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

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

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

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

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

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

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

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

This course focuses on Layer 2 switching protocols, concepts and technologies. Topics 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).

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

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

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

CISN 300 Network Systems Administration 3 Units*Advisory: CISC 320, 350, and 351**Course Transferable to CSU**Hours: 45 hours LEC; 27 hours LAB*

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

CISN 302 Intermediate Network Systems Administration 3 Units*Prerequisite: CISN 300 with a grade of "C" or better**Course Transferable to CSU**Hours: 45 hours LEC; 27 hours LAB*

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

CISN 307 Windows Active Directory Services 3 Units*Prerequisite: CISN 302 with a grade of "C" or better**Course Transferable to CSU**Hours: 45 hours LEC; 27 hours LAB*

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

CISN 308 Internetworking with TCP/IP 3 Units*Prerequisite: CISN 302 with a grade of "C" or better**Course Transferable to CSU**Hours: 45 hours LEC; 27 hours LAB*

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

Computer Information Science - Programming**CISP 300 Algorithm Design/Problem Solving 3 Units***Advisory: CISC 310**General Education: AA/AS Area II(b)**Course Transferable to UC/CSU**Hours: 54 hours LEC*

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

CISP 310 Assembly Language Programming for Microcomputers 4 Units*Prerequisite: CISP 360 or 480 with a grade of "C" or better**Course Transferable to UC/CSU**Hours: 54 hours LEC; 54 hours LAB*

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.

CISP 315 Introduction to Computer Architecture and Design 4 Units*Prerequisite: CISP 310 with a grade of "C" or better**General Education: AA/AS Area II(b)**Course Transferable to UC/CSU**Hours: 54 hours LEC; 54 hours LAB*

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

CISP 350 Database Programming 3 Units*Advisory: CISA 320 and CISC 310**General Education: AA/AS Area II(b)**Course Transferable to CSU**Hours: 36 hours LEC; 54 hours LAB*

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

CISP 360 Introduction to Structured Programming 4 Units*Prerequisite: CISP 300, 320, or 370 with a grade of "C" or better**General Education: AA/AS Area II(b)**Course Transferable to UC/CSU**Hours: 54 hours LEC; 54 hours LAB*

This course is an introduction to structured programming and objects. Topics include program design, documentation, testing, and debugging, as well as data representation, data types, variables, constants, and operators. It also includes control structures, interactive and file input/output, standard libraries, arrays, pointers, methods (functions), classes and objects. (C-ID COMP 112)

CISP 362 Programming for Mobile Devices I 4 Units*Corequisite: CISP 300 or 370**Course Transferable to CSU**Hours: 54 hours LEC; 54 hours LAB*

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.

CISP 363 Programming for Mobile Devices II 4 Units*Prerequisite: CISP 362 with a grade of "C" or better**Corequisite: CISP 360**Course Transferable to CSU**Hours: 54 hours LEC; 54 hours LAB*

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.

CISP 370 Beginning Visual Basic 4 Units*Advisory: CISC 310 and CISP 300**Course Transferable to CSU**Hours: 54 hours LEC; 54 hours LAB*

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

CISP 371 Intermediate Visual Basic 4 Units*Prerequisite: CISP 370 with a grade of "C" or better**Course Transferable to CSU**Hours: 54 hours LEC; 54 hours LAB*

This intermediate course in Visual Basic programming further examines data and its relationship to the functions that operate on data. Topics include multiple forms, components, properties, classes, objects, static and dynamic relationships, databases, data sets, queries, hierarchies, inheritance, associations, testing, and debugging.

CISP 372 Beginning Visual Basic for Applications Programming 1 Unit*Course Transferable to CSU**Hours: 15 hours LEC; 9 hours LAB*

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

CISP 400 Object Oriented Programming with C++ 4 Units*Prerequisite: CISP 360 with a grade of "C" or better**Advisory: CISC 323**General Education: AA/AS Area II(b)**Course Transferable to UC/CSU**Hours: 54 hours LEC; 54 hours LAB*

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

CISP 401 Object Oriented Programming with Java 4 Units*Prerequisite: CISP 360 with a grade of "C" or better**Course Transferable to UC/CSU**Hours: 54 hours LEC; 54 hours LAB*

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

CISP 430 Data Structures 4 Units*Prerequisite: CISP 400 or 401 with a grade of "C" or better**Course Transferable to UC/CSU**Hours: 54 hours LEC; 54 hours LAB*

This course applies object-oriented techniques for systematic problem analysis and the managing of program complexity using abstraction. Specifications, design, coding, testing, and documentation of large multi-file programs are covered. It uses advanced language features such as classes, strings, non-text files, pointers, and recursion. Abstract data types such as stacks, queues, lists, binary trees, heaps/priority queues, hash tables, and graphs are examined. Various sorting and searching algorithms are presented and analyzed using Big-O notation. (C-ID COMP 132)

CISP 440 Discrete Structures for Computer Science 3 Units*Prerequisite: CISP 360 and MATH 370 with grades of "C" or better**Corequisite: CISP 430**General Education: AA/AS Area II(b); CSU Area B4**Course Transferable to UC/CSU**Hours: 54 hours LEC*

This course is an introduction to the 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. (C-ID COMP 152)

CISP 480 Honors Introduction to Structured Programming 5 Units*Prerequisite: Placement into ENGWR 480 through the assessment process.**Advisory: CISC 310**General Education: AA/AS Area II(b) (effective Summer 2013)**Course Transferable to UC/CSU**Hours: 72 hours LEC; 54 hours LAB*

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

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

Advisory: CISC 320, 350, or 351
Course Transferable to CSU
Hours: 18 hours LEC; 18 hours LAB

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

CISS 301 Ethical Hacking 2 Units

Advisory: CISC 320, 323, 350, and 351
Course Transferable to CSU
Hours: 27 hours LEC; 27 hours LAB

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

CISS 310 Network Security Fundamentals 3 Units

Advisory: CISC 119, 140, and 302
Course Transferable to CSU
Hours: 45 hours LEC; 27 hours LAB

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

CISS 325 Network Security and Firewalls 3 Units

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

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

CISS 341 Implementing Windows Operating System Security 3 Units

Advisory: CISC 320, CISC 351, and CISS 310
Course Transferable to CSU
Hours: 45 hours LEC; 27 hours LAB

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

CISS 342 Implementing Linux Operating System Security 3 Units

Advisory: CISC 323 and CISS 310
Course Transferable to CSU
Hours: 45 hours LEC; 27 hours LAB

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

CISS 350 Disaster Recovery 3 Units

Advisory: CISS 310
Course Transferable to CSU
Hours: 54 hours LEC

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

CISS 360 Computer Forensics and Investigation 3 Units

Advisory: CISC 324, CISS 310, and CISS 350
Course Transferable to CSU
Hours: 45 hours LEC; 27 hours LAB

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

Computer Information Science - Web**CISW 300 Web Publishing 3 Units**

Advisory: CISC 300 and 305
Course Transferable to CSU
Hours: 36 hours LEC; 54 hours LAB

This course is an introduction to publishing on the World Wide Web. Topics include creating web pages with the Hyper Text Markup 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.

CISW 304 Cascading Style Sheets 2 Units

Prerequisite: CISW 300 with a grade of "C" or better
Course Transferable to CSU
Hours: 27 hours LEC; 27 hours LAB

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

CISW 310 Advanced Web Publishing 4 Units

Prerequisite: CISW 300 with a grade of "C" or better
Course Transferable to CSU
Hours: 54 hours LEC; 54 hours LAB

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

CISW 321 Web Site Development using Dreamweaver 3 Units

Advisory: CISC 305 and CISW 300
Course Transferable to CSU
Hours: 36 hours LEC; 54 hours LAB

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

CISW 350 Imaging for the Web 1 Unit

Advisory: CISC 306 or CISW 300
Course Transferable to CSU
Hours: 18 hours LEC; 18 hours LAB

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

CISW 355 Web Imaging Projects 2 Units

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

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

CISW 360 Beginning Flash 3 Units

Advisory: ARTNM 324, CISW 300, and CISW 350
Course Transferable to CSU
Hours: 36 hours LEC; 54 hours LAB

This course introduces the design and the development of Flash-based interactive web sites and applications. Topics include the creation of simple vector-based graphics, buttons, animation and movies, and the integration of sound, raster graphics, and video.

CISW 370 Designing Accessible Web Sites 1 Unit

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

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

CISW 400 Client-side Web Scripting 4 Units

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

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

CISW 410 Middleware Web Scripting 4 Units

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

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

CISW 420 Server-side Web Scripting 4 Units

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

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

CISW 442 Web Publishing with XML 3 Units

Prerequisite: CISW 300 with a grade of "C" or better
Course Transferable to CSU
Hours: 36 hours LEC; 54 hours LAB

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