Area: Business & Computer Science  
Dean: Kirsten Corbin  
Phone: (916) 484-8361  
Counseling: (916) 484-8572

DEGREES AND CERTIFICATES

Computer Science Degree  
Major Code: 011428A01

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

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

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  
Major Code, Cisco: 011427A04  
Major Code, Linux: 011427A02  
Major Code, MS Windows: 011427A03

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.
- 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

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>BUS 310 Business Communications (3)</td>
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<td>or ENGV 300 College Composition (3)</td>
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<tr>
<td>or ENGV 480 Honors College Composition (3)</td>
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<tr>
<td>or ESLW 340 Advanced Composition (4)</td>
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<tr>
<td>CISA 315 Introduction to Electronic Spreadsheets</td>
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<tr>
<td>CISC 320 Operating Systems</td>
<td>1</td>
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<tr>
<td>CISC 323 Linux Operating System</td>
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<tr>
<td>CISC 330 Introduction to Data Communications</td>
<td>1</td>
</tr>
<tr>
<td>CIS 361 Microcomputer Support Essentials –</td>
<td>3</td>
</tr>
<tr>
<td>Preparation for A+ Certification</td>
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<tr>
<td>CISS 310 Network Security Fundamentals</td>
<td>3</td>
</tr>
</tbody>
</table>

CISCO Concentration ........................................33 - 35 Units

Core Requirements ...........................................14 - 15

[ CISC 324 Intermediate Linux Operating System (3) ]
| CISC 110 Networking Technologies - | Preparation for N+ Certification (2) | 3 - 4 |
| CIS 324 Intermediate Linux Operating System (3) |       |
| CIS 10 Networking Technologies - | Preparation for N+ Certification (2) | 3 - 4 |
| CIS 110 Intermediate Networking Technologies - | Preparation for N+ Certification |       |
| CIS 324 Intermediate Linux Operating System (3) |       |
| CIS 10 Networking Technologies - | Preparation for N+ Certification (2) | 3 - 4 |
| CIS 110 Intermediate Networking Technologies - | Preparation for N+ Certification |       |
| CIS 324 Intermediate Linux Operating System (3) |       |
| CIS 10 Networking Technologies - | Preparation for N+ Certification (2) | 3 - 4 |
| CIS 110 Intermediate Networking Technologies - | Preparation for N+ Certification |       |
| CIS 324 Intermediate Linux Operating System (3) |       |
| CIS 10 Networking Technologies - | Preparation for N+ Certification (2) | 3 - 4 |
| CIS 110 Intermediate Networking Technologies - | Preparation for N+ Certification |       |
| CIS 324 Intermediate Linux Operating System (3) |       |
| CIS 10 Networking Technologies - | Preparation for N+ Certification (2) | 3 - 4 |
| CIS 110 Intermediate Networking Technologies - | Preparation for N+ Certification |       |
| CIS 324 Intermediate Linux Operating System (3) |       |
| CIS 10 Networking Technologies - | Preparation for N+ Certification (2) | 3 - 4 |
| CIS 110 Intermediate Networking Technologies - | Preparation for N+ Certification |       |
| CIS 324 Intermediate Linux Operating System (3) |       |
| CIS 10 Networking Technologies - | Preparation for N+ Certification (2) | 3 - 4 |
| CIS 110 Intermediate Networking Technologies - | Preparation for N+ Certification |       |
| CIS 324 Intermediate Linux Operating System (3) |       |
| CIS 10 Networking Technologies - | Preparation for N+ Certification (2) | 3 - 4 |
| CIS 110 Intermediate Networking Technologies - | Preparation for N+ Certification |       |
| CIS 324 Intermediate Linux Operating System (3) |       |
| CIS 10 Networking Technologies - | Preparation for N+ Certification (2) | 3 - 4 |
| CIS 110 Intermediate Networking Technologies - | Preparation for N+ Certification |       |
| CIS 324 Intermediate Linux Operating System (3) |       |
| CIS 10 Networking Technologies - | Preparation for N+ Certification (2) | 3 - 4 |
| CIS 110 Intermediate Networking Technologies - | Preparation for N+ Certification |       |
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| CIS 10 Networking Technologies - | Preparation for N+ Certification (2) | 3 - 4 |
| CIS 110 Intermediate Networking Technologies - | Preparation for N+ Certification |       |
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| CIS 10 Networking Technologies - | Preparation for N+ Certification (2) | 3 - 4 |
| CIS 110 Intermediate Networking Technologies - | Preparation for N+ Certification |       |
| CIS 324 Intermediate Linux Operating System (3) |       |
| CIS 10 Networking Technologies - | Preparation for N+ Certification (2) | 3 - 4 |
| CIS 110 Intermediate Networking Technologies - | Preparation for N+ Certification |       |
| CIS 324 Intermediate Linux Operating System (3) | June 2022 | 189 |
(CIS: Computer Networking Management Certificate continued)

- configure and implement basic data security methods for protecting servers, workstations and networks from unauthorized access.
- evaluate and demonstrate basic procedures for troubleshooting and replacing field replaceable components in microcomputers.
- implement, evaluate and troubleshoot a transmission control protocol/internet protocol (TCP/IP) addressing scheme.
- define, implement, evaluate and troubleshoot the most common utilities and protocols of the TCP/IP suite.

CISCO CONCENTRATION:

- design, evaluate, construct and implement a routed network using TCP/IP and industry standard routing protocols and state of the technology routing equipment, in a wired or wireless configuration.
- design, evaluate, construct and implement a multi-layer 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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>CISC 133</td>
<td>Linux Operating System</td>
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<tr>
<td>CISC 350</td>
<td>Introduction to Data Communications</td>
</tr>
<tr>
<td>CISC 361</td>
<td>Microcomputer Support Essentials - Preparation for A+ Certification</td>
</tr>
<tr>
<td>CISS 310</td>
<td>Network Security Fundamentals</td>
</tr>
</tbody>
</table>

CISCO Concentration 21 Units

Core Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
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<tbody>
<tr>
<td>CISC 324</td>
<td>Intermediate Linux Operating System</td>
</tr>
<tr>
<td>CISS 140</td>
<td>CISCO Networking Academy (CCNA): Networking Fundamentals</td>
</tr>
<tr>
<td>CISS 141</td>
<td>CISCO Networking Academy (CCNA): Routing Protocols and Concepts</td>
</tr>
<tr>
<td>CISS 142</td>
<td>CISCO Networking Academy (CCNA): LAN Switching and Wireless</td>
</tr>
<tr>
<td>CISS 143</td>
<td>CISCO Networking Academy (CCNA): Accessing the Wide Area Network</td>
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</table>

LINUX Concentration 23 Units

Core Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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</thead>
<tbody>
<tr>
<td>CISC 324</td>
<td>Intermediate Linux Operating System</td>
</tr>
<tr>
<td>CISS 110</td>
<td>Networking Technologies - Preparation for N+ Certification</td>
</tr>
<tr>
<td>CISS 111</td>
<td>Intermediate Networking Technologies - Preparation for N+ Certification</td>
</tr>
<tr>
<td>CISS 119</td>
<td>TCP/IP Protocols</td>
</tr>
<tr>
<td>CISS 120</td>
<td>Beginning Network Administration with Linux</td>
</tr>
<tr>
<td>CISS 121</td>
<td>Network Administration with Linux: LAN Services</td>
</tr>
<tr>
<td>CISS 122</td>
<td>Network Administration with Linux: Internet Services</td>
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</tbody>
</table>

WINDOWS Concentration 24 Units

Core Requirements

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CISS 110</td>
<td>Networking Technologies - Preparation for N+ Certification</td>
</tr>
<tr>
<td>CISS 111</td>
<td>Intermediate Networking Technologies - Preparation for N+ Certification</td>
</tr>
<tr>
<td>CISS 300</td>
<td>Network Systems Administration</td>
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<tr>
<td>CISS 302</td>
<td>Intermediate Network Systems Administration</td>
</tr>
<tr>
<td>CISS 307</td>
<td>Windows Active Directory Services</td>
</tr>
<tr>
<td>CISS 308</td>
<td>Internetworking with TCP/IP (3)</td>
</tr>
</tbody>
</table>

CIS: Computer Programming Degree

Major Code, C++: 011326A05
Major Code, Java: 011326A03
Major Code, Visual Basic: 011326A04

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>CISS 310</td>
<td>Introduction to Computer Information Science</td>
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<tr>
<td>CISS 350</td>
<td>Database Programming</td>
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</table>

C++ Concentration 19-21 Units

Core Requirements

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<thead>
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<th>Course Code</th>
<th>Course Title</th>
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<tbody>
<tr>
<td>CISS 300</td>
<td>Algorithm Design/Problem Solving (3)</td>
</tr>
<tr>
<td>or CISS 360</td>
<td>Introduction to Structured Programming (4)</td>
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<tr>
<td>CISS 360</td>
<td>Honors Introduction to Structured Programming (5)</td>
</tr>
<tr>
<td>CISS 400</td>
<td>Object Oriented Programming with C++</td>
</tr>
<tr>
<td>CISS 430</td>
<td>Data Structures</td>
</tr>
</tbody>
</table>
Java Concentration 18-20 Units

Core Requirements ............................................................5 - 7
CISP 300  Algorithm Design/Problem Solving (3) .........................5 - 7
and CISP 360  Introduction to Structured Programming (4) ........5 - 7
or CISP 480  Honors Introduction to Structured Programming (5) .5 - 7
CISP 401  Object Oriented Programming with Java ....................4
A minimum of 3 units from the following: ................................ 3
CISC 320  Operating Systems (1)
CISC 323  Linux Operating System (1)
CISC 324  Intermediate Linux Operating System (1)
CISP 310  Assembly Language Programming for Microcomputers (4)
CISP 362  Programming for Mobile Devices I (4)
CISP 363  Programming for Mobile Devices II (4)

Visual Basic Concentration 20 Units

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

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

Major Code, C++: 011326C05
Major Code, Java: 011326C03
Major Code, Visual Basic: 011326C04

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.

Java Concentration Requirements 18-20 Units

Core Requirements ............................................................4
CISC 310  Introduction to Computer Information Science ...............4
CISC 320  Operating Systems ..............................................4

C++ Concentration Requirements 18-20 Units

Core Requirements ............................................................4
CISP 300  Algorithm Design/Problem Solving (3) .........................4
and CISP 360  Introduction to Structured Programming (4) ..........4
or CISP 480  Honors Introduction to Structured Programming (5) .4
CISP 400  Object Oriented Programming with C++ ....................4
CISP 430  Data Structures ..................................................4
A minimum of 1 unit from the following: ................................ 1
CISC 323  Linux Operating System (1)
CISC 324  Intermediate Linux Operating System (1)

CISP 300  Algorithm Design/Problem Solving (3) .........................5 - 7
and CISP 360  Introduction to Structured Programming (4) ..........5 - 7
or CISP 480  Honors Introduction to Structured Programming (5) .5 - 7
CISP 401  Object Oriented Programming with Java ....................4
A minimum of 2 units from the following: ................................ 2
CISC 323  Linux Operating System (1)
CISC 324  Intermediate Linux Operating System (1)
CISP 310  Assembly Language Programming for Microcomputers (4)
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 Applications .........4
CISP 300  Algorithm Design/Problem Solving ..........................4
CISP 350  Database Programming ..........................................4
CISP 360  Introduction to Structured Programming ...................4
CISP 361  Programming for Microcomputers (4)
CISP 370  Beginning Visual Basic ........................................4
CISP 371  Intermediate Visual Basic .......................................4

CIS: Database Management Degree

Major Code: 011425A01

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, database applications, and enterprise and Internet platforms.

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 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.

(continued on next page)
Computer Information Science

(CIS: Database Management Degree continued)

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

Requirements for Degree 39-40 Units

<table>
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<tr>
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<th>Course Title</th>
<th>Units</th>
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<tbody>
<tr>
<td>ACCT 101</td>
<td>Fundamentals of College Accounting</td>
<td>3-4</td>
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<td>or ACCT 301</td>
<td>Financial Accounting</td>
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<tr>
<td>BUS 110</td>
<td>Business Economics</td>
<td>3</td>
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<tr>
<td>or ECON 302</td>
<td>Principles of Macroeconomics</td>
<td></td>
</tr>
<tr>
<td>BUS 300</td>
<td>Introduction to Business</td>
<td>3</td>
</tr>
<tr>
<td>BUS 310</td>
<td>Business Communications</td>
<td>3</td>
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<tr>
<td>or ENGW 300</td>
<td>College Composition</td>
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<tr>
<td>CISA 315</td>
<td>Introduction to Electronic Spreadsheets</td>
<td>2</td>
</tr>
<tr>
<td>CISA 320</td>
<td>Introduction to Database Management</td>
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<td>CISA 322</td>
<td>Design and Development of Desktop</td>
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<td></td>
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<td>CISC 310</td>
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<tr>
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<tr>
<td>CISP 370</td>
<td>Beginning Visual Basic</td>
<td>4</td>
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<tr>
<td>CISW 300</td>
<td>Web Publishing</td>
<td>3</td>
</tr>
<tr>
<td>CISW 410</td>
<td>Middleware Web Scripting</td>
<td>4</td>
</tr>
</tbody>
</table>

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

Major Code: 011324C01

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, 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

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<tr>
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<tbody>
<tr>
<td>CISA 315</td>
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<td>CISW 410</td>
<td>Middleware Web Scripting</td>
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</tr>
</tbody>
</table>

CIS: Microcomputer Applications Degree

Major Code: 011065A01

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 300.1</td>
<td>Keyboarding/Applications: Beginning</td>
<td>1</td>
</tr>
<tr>
<td>or BUS 301</td>
<td>Business Economics</td>
<td>1</td>
</tr>
<tr>
<td>or BUSTEC 126</td>
<td>Keyboarding/Outlook: Basics (1)</td>
<td></td>
</tr>
<tr>
<td>CISA 126</td>
<td>Introduction to Electronic Spreadsheets</td>
<td>2</td>
</tr>
<tr>
<td>or CISA 127</td>
<td>Introduction to Electronic Spreadsheets Tools</td>
<td>1</td>
</tr>
<tr>
<td>or BUSTEC 127</td>
<td>Keyboarding/Outlook: Tools (1)</td>
<td></td>
</tr>
<tr>
<td>CISA 305</td>
<td>Beginning Word Processing</td>
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<tr>
<td>CISA 306</td>
<td>Intermediate Word Processing</td>
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</tr>
<tr>
<td>CISA 315</td>
<td>Introduction to Electronic Spreadsheets</td>
<td>2</td>
</tr>
<tr>
<td>CISA 316</td>
<td>Intermediate Electronic Spreadsheets</td>
<td>2</td>
</tr>
<tr>
<td>CISA 320</td>
<td>Introduction to Database Management</td>
<td>1</td>
</tr>
<tr>
<td>CISA 322</td>
<td>Design and Development of Desktop Database</td>
<td>3</td>
</tr>
<tr>
<td>CISA 330</td>
<td>Desktop Publishing</td>
<td>2</td>
</tr>
<tr>
<td>CISA 340</td>
<td>Presentation Graphics</td>
<td>2</td>
</tr>
<tr>
<td>CISC 306</td>
<td>Introduction to Web Page Creation</td>
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</tr>
<tr>
<td>CISC 310</td>
<td>Introduction to Computer Information Science</td>
<td>3</td>
</tr>
<tr>
<td>CISC 320</td>
<td>Operating Systems</td>
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<tr>
<td>CISC 325</td>
<td>Linux Operating System</td>
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<tr>
<td>CISP 370</td>
<td>Beginning Visual Basic</td>
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</table>

And a minimum of 5 units from the following:

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<tr>
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<th>Units</th>
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</thead>
<tbody>
<tr>
<td>ACCT 341</td>
<td>Computerized Accounting</td>
<td>2</td>
</tr>
<tr>
<td>BUSTEC 313</td>
<td>Web-based Conferencing and Presentations for the Business Professional</td>
<td>2</td>
</tr>
<tr>
<td>CISA 160</td>
<td>Project Management Techniques and Software</td>
<td>3</td>
</tr>
</tbody>
</table>
CISA 171  Introduction to Adobe Acrobat (1)
CISC 350  Introduction to Data Communications (1)
CISC 351  Introduction to Local Area Networks (1)
CIS 315  Ethical Hacking (3)
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)
CISW 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
Major Code: 011327C01

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.
- recognize within the information technology (IT) field the diverse requirements for managing a local computing environment.
- 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/ged.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
CISA 350  Introduction to the Internet ....................................................... 1
CISA 360  Introduction to Computer Information Science ......................... 3
CISA 370  Operating Systems .................................................................. 1
CISA 371  Introduction to Data Communications ....................................... 1
CISA 375  Introduction to Local Area Networks ......................................... 1
CISA 380  Microcomputer Support Essentials - Preparation for A+ Certification .......................................................... 3
CISA 382  Microcomputer and Applications Support ................................ 2
CISA 383  Microcomputer Support Technical - Preparation for A+ Certification .......................................................... 3
CIS 315  Ethical Hacking ........................................................................... 3

And 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)
CISA 306  Introduction to Web Page Creation (1)
CISC 323  Linux Operating System (1)

CIS: PC Support Management Degree
Major Code: 011426A01

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 32 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
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
CIS 315  Ethical Hacking ........................................................................... 3

And a minimum of 6 units from the following: .............................................. 6
CISA 126  Outlook: Basics (1)
CISA 127  Outlook: Tools (1)
CIB 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)

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.
**Computer Information Science**

**CIS: PC Support Certificate**
Major Code: 011325C01
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** 26 Units

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 310</td>
<td>Business Communications</td>
<td>3</td>
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<tr>
<td>CISC 310</td>
<td>Introduction to Computer Information Science</td>
<td>3</td>
</tr>
<tr>
<td>CISC 320</td>
<td>Operating Systems</td>
<td>1</td>
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<tr>
<td>CISC 350</td>
<td>Introduction to Data Communications</td>
<td>1</td>
</tr>
<tr>
<td>CISC 351</td>
<td>Introduction to Local Area Networks</td>
<td>1</td>
</tr>
<tr>
<td>CISC 361</td>
<td>Microcomputer Support Essentials - Preparation for A+ Certification</td>
<td>3</td>
</tr>
<tr>
<td>CISC 362</td>
<td>Microcomputer and Applications Support</td>
<td>2</td>
</tr>
<tr>
<td>CISC 363</td>
<td>Microcomputer Support Technical - Preparation for A+ Certification</td>
<td>3</td>
</tr>
<tr>
<td>CISS 315</td>
<td>Ethical Hacking</td>
<td>3</td>
</tr>
<tr>
<td>CISA 126</td>
<td>Outlook: Basics</td>
<td>1</td>
</tr>
<tr>
<td>CISA 127</td>
<td>Outlook: Tools</td>
<td>1</td>
</tr>
<tr>
<td>CISA 305</td>
<td>Beginning Word Processing</td>
<td>2</td>
</tr>
<tr>
<td>CISA 315</td>
<td>Introduction to Electronic Spreadsheets</td>
<td>2</td>
</tr>
<tr>
<td>CISA 320</td>
<td>Introduction to Database Management</td>
<td>1</td>
</tr>
<tr>
<td>CISA 340</td>
<td>Presentation Graphics</td>
<td>2</td>
</tr>
<tr>
<td>CISA 366</td>
<td>Introduction to Web Page Creation</td>
<td>1</td>
</tr>
<tr>
<td>CISC 323</td>
<td>Linux Operating System</td>
<td>1</td>
</tr>
</tbody>
</table>

And a minimum of 6 units from the following:

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CISA 126</td>
<td>Outlook: Basics</td>
</tr>
<tr>
<td>or BUS 316</td>
<td>Outlook: Basics</td>
</tr>
<tr>
<td>and CISA 127</td>
<td>Outlook: Tools</td>
</tr>
<tr>
<td>or BUS 317</td>
<td>Outlook: Tools</td>
</tr>
<tr>
<td>CISA 305</td>
<td>Beginning Word Processing</td>
</tr>
<tr>
<td>CISA 315</td>
<td>Introduction to Electronic Spreadsheets</td>
</tr>
<tr>
<td>CISA 320</td>
<td>Introduction to Database Management</td>
</tr>
<tr>
<td>CISA 340</td>
<td>Presentation Graphics</td>
</tr>
<tr>
<td>CISA 366</td>
<td>Introduction to Web Page Creation</td>
</tr>
<tr>
<td>CISC 323</td>
<td>Linux Operating System</td>
</tr>
</tbody>
</table>

1 Taken on the Windows operating system.

**Computer Information Security Essentials Certificate**
Major Code: 011584C01
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:*
- compare and contrast the benefits of firewalls vs. intrusion detection devices and software.
- construct and apply secure group policy settings at the Organizational Unit (OU), Domain, Site or local machine level.
- 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

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CISS 310</td>
<td>Network Security Fundamentals</td>
</tr>
<tr>
<td>CISS 325</td>
<td>Network Security and Firewalls</td>
</tr>
<tr>
<td>or CISS 341</td>
<td>Implementing Windows Operating System Security (3)</td>
</tr>
<tr>
<td>or CISS 342</td>
<td>Implementing Linux Operating System Security (3)</td>
</tr>
<tr>
<td>CISS 360</td>
<td>Computer Forensics and Investigation</td>
</tr>
</tbody>
</table>

**Information Systems Security Degree**
Major Code: 011554A01
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.
- 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.
- 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.
Requirements for Degree  

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CISC 323</td>
<td>Linux Operating System</td>
<td>1</td>
</tr>
<tr>
<td>CISC 324</td>
<td>Intermediate Linux Operating System</td>
<td>1</td>
</tr>
<tr>
<td>CISC 330</td>
<td>Network Systems Administration</td>
<td>3</td>
</tr>
<tr>
<td>CISC 302</td>
<td>Intermediate Network Systems Administration (3)</td>
<td>3</td>
</tr>
<tr>
<td>or CISP 140</td>
<td>CISCO Networking Academy (CCNA)TM: Networking Fundamentals (3)</td>
<td>3</td>
</tr>
<tr>
<td>CISS 300</td>
<td>Introduction to Information Systems Security</td>
<td>1</td>
</tr>
<tr>
<td>CISS 310</td>
<td>Network Security Fundamentals</td>
<td>3</td>
</tr>
<tr>
<td>CISS 315</td>
<td>Ethical Hacking</td>
<td>3</td>
</tr>
<tr>
<td>CISS 325</td>
<td>Network Security and Firewalls</td>
<td>3</td>
</tr>
<tr>
<td>CISS 341</td>
<td>Implementing Windows Operating System Security</td>
<td>3</td>
</tr>
<tr>
<td>CISS 342</td>
<td>Implementing Linux Operating System Security</td>
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</tr>
<tr>
<td>CISS 350</td>
<td>Disaster Recovery</td>
<td>3</td>
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<td>CISS 360</td>
<td>Computer Forensics and Investigation</td>
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<tr>
<td>CISP 300</td>
<td>Web Publishing</td>
<td>3</td>
</tr>
</tbody>
</table>

**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**  
Major Code: 011554C01

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  

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CISC 323</td>
<td>Linux Operating System</td>
<td>1</td>
</tr>
<tr>
<td>CISC 324</td>
<td>Intermediate Linux Operating System</td>
<td>1</td>
</tr>
<tr>
<td>CISS 310</td>
<td>Network Security Fundamentals</td>
<td>3</td>
</tr>
<tr>
<td>CISS 315</td>
<td>Ethical Hacking</td>
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<tr>
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<td>Network Security and Firewalls</td>
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<td>Implementing Windows Operating System Security</td>
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</tr>
<tr>
<td>CISS 342</td>
<td>Implementing Linux Operating System Security</td>
<td>3</td>
</tr>
<tr>
<td>CISP 140</td>
<td>CISCO Networking Academy (CCNA)TM: Networking Fundamentals (3)</td>
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</tr>
<tr>
<td>or CISP 300</td>
<td>Network Systems Administration (3)</td>
<td>3</td>
</tr>
<tr>
<td>or CISP 302</td>
<td>Intermediate Network Systems Administration (3)</td>
<td>3</td>
</tr>
</tbody>
</table>

**Internet Marketing Certificate**  
Major Code: 011320C01

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

**Student Learning Outcomes**

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

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

**Career Opportunities**

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

Requirements for Certificate  

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>BUS 310</td>
<td>Business Communications</td>
<td>3</td>
</tr>
<tr>
<td>CISA 330</td>
<td>Desktop Publishing</td>
<td>2</td>
</tr>
<tr>
<td>CISA 340</td>
<td>Presentation Graphics</td>
<td>2</td>
</tr>
<tr>
<td>CISA 345</td>
<td>Technical Marketing Applications</td>
<td>2</td>
</tr>
<tr>
<td>CISA 346</td>
<td>Social Media Applications</td>
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<td>CISP 350</td>
<td>Imaging for the Web</td>
<td>1</td>
</tr>
<tr>
<td>MKT 330</td>
<td>Internet Marketing</td>
<td>3</td>
</tr>
</tbody>
</table>
Mobile Programming Certificate

Major Code: 011459C01

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) ....................................... 4
CISP 362  Programming for Mobile Devices I ............................... 4

2nd semester:
CISP 360  Introduction to Mobile Devices I ................................. 4
CISP 363  Programming for Mobile Devices II ............................. 4

Network Administration Essentials - Windows Certificate

Major Code: 011585C01

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

Major Code: 011458C01

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 .......................................................... 4
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

A minimum of 4 units from the following:

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)
Web Publishing Certificate
Major Code: 011424C01
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)

A minimum of 3 units from the following: 3
ARTNM 302  Intermediate Web Design (3)
CISW 321  Web Site Development using Dreamweaver (3)
CISW 355  Web Imaging Projects (2)
CISW 360  Beginning Flash (3)

Technical Communications Degree
Major Code: 011222A01
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 410  Middleware Web Scripting 4
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 302  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)
ENGR 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
Major Code: 011222C01
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.

(continued on next page)
(Technical Communications Certificate continued)

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/gdet.php?major=011222C01 for Gainful Employment Disclosure.

Requirements for Certificate 21.5-22.5 Units

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Description</th>
<th>Units</th>
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<tbody>
<tr>
<td>ARTNM 352</td>
<td>Design for Publication</td>
<td>3-4</td>
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<tr>
<td>or CISA 330</td>
<td>Desktop Publishing</td>
<td>2</td>
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<tr>
<td>and CISA 331</td>
<td>Intermediate Desktop Publishing</td>
<td>3</td>
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<tr>
<td>CISA 305</td>
<td>Beginning Word Processing</td>
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<td>Web Publishing</td>
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<td>TECCOM 300</td>
<td>Introduction to Technical/Professional Communication</td>
<td>3</td>
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<tr>
<td>TECCOM 330</td>
<td>Technical/Professional Communication: Writing Technical Manuals</td>
<td>3</td>
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<tr>
<td>TECCOM 340</td>
<td>Technical/Professional Communication: Developing Help Systems</td>
<td>1.5</td>
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<tr>
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<td>3</td>
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<tr>
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<td>4</td>
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<tr>
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<tr>
<td>TECCOM 320</td>
<td>Technical/Professional Communication: Proposal Writing</td>
<td>3</td>
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</tbody>
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CISA 126  Outlook: Basics 1 Unit

Same As: BUSTEC 126
Advisory: BUSTEC 300.1
Hours: 18 hours LEC

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

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 300.1 with a grade of “C” or better
Hours: 18 hours LEC

This course presents the advanced personal information management tools in Outlook. Topics include working with multiple email accounts, using rules and folders, incorporating advanced calendar and contact features, collaborating using sharing and delegate features, and customizing the Outlook user interface. In addition, the course covers the integration of Outlook with other applications in the Microsoft Office suite. Additionally, BUSTEC 126/CISA 126 and BUSTEC 127/CISA 127 taken together are considered sufficient preparation to pass the Microsoft Office Specialist certification for the Microsoft Outlook application and the communications portion of the International Computer Driver’s License (ICDL) Module 7: Information and Communication. This course is not open to students who have completed BUSTEC 127.

CISA 160  Project Management Techniques and Software 3 Units

Same As: MGMT 142
Advisory: ENGRD 116; OR ESLR 320 and ESWL 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
This course introduces word processing and presentation software. The basic features and skills of creating, editing, and formatting documents; inserting tables and graphics, and enhancing word processed documents and presentations are covered.

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

CISA 320 Introduction to Database Management 1 Unit
Advisory: BUSTEC 300.1 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 335 Technical Marketing Applications 2 Units
Advisory: CISC 305
Course Transferable to CSU
Hours: 27 hours LEC; 27 hours LAB
This course provides an in-depth look at using presentation software in business environments. Topics include elements of good presentation design, slide show techniques, integrating and linking of various software applications and media, animation effects, and the production of presentations using a variety of software and hardware.

CISA 340 Presentation Graphics 2 Units
Advisory: CISC 300
Course Transferable to CSU
Hours: 27 hours LEC; 27 hours LAB
This course provides an overview of online marketing applications. It includes creating websites using cloud based software, building media-rich content for blogs, and developing marketing strategies using Search Engine Optimization (SEO) tools such as Google Analytics. It also covers email marketing software to create and manage mailing lists, newsletters, and automated campaigns. Additionally, it covers audience building with other cloud based marketing tools such as podcasts, ebooks, webinars, and more. All software used in this course is free, cloud based, and mobile.

CISA 346 Social Media Applications 1 Unit
Advisory: CISC 305
Course Transferable to CSU
Hours: 18 hours LEC; 18 hours LAB
This course introduces a variety of social media applications and content platforms for marketing both small and large businesses. It includes popular applications for online social networking services (Facebook Pages for business), microblogging (Twitter), visual bookmark boards (Pinterest), video-sharing websites and YouTube channels, Internet based photo and video sharing apps (Instagram and Snapchat), and image editing mobile apps specifically for marketing. It also includes tracking social media, apps and integration, link building, and monetization.
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 308  Exploring Computer Environments and the Internet  1 Unit
Course Transferable to CSU
Hours: 18 hours LEC
This course introduces the fundamentals of microcomputer hardware, software, and computer networking, focusing on operating systems. The fundamentals of the Internet and Internet tools are also introduced.

CISC 320  Operating Systems  1 Unit
Course Transferable to CSU
Hours: 18 hours LEC; 18 hours LAB
This course introduces the basic features of the Windows operating system for personal, non-technical information, as well as in-class hands-on instruction reinforcement. This course introduces the fundamentals of microcomputer hardware, software, and computer networking, focusing on operating systems. The fundamentals of the Internet and Internet tools are also introduced.
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 395  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: AA/AS 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 complete 75 hours of related paid work experience, or 60 hours of related unpaid work experience for one unit. An additional 75 or 60 hours of related work experience is required for each additional unit. All students are required to attend the first class meeting, a mid-semester meeting, and a final meeting. Additionally, students who have not already successfully completed a Work Experience course will be required to attend weekly orientations while returning participants may meet individually with the instructor as needed. Students may take up to 16 units total across all Work Experience course offerings. This course may be taken up to four times when there are new or expanded learning objectives. Only one Work Experience course may be taken per semester.
In 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: 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 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: 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 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)™: 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)™: 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. Topic include hierarchy LAN design, basic switch concepts and configuration, Virtual LANs (VLANs), Virtual Trunking Protocol (VTP), Spanning Tree Protocol (STP), Inter-VLAN routing, basic wireless concepts and configuration. Implementing, verifying, securing and troubleshooting converged switching technologies in a small-to-medium network, including integrating wireless devices into a LAN, are also covered. This is the third course in preparation for Cisco CCNA certification examination. ARC is a certified Cisco Networking Academy and all courses are taught by Cisco Certified Academy Instructors (CCAI).

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.

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. (C-ID COMP 142)
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 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, functions, interactive and file input/output, standard libraries, arrays, pointers, structures, 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: CISP 310 and CISP 300
Course Transferable to CSU
Hours: 54 hours LEC; 54 hours LAB
This introductory programming course covers the development of Windows-based desktop applications using Visual Basic (VB). Topics include best practices for Graphical User Interface (GUI) design, use of the VB application development software, organizing code into procedures and functions, variable scope, structures, arrays, input data validation, calculation, file input and output, and multiple-window applications. This course is designed for those who want a strong foundation in basic programming and building GUI applications.

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

CISP 390 Introduction to Programming with Java 4 Units
Prerequisite: CISP 360 with a grade of “C” or better
Corequisite: CISP 430
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 400 Object Oriented Programming with C++ 4 Units
Prerequisite: CISP 360 or 480 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 a programming languages overview, program analysis and design, encapsulation, overloading, classes, inheritance, virtual functions, polymorphism, templates, exception handling, and the standard template library. In addition, basic Linux/UNIX commands and make files are covered. (C-ID COMP 122)

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. Specification, design, coding, testing, and documentation of large multi-file programs are covered. It uses advanced language features such as classes, strings, non-text files, pointers, and recursion. Abstract data types such as stacks, queues, lists, binary trees, heaps/priority queues, hash tables, and graphs are examined. Various sorting and searching algorithms are presented and analyzed using Big-O notation. (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)
CISS 310 Network Security Fundamentals 3 Units
Advisory: CISN 119, 140, and 302
Course Transferable to CSU
Hours: 45 hours LEC; 27 hours LAB
This course is an introduction to the fundamental principles and skills of Information Technology security and risk management at the organizational level. Topics include network security, compliance and operational security, threats and vulnerabilities, application and data security, host security, access control and identity management, and cryptography. The required content of the Computing Technology Industry Association (CompTIA) Security+ certification exam is covered.

CISS 315 Ethical Hacking 3 Units
Advisory: CISS 300 and CISS 310
Course Transferable to CSU
Hours: 48 hours LEC; 28 hours LAB
This course introduces the network security specialist to the various methodologies for attacking a network. Topics include the concepts, principles, and techniques necessary to attack and disable a network within the context of properly securing a network. It emphasizes network attack techniques and methodologies, and appropriate defenses and countermeasures. Supplementary hardware and software may be required.

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 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 324, CISS 310, and CISS 330
Course Transferable to CSU
Hours: 45 hours LEC; 27 hours LAB
This course provides in-depth information on the Linux/UNIX operating system security features, as well as step-by-step configuration for effective operating system security. The techniques needed in order to maintain the integrity, authenticity, availability, and privacy of the system and user data are covered.

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 Hypertext Markup Language (HTML).

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 publish websites. Topics include creating web pages that contain text, images, links, tables, forms, Cascading Style Sheets, and image maps, as well as how to enhance web pages with Flash elements and built-in scripting languages. Additional topics include developing effective website structures, using website management tools, website documentation, making global updates to a website, and using advanced Dreamweaver features.

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

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 Websites  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 websites for people with disabilities. Current legal requirements for accessible websites, 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.