

**Degrees:**

- A.S. – Computer Science
- A.S. – Information Processing
- A.S. – Information Systems Security
- A.S. – Management Information Science
- A.S. – Network Administration
- A.S. – Network Design
- A.S. – Web Developer

**Certificates of Achievement:**

- Advanced CISCO Networking
- Business Information Worker
- Computer Science
- Front-End Web Developer
- Information Processing Specialist
- Information Processing Technician
- Information Systems Security
- Management Information Science
- Network Administration
- Network Design
- PC Support
- Programming
- Web Developer
- Web Production Specialist

**Division of Business and Computer Information Science**

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**Advanced CISCO Networking**

**Certificate of Achievement**

**Program Information**

The Advanced CISCO Networking Certificate recognizes the advanced skills needed for job enhancement and promotion in today's networking and Internet environment. It focuses on advanced knowledge and skills required for supervisory, management, and troubleshooting computer network operations. It prepares students for promotional positions in computer network design.

**Career Opportunities**

Networking skills and experience are needed for network technical support staff, network administrators, network designers, network troubleshooters, and information systems security specialists. According to the Bureau of Labor Statistics (2008-2018) figures, job demands in these areas will grow a phenomenal 53.4% annually and will continue to exceed the number of available and trained workers.

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

- develop best practices for configuring scalable IP addresses.
- construct and configure complex access control lists.
- design and test edge router connectivity into a BGP network.
- evaluate and implement advanced multilayer switching configuration.

**Required Program**

**Units**

CISN 350 CISCO Networking Academy (CCNP) <sup>tm</sup> .....	3
Advanced Router Configuration	
CISN 351 CISCO Networking Academy (CCNP) <sup>tm</sup> .....	3
Remote Access (3)	
or CISN 336 Wireless Technologies (3)	
CISN 352 CISCO Networking Academy (CCNP) <sup>tm</sup> .....	3
Multi-Layer Switching	
CISN 353 CISCO Networking Academy (CCNP) <sup>tm</sup> .....	3
Internetwork Troubleshooting	
CISN 342 CISCO Networking Academy (CCNA) <sup>tm</sup> .....	3
Advanced Routing and Switching	
CISN 343 CISCO Networking Academy (CCNA) <sup>tm</sup> .....	3
Wide Area Network and Project-Based	

**Total Units Required** **18**

**Certificate of Achievement**

The Certificate of Achievement may be obtained by completion of the required courses with grades of "C" or better.

**Computer Science**

**Associate in Science Degree**

**Program Information**

This Computer Science program is designed for students preparing for careers in computer programming and systems analysis. It provides the lower division foundation in currently used and advanced programming languages, databases and operating systems.

**Career Opportunities**

Technical positions include: computer operator, computer programmer, systems analyst, database administrator, computer support or help desk specialist, Web developer, and application developer. California is experiencing a shortage of students completing a BS degree in these fields and this shortage is expected to be worse in 2020.

**Gainful Employment**

For more information about program costs, graduation rates, median debt of program graduates, and other important information regarding gainful employment, please visit: <http://www.losrios.edu/gainful-emp-info/gedt.php?major=051064C01>

**Transfer Information**

California State University, Sacramento offers majors in Computer Science and Computer Engineering through the School of Engineering and Computer Science and also Management Information Science as part of the Business Administration degree. Students planning to transfer to California State University, Chico or University of California, Davis should include computer-programming languages in C++ or Java, assembly language, data structures, discrete structures, one year of analytical geometry and calculus, and physics or chemistry. Students must also meet university admission requirements and other general education courses as outlined by each university. Consultation with an SCC counselor is advised.

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

- analyze development projects.
- build a project while utilizing the project development model.
- manage a programming project, both individually and as a member of a team, from initial concept through design, programming, debugging, testing, and deployment.
- evaluate a program to determine how it will meet the needs of its intended audience.
- use a database to store data associated with programs written in a programming language.
- design, write, test, debug, and implement computer programs in a structured language, a low-level language, an object-oriented language, or scripting language.
- create programs utilizing a variety of programming environments.

**Required Program****Units**

CISA 323 Database Management using Microsoft Access .....	2
CISA 324 Database Management using SQL.....	2
CISC 310 Introduction to Computer Information Science.....	3
CISC 323 Linux Operating System .....	1
CISC 324 Intermediate Linux Operating System .....	1
CISP 301 Algorithm Design and Implementation.....	4
CISP 310 Assembly Language Programming for Microcomputers .....	4
CISP 360 Introduction to Structured Programming .....	4
CISP 400 Object Oriented Programming with C++ (4).....	4
or CISP 401 Object Oriented Programming with Java (4)	
CISP 430 Data Structures.....	4
CISP 440 Discrete Structures for Computer Science (3).....	3 <sup>1</sup>

A minimum of 6 units from the following: .....

CISC 351 Introduction to Local Area Networks (1)	
CISC 355 Introduction to Data Communications (1.5)	
CISN 303 Network Administration – Linux Server (3)	
CISP 350 Database Programming (3)	
CISP 362 Programming for Mobile Devices I (4)	
CISP 370 Beginning Visual Basic (4)	
CISP 401 Object Oriented Programming with Java (4)	
CISP 452 Introduction to Systems Programming (3)	
CISP 457 Introduction to Systems Analysis and Design (3)	
CISS 300 Introduction to Information Systems Security (1)	
CISS 310 Network Security Fundamentals (3)	
CISW 320 Introduction to Web Site Development (3)	
CISW 400 Client-side Web Scripting (4)	
CISW 410 Middleware Web Scripting (4)	

**Total Units Required****38**

<sup>1</sup>Students looking for immediate employment should take CISP 457 as well as these courses.

**Suggested Electives**

BUS 300, 310, 330; ENGR 300, ESLW 340, MATH 400, 401, 420

**Associate in Science (A.S.) Degree**

The Associate in Science Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See SCC graduation requirements.

**Computer Science****Certificate of Achievement****Program Information**

This Computer Science program is designed for students preparing for careers in computer programming and systems analysis. It provides a foundation in currently used and advanced programming languages, databases and operating systems.

**Career Opportunities**

Technical positions include: computer operator, computer programmer, systems analyst, database administrator, computer support or help desk specialist, Web developer, and application developer. California is experiencing a shortage of students completing a BS degree in these fields and this shortage is expected to be worse in 2020.

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

- analyze development projects.
- build a project while utilizing the project development model.
- manage a programming project, both individually and as a member of a team, from initial concept through design, programming, debugging, testing, and deployment.
- evaluate a program to determine how it will meet the needs of its intended audience.
- use a database to store data associated with programs written in a programming language.
- design, write, test, debug, and implement computer programs in a structured language, a low-level language, an object-oriented language, or scripting language.
- create programs utilizing a variety of programming environments.

**Required Program****Units**

CISA 323 Database Management using Microsoft Access .....	2
CISA 324 Database Management using SQL.....	2
CISC 310 Introduction to Computer Information Science.....	3
CISC 323 Linux Operating System .....	1
CISC 324 Intermediate Linux Operating System .....	1
CISP 301 Algorithm Design and Implementation.....	4
CISP 310 Assembly Language Programming for Microcomputers .....	4
CISP 360 Introduction to Structured Programming .....	4
CISP 400 Object Oriented Programming with C++ (4).....	4
or CISP 401 Object Oriented Programming with Java (4)	
CISP 430 Data Structures.....	4
CISP 440 Discrete Structures for Computer Science (3).....	3 <sup>1</sup>
or CISP 457 Introduction to Systems Analysis and Design (3)	

A minimum of 6 units from the following: .....

CISC 351 Introduction to Local Area Networks (1)	
CISC 355 Introduction to Data Communications (1.5)	
CISN 303 Network Administration – Linux Server (3)	
CISP 350 Database Programming (3)	
CISP 362 Programming for Mobile Devices I (4)	
CISP 401 Object Oriented Programming with Java (4)	
CISP 452 Introduction to Systems Programming (3)	
CISP 457 Introduction to Systems Analysis and Design (3)	
CISS 300 Introduction to Information Systems Security (1)	
CISS 310 Network Security Fundamentals (3)	
CISW 320 Introduction to Web Development (3)	
CISW 400 Client-side Web Scripting (4)	
CISW 410 Middleware Web Scripting (4)	

**Total Units Required****38**

<sup>1</sup>Students who plan to transfer should take CISP 440. Students looking for immediate employment should take CISP 457.

**Certificate of Achievement**

The Certificate of Achievement may be obtained by completion of the required program with grades of “C” or better.

**Front-End Web Developer****Certificate of Achievement****Program Information**

Front-End Web Developers are proficient at creating Web site structure with some interactivity. There is emphasis on learning HTML, CSS, JavaScript, and user interface, user experience design.

**Career Opportunities**

Career Opportunities could include employment in front-end Web Development or Web Production. This certificate teaches foundation skills needed to work toward becoming a Web Developer. Jobs for Web developers are projected to grow 27 percent from 2014 to 2024, according to the Bureau of Labor Statistics.

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

- manage a multi-level Web site hosted on a Web server.
- utilize multiple programs simultaneously in order to develop Web sites.

- research and implement current, valid World Wide Web Consortium (W3C) standards including technical recommendations for markup languages, the Web Accessibility Initiative (WAI), the Web Mobility Initiative (WMI), and other recommendations as they are introduced.
- plan a structured approach to Web site development that identifies the information dissemination needs of a client and organizes the content effectively and efficiently in order to communicate to an identified audience, and then develop and implement an appropriate Web solution.
- write HTML, CSS, and JavaScript code in the currently used version.
- utilize client-side scripting in order to manipulate interactive objects like navigation bars, forms, rollovers, other event handling, and the control of windows, frames, and layers.
- create composite images that demonstrate visual design concepts of scale, rhythm, and balance.
- construct images utilizing selections, layers, masks, adjustment layers, and blending modes.
- demonstrate an understanding of the current technologies and processes of interactive design, motion graphics, and Web site development.
- conceive and design effective Web site wireframes, navigation, user interfaces, and Web page prototypes.
- utilize User Interface (UI) and User Experience (UX) to enhance customer satisfaction and loyalty by improving the usability, ease of use, and pleasure provided in the interaction between the customer and the product.

Required Program	Units
CISC 310 Introduction to Computer Information Science.....	3
CISC 323 Linux Operating System .....	1
CISC 324 Intermediate Linux Operating System .....	1
CISP 301 Algorithm Design and Implementation.....	4
CISW 304 Cascading Style Sheets .....	2
CISW 320 Introduction to Web Development .....	3
CISW 370 Designing Accessible Websites.....	1
CISW 400 Client-side Web Scripting .....	4
GCOM 330 Digital Imaging I .....	3
GCOM 360 User Interface Design.....	3
<b>Total Units Required</b>	<b>25</b>

#### Certificate of Achievement

The Certificate of Achievement may be obtained by completion of the required program with grades of "C" or better.

## Information Processing

### Associate in Science Degree

#### Program Information

This degree combines microcomputer software proficiencies and competencies in hardware support, maintenance, and repair with general education requirements. Students will be able to incorporate inter-related certificates (Information Processing Technician and Information Processing Specialist) as major fields of study with general education courses in other disciplines to earn an Associate in Science degree in Information Processing.

#### Career Opportunities

Students who have obtained certificates (Information Processing Technician and Information Processing Specialist) are interested in attaining associate degrees for continued job advancement. Many employees with advanced software proficiencies and competencies in hardware support, maintenance, and repair are considered top candidates for supervisory or managerial positions.

Such positions include: office supervisors, office managers, computer support specialists, and information processing specialists. Based on Bureau of Labor Statistics (2008-2018) figures, job demands in these areas will grow approximately 11.0% and will continue to exceed the number of available and trained workers.

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

- demonstrate an understanding of global, ethical, and societal concerns relating to the impact of computers.
- adapt to technological changes and innovations in computers and use the techniques, skills, and tools necessary to meet needs.
- analyze needs, design solutions, and implement necessary microcomputer applications or processes to on-the-job problems in a team environment using appropriate diagnostic tools.

#### Required Program

Required Program	Units
CISA 305 Beginning Word Processing .....	2
CISA 306 Intermediate Word Processing .....	2
CISA 315 Introduction to Electronic Spreadsheets .....	2
CISA 323 Database Management using Microsoft Access .....	2
CISA 324 Database Management using SQL (2) .....	2
or CISA 316 Intermediate Electronic Spreadsheets (2)	
CISA 340 Presentation Graphics.....	2
CISC 305 Introduction to the Internet .....	1
CISC 306 Introduction to Web Page Creation .....	1
CISC 310 Introduction to Computer Information Science.....	3
CISC 320 Operating Systems.....	1
CISC 351 Introduction to Local Area Networks (1) .....	1 – 3
or CISN 340 CISCO Networking Academy (CCNA)tm: Data Communication and Networking (3)	
CISC 360 Information & Communication Technology Essentials (A+).4	
CISS 300 Introduction to Information Systems Security (1).....	1 – 2
or CISS 301 Ethical Hacking (2)	
<b>Total Units Required</b>	<b>24 – 27</b>

#### Suggested Electives

BUS 310, CISC 323, 351; CISN 340; CISP 301; CISS 300; CISW 320

#### Associate in Science (A.S.) Degree

The Associate in Science Degree in Information Processing may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See SCC graduation requirements.

## Information Processing Specialist

### Certificate of Achievement

#### Program Information

This certificate builds upon a previous background in the use of microcomputer application programs. As the student advances in an office-related career path, technical expertise in all aspects of information processing is expected. In addition to advanced software courses in spreadsheet and database management, this certificate also provides the student with hands-on training in hardware support and maintenance.

#### Career Opportunities

This certificate prepares students to become office workers who can utilize the typical tools required in most offices. These positions require a high proficiency with office software applications as well as the ability to identify and troubleshoot microcomputer problems.

Such positions include: secretaries, office workers, first line supervisors, administrative analysts, information resource personnel, or lead administrative specialists. Based on Bureau of Labor Statistics (2008-2018) figures, job demands in these areas will grow approximately 11.0% annually and will continue to exceed the number of available and trained workers.

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

- design, implement, manage, and evaluate data management systems involving custom macros to solve complex business problems.
- analyze and integrate data from various application programs for individual and group on-the-job projects.
- set up, test, and implement complex macros and scripts for on-the-job usage.

- demonstrate understanding of basic hardware components and the organization, installation, and repair of microcomputers.
- evaluate different hardware and software specification standards and implement problem-solving strategies or techniques using various diagnostic tools.
- analyze on-the-job needs, identify software and hardware related problems, and effectively communicate solutions to end users.

#### Required Program

	Units
CISA 305 Beginning Word Processing .....	2
CISA 306 Intermediate Word Processing .....	2
CISA 315 Introduction to Electronic Spreadsheets .....	2
CISA 323 Database Management using Microsoft Access .....	2
CISA 324 Database Management using SQL (2) .....	2
or CISA 316 Intermediate Electronic Spreadsheets (2)	
CISA 340 Presentation Graphics.....	2
CISC 305 Introduction to the Internet .....	1
CISC 306 Introduction to Web Page Creation (1).....	1
CISC 310 Introduction to Computer Information Science (3) .....	3
CISC 320 Operating Systems.....	1
CISC 351 Introduction to Local Area Networks (1) .....	1 – 3
or CISN 340 CISCO Networking Academy (CCNA)tm: Data Communication and Networking (3)	
CISC 360 Information & Communication Technology Essentials (A+). 4	
CISS 300 Introduction to Information Systems Security (1).....	1 – 2
or CISS 301 Ethical Hacking (2)	

#### Total Units Required

24 – 27

#### Certificate of Achievement

The Certificate of Achievement may be obtained by completion of the required program with grades of “C” or better.

## Information Processing Technician

### Certificate of Achievement

#### Program Information

This information processing technician certificate focuses on basic entry-level skills in word processing, operating systems, spreadsheet, database management, graphics, and the use of the Internet. This certificate is designed for students interested in job advancement requiring microcomputer software skills.

#### Career Opportunities

Students who are currently employed in entry-level office-related jobs are interested in opportunities for advancement. These positions usually require competencies in microcomputer applications courses in the Windows operating system environment. These microcomputer application courses include: word processing, spreadsheet, database management, graphic presentation, and the use of the Internet. Such positions include: health information technicians, customer or client service representatives, and customer support specialists. Based on Bureau of Labor Statistics (2008-2018) figures, job demands in these areas will grow an average of 11.4% annually and will continue to exceed the number of available and trained workers.

#### Gainful Employment

For more information about program costs, graduation rates, median debt of program graduates, and other important information regarding gainful employment, please visit: <http://www.losrios.edu/gainful-emp-info/gedt.php?major=051462C01>

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

- demonstrate proficiency in Windows operating system commands, programs, file and folders management, storage, and utilities.
- identify on-the-job problems, projects, presentations, and assignments and design appropriate software solutions or tools.
- evaluate effectiveness of software solutions and implement suitable software changes, enhancements, or improvements.
- design and implement data management systems involving queries, data entry, screen, forms, tables, reports, and labels.
- explain and use asynchronous and synchronous communication tools.

- identify Internet laws, guidelines, and security and privacy issues and determine specific on-the-job applications.
- set up, test, and implement complex macros and scripts for on-the-job usage.

#### Required Program

	Units
CISA 305 Beginning Word Processing .....	2
CISA 306 Intermediate Word Processing .....	2
CISA 315 Introduction to Electronic Spreadsheets .....	2
CISA 323 Database Management using Microsoft Access .....	2
CISA 340 Presentation Graphics.....	2
CISC 305 Introduction to the Internet .....	1
CISC 306 Introduction to Web Page Creation .....	1
CISC 310 Introduction to Computer Information Science.....	3

#### Total Units Required

15

#### Certificate of Achievement

The Certificate of Achievement may be obtained by completion of the required program with grades of “C” or better.

## Information Systems Security

### Associate in Science Degree

#### Program Information

Information systems security has become a critical knowledge area for those interested in a career as an information technology professional. This degree 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.

#### Career Opportunities

Networking/security skills and experience are needed for technical support staff, administrators, designers, troubleshooters, and information systems security specialists. According to the Bureau of Labor Statistics (2008-2018) figures, job demands in these areas will grow a phenomenal 37.1% annually, and will continue to exceed the number of available and trained workers.

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

- develop best practices for configuring network operating system services to provide optimum security.
- compare and contrast the benefits of firewalls vs. intrusion detection devices and software.
- 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.
- construct file system permissions and share permissions 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.
- explain and configure a network firewall to provide optimum security from external threats and exploits.
- construct and apply group policies and file system permissions to secure files and network resources.

#### Required Program

	Units
CISC 320 Operating Systems (1) .....	1
or CISC 323 Linux Operating System (1)	
CISN 300 Network Systems Administration (3) .....	3
or CISN 303 Network Administration – Linux Server (3)	
CISN 302 Intermediate Network Systems Administration (3) .....	3
CISS 300 Introduction to Information Systems Security .....	1

CISS 310 Network Security Fundamentals.....	3
CISS 320 Implementing Network Security and Counter Measures.....	3
CISS 330 Implementing Internet Security and Firewalls.....	3
CISS 341 Implementing Windows Operating System Security (3).....	3
or CISS 342 Implementing Linux Operating System Security (3)	
CISS 350 Disaster Recovery.....	3
CISS 360 Computer Forensics and Investigation.....	3

A minimum of 3 units from the following:..... 3

CISC 310 Introduction to Computer Information Science (3)	
CISC 355 Introduction to Data Communications (1.5)	
CISC 351 Introduction to Local Area Networks (1)	
CISC 360 Information & Communication Technology Essentials (A+) (4)	
CISN 308 Internetworking with TCP/IP (3)	
CISN 374 Messaging Server Administration (3)	
CISN 340 CISCO Networking Academy (CCNA)tm: Data Communication and Networking (3)	
CISC 324 Intermediate Linux Operating System (1)	
CISS 301 Ethical Hacking (2)	
CISN 315 Advanced Network Administration (2)	
CISN 303 Network Administration – Linux Server (3)	
CISN 341 CISCO Networking Academy (CCNA)tm: Networking Theory and Routing Technologies (3)	

**Total Units Required** 29

#### Suggested Electives

BUS 310, ENGWR 300, ESLW 340

#### Associate in Science (A.S.) Degree

The Associate in Science degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See SCC graduation requirements.

## Information Systems Security

### Certificate of Achievement

#### Program Information

Information systems security has become a critical knowledge area for those interested in a career as an information technology professional. This degree 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.

#### Career Opportunities

Networking/security skills and experience are needed for technical support staff, administrators, designers, troubleshooters, and information systems security specialists. According to the Bureau of Labor Statistics (2008-2018) figures, job demands in these areas will grow a phenomenal 37.1% annually, and will continue to exceed the number of available and trained workers.

#### Gainful Employment

For more information about program costs, graduation rates, median debt of program graduates, and other important information regarding gainful employment, please visit: <http://www.losrios.edu/gainful-emp-info/gedt.php?major=051535C01>

#### 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.

- construct file system permissions and share permissions to allow only the minimum levels of access needed by users to use network resources.
- define the elements of the CIA triad, defining the purpose of each of the elements.
- utilize a protocol analyzer, demonstrating the ability to capture unencrypted packets for viewing.

#### Required Program

#### Units

CISC 320 Operating Systems (1).....	1
or CISC 323 Linux Operating System (1)	
CISN 300 Network Systems Administration (3).....	3
or CISN 303 Network Administration – Linux Server (3)	
CISN 340 CISCO Networking Academy (CCNA)tm: Data Communication and Networking (3).....	3
or CISN 304 Networking Technologies (3)	
CISS 300 Introduction to Information Systems Security.....	1
CISS 301 Ethical Hacking.....	2
CISS 310 Network Security Fundamentals.....	3
CISS 320 Implementing Network Security and Counter Measures.....	3
CISS 341 Implementing Windows Operating System Security (3).....	3
or CISS 342 Implementing Linux Operating System Security (3)	
CISS 360 Computer Forensics and Investigation.....	3

**Total Units Required** 22

#### Certificate of Achievement

The Certificate of Achievement may be obtained by completion of the required program with grades of “C” or better.

## Management Information Science

### Associate in Science Degree

#### Certificate of Achievement

#### Program Information

The Management Information Science degree is designed for students preparing for careers in business to effectively use and manage computers. The focus of the program is to develop student proficiency in a variety of computer applications and operating systems so that they may produce timely and accurate information. Elective courses give an opportunity to develop further skills in computer programming, database management, networking, Web development, and information systems security.

#### Career Opportunities

Computer skills and experience are needed for technical support staff, end-user consultants, network administrators, database specialists, information systems manager and specialists, programmers and analysts, software specialists, systems analysts, technical writers, information systems security specialists, and webmasters. According to the Bureau of Labor Statistics (2008-2018) figures, job demands in these areas will grow 22.9% annually and will continue to exceed the number of available and trained workers.

#### Gainful Employment

For more information about program costs, graduation rates, median debt of program graduates, and other important information regarding gainful employment, please visit: <http://www.losrios.edu/gainful-emp-info/gedt.php?major=051067C01>

#### Note to Transfer Students

If you are interested in transferring to a four-year college or university to pursue a bachelor's degree in this major, it is critical that you meet with a SCC counselor to select and plan courses for your major. Schools vary widely in terms of the required preparation.

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

- solve business problems by utilizing various types of software.
- design algorithms that can be implemented by writing computer programs to solve typical problems.
- construct and implement computer programs or scripts.
- design professional documents for a variety of situations using appropriate software, working individually or in a team.

- apply working knowledge of principles in computer networking, data communications, data management, information systems security, web development, or programming concepts.
- adapt to technological changes and innovations in the computer industry and use techniques, skills, and tools necessary to meet needs.
- locate information stored on the Internet, determine the validity of online resources, download and store files, and use the correct syntax for citing Internet resources.

**Required Program****Units**

CISA 305 Beginning Word Processing .....	2
CISA 315 Introduction to Electronic Spreadsheets .....	2
CISA 323 Database Management using Microsoft Access .....	2
CISA 340 Presentation Graphics.....	2
CISC 305 Introduction to the Internet .....	1
CISC 310 Introduction to Computer Information Science.....	3
CISC 320 Operating Systems (1) .....	1
or CISC 323 Linux Operating System (1)	
CISP 301 Algorithm Design and Implementation.....	4
CISP 360 Introduction to Structured Programming (4) .....	4
A minimum of 4 units from the following: .....	4
CISP 400 Object Oriented Programming with C++ (4)	
CISP 401 Object Oriented Programming with Java (4)	
A minimum of 4 units from the following: .....	4
CISA 306 Intermediate Word Processing (2)	
CISA 316 Intermediate Electronic Spreadsheets (2)	
CISA 324 Database Management using SQL (2)	
CISC 306 Introduction to Web Page Creation (1)	
CISC 324 Intermediate Linux Operating System (1)	
CISC 355 Introduction to Data Communications (1.5)	
CISC 360 Information & Communication Technology Essentials (A+) (4)	
A minimum of 6 units from the following: .....	6
CISC 355 Introduction to Data Communications (1.5)	
CISN 300 Network Systems Administration (3)	
CISN 303 Network Administration – Linux Server (3)	
CISN 306 Advanced Network Systems Administration (3)	
CISN 308 Internetworking with TCP/IP (3)	
CISP 310 Assembly Language Programming for Microcomputers (4)	
CISP 350 Database Programming (3)	
CISP 400 Object Oriented Programming with C++ (4)	
CISP 401 Object Oriented Programming with Java (4)	
CISP 430 Data Structures (4)	
CISP 440 Discrete Structures for Computer Science (3)	
CISP 452 Introduction to Systems Programming (3)	
CISP 457 Introduction to Systems Analysis and Design (3)	
CISS 300 Introduction to Information Systems Security (1)	
CISS 301 Ethical Hacking (2)	
CISS 310 Network Security Fundamentals (3)	
CISW 320 Introduction to Web Development (3)	
CISW 400 Client-side Web Scripting (4)	
CISW 410 Middleware Web Scripting (4)	

**Total Units Required****35****Other Electives**

ACCT 301, 311; BUS 310, ECON 302, 304; ENGWR 300, 480; MATH 120, 400, 401; STAT 300, 480

**Associate in Science (A.S.) Degree**

The Associate in Science Degree in Management Information Science may be obtained by completion of the required program, plus sufficient general education requirements, plus sufficient electives to meet a 60-unit total. See SCC graduation requirements.

**Certificate of Achievement**

The Certificate of Achievement may be obtained by completion of the required program with grades of “C” or better.

**Network Administration****Associate in Science Degree****Certificate of Achievement****Program Information**

The Network Administration Degree and Certificate of Achievement provides the skills needed in the networking environment. Focus is on the knowledge and skills required for day-to-day operation and management of computer networks. The Network Administration Degree and Certificate of Achievement prepare students for entry-level positions in computer network administration.

**Career Opportunities**

Networking skills and experience are needed for network technical support staff, network administrators, network designers, network troubleshooters, and information systems security specialists. According to the Bureau of Labor Statistics (2008-2018) figures, job demands in these areas will grow a phenomenal 53.4% annually and will continue to exceed the number of available and trained workers.

**Gainful Employment**

For more information about program costs, graduation rates, median debt of program graduates, and other important information regarding gainful employment, please visit: <http://www.losrios.edu/gainful-emp-info/gedt.php?major=051272C01>

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

- demonstrate competency in Windows operating system terminology and commands, account management, and file management and storage.
- construct and implement computer network systems by applying the steps of the network design model working individually or in a team.
- demonstrate working knowledge of principles in computer networking and data management, or information systems security, or web server administration, depending on the electives chosen.
- define best practices for configuring network operating system services.
- analyze and apply directory services group policy settings at the Organizational Unit (OU), domain, site or local machine level.

**Required Program****Units**

CISC 320 Operating Systems (1) .....	1
or CISC 323 Linux Operating System (1)	
CISN 300 Network Systems Administration (3) .....	3
CISN 302 Intermediate Network Systems Administration .....	3
CISN 306 Advanced Network Systems Administration (3) .....	3
CISN 307 Windows Active Directory Services.....	3
CISN 308 Internetworking with TCP/IP .....	3
CISS 300 Introduction to Information Systems Security (1).....	1 – 2
or CISS 301 Ethical Hacking (2)	
A minimum of 10 units from the following: .....	10
CISC 310 Introduction to Computer Information Science (3)	
CISC 324 Intermediate Linux Operating System (1)	
CISC 351 Introduction to Local Area Networks (1)	
CISC 355 Introduction to Data Communications (1.5)	
CISN 340 CISCO Networking Academy (CCNA)tm: Data Communication and Networking (3)	
CISN 341 CISCO Networking Academy (CCNA)tm: Networking Theory and Routing Technologies (3)	
CISN 346 Network Design and Projects (3.5)	
CISN 303 Network Administration – Linux Server (3)	
CISN 304 Networking Technologies (3)	
CISN 315 Advanced Network Administration (2)	
CISN 320 Designing Windows Directory Services (3)	
CISN 374 Messaging Server Administration (3)	
CISS 301 Ethical Hacking (2)	
CISS 310 Network Security Fundamentals (3)	
CISS 320 Implementing Network Security and Counter Measures (3)	

- CISS 330 Implementing Internet Security and Firewalls (3)
- CISS 360 Computer Forensics and Investigation (3)
- CISS 350 Disaster Recovery (3)

**Total Units Required** **27 – 28**

**Suggested Electives**

BUS 310, ENGWR 300, ESLW 340, STAT 480

**Associate in Science (A.S.) Degree**

The Associate in Science Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See SCC graduation requirements.

**Certificate of Achievement**

The Certificate of Achievement may be obtained by completion of the required program with grades of “C” or better.

**Network Design**

**Associate in Science Degree**

**Certificate of Achievement**

**Program Information**

The Network Design Degree and Certificate of Achievement provides the skills needed in the networking environment. Focus is on the knowledge and skills required for day-to-day operation and management of computer networks. The Network Design Degree and Certificate of Achievement prepare students for entry-level positions in computer network design.

**Career Opportunities**

Networking skills and experience are needed for network technical support staff, network administrators, network designers, network troubleshooters, and information systems security specialists. According to the Bureau of Labor Statistics (2008-2018) figures, job demands in these areas will grow a phenomenal 53.4% annually and will continue to exceed the number of available and trained workers.

**Gainful Employment**

For more information about program costs, graduation rates, median debt of program graduates, and other important information regarding gainful employment, please visit: <http://www.losrios.edu/gainful-emp-info/gedt.php?major=051422C01>

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

- develop best practices for configuring Internet Protocol (IP) addresses.
- evaluate and implement technologies to support IP routing protocols such as Routing Information Protocol (RIP), Interior Gateway Routing Protocol (IGRP), and Open Shortcut Path First (OSPF).
- construct and configure access lists.
- compare and contrast types of network media.
- demonstrate working knowledge of principles in computer networking and data management, information systems security, or web server administration, depending on the electives chosen.
- demonstrate competency in Windows operating system terminology and commands, account management, and file management and storage

**Required Program**

**Units**

- CISC 320 Operating Systems (1) ..... 1  
or CISC 323 Linux Operating System (1)
- CISN 340 CISCO Networking Academy (CCNA)tm: Data Communication and Networking ..... 3
- CISN 341 CISCO Networking Academy (CCNA)tm: Networking Theory and Routing Technologies ..... 3
- CISN 342 CISCO Networking Academy (CCNA)tm: Advanced Routing and Switching ..... 3
- CISN 343 CISCO Networking Academy (CCNA)tm: Wide Area Network and Project-Based ..... 3
- CISN 346 Network Design and Projects ..... 3.5
- CISN 336 Wireless Technologies ..... 3

- CISN 308 Internetworking with TCP/IP ..... 3
- CISS 310 Network Security Fundamentals ..... 3

A minimum of 6 units from the following: ..... 6

- CISC 310 Introduction to Computer Information Science (3)
- CISS 320 Implementing Network Security and Counter Measures (3)
- CISN 300 Network Systems Administration (3)
- CISN 303 Network Administration – Linux Server (3)
- CISN 304 Networking Technologies (3)

**Total Units Required** **31.5**

**Associate in Science (A.S.) Degree**

The Associate in Science Degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total. See SCC graduation requirements.

**Certificate of Achievement**

The Certificate of Achievement may be obtained by completion of the required program with grades of “C” or better.

**PC Support**

**Certificate of Achievement**

**Program Information**

With the rapid expansion of computers into all aspects of society, there is a growing need for technicians with a broad range of knowledge in computer applications to install, maintain, and support computers and the networks that they utilize. Students earning this certificate are prepared to acquire entry-level positions in computer support. Employers hiring students earning this certificate will immediately benefit from the skills the students bring to their jobs.

**Career Opportunities**

Career opportunities for students earning the PC Support Certificate include entry level positions in the following areas: Technical Salesperson, Help Desk Support Technician, Systems Analyst, Data Entry Personnel, Assistant Documentation Specialist and Assistant Trainer. According to the Bureau of Labor Statistics (2008-2018) figures, job demands in these areas will grow 22.9% annually and will continue to exceed the number of available and trained workers.

**Gainful Employment**

For more information about program costs, graduation rates, median debt of program graduates, and other important information regarding gainful employment, please visit: <http://www.losrios.edu/gainful-emp-info/gedt.php?major=051325C01>

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

- compose clear, grammatically-correct documents related to business.
- design electronic spreadsheets useful in making decisions.
- design, install, and maintain a local area network.
- design presentation graphics.
- construct and implement web pages, including links, graphics, and text.
- demonstrate understanding of the basic components of data communications.
- analyze and troubleshoot computer hardware and software problems.
- apply database software to organize information for decision-making.
- demonstrate competency in basic operating systems terminology, commands, and functions.
- demonstrate competence in the Internet related to searches, email, and security.
- demonstrate competence in formatting text using word processing software.

Required Program	Units
BUS 310 Business Communications (3).....	3 – 4
or ENGWR 300 College Composition (3)	
or ESLW 340 Advanced Composition (4)	
CISA 305 Beginning Word Processing .....	2
CISA 315 Introduction to Electronic Spreadsheets .....	2
CISA 323 Database Management using Microsoft Access .....	2
CISA 340 Presentation Graphics.....	2
CISC 305 Introduction to the Internet .....	1
CISC 306 Introduction to Web Page Creation (1).....	1 – 3
or CISW 320 Introduction to Web Development (3)	
CISC 310 Introduction to Computer Information Science.....	3
CISC 320 Operating Systems.....	1
CISC 351 Introduction to Local Area Networks.....	1
CISC 355 Introduction to Data Communications .....	1.5
CISC 360 Information & Communication Technology Essentials (A+). 4	
CISS 300 Introduction to Information Systems Security (1).....	1 – 2
or CISS 301 Ethical Hacking (2)	
<b>Total Units Required</b>	<b>24.5 – 28.5</b>

### Certificate of Achievement

The Certificate of Achievement may be obtained by completion of the required program with grades of “C” or better.

## Programming

### Certificate of Achievement

#### Program Information

The programming certificate provides the basic proficiencies required of computer programmers for entry-level software technician positions or further study in Computer Science.

#### Career Opportunities

Although programmer and programmer-analyst opportunities will decrease by approximately 3% by 2018, other programming-related positions will increase. According to the Bureau of Labor Statistics (2008-2018) figures, demand for software designers, systems analysts, database administrators and software testers will grow 34% annually and will continue to exceed the number of available and trained workers.

#### Gainful Employment

For more information about program costs, graduation rates, median debt of program graduates, and other important information regarding gainful employment, please visit: <http://www.losrios.edu/gainful-emp-info/gedt.php?major=051326C01>

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

- analyze information processing requirements using structured or object oriented software development methodologies.
- design structured or object oriented software systems.
- build structured or object oriented software systems.
- evaluate software systems for conformance to system requirements.
- document program or systems requirements or present written analyses.

Required Program	Units
BUS 310 Business Communications (3).....	3
or ENGWR 300 College Composition (3)	
CISP 301 Algorithm Design and Implementation.....	4
CISP 360 Introduction to Structured Programming .....	4
CISP 400 Object Oriented Programming with C++ (4).....	4
or CISP 401 Object Oriented Programming with Java (4)	
CISP 430 Data Structures.....	4
CISP 457 Introduction to Systems Analysis and Design.....	3
<b>Total Units Required</b>	<b>22</b>

### Certificate of Achievement

The Certificate of Achievement may be obtained by completion of the required program with grades of “C” or better.

## Web Developer

### Associate in Science Degree Certificate of Achievement

#### Program Information

Web Developers are proficient at creating Web site structure and interactivity. The Web Developer degree requires students to use database tools and custom applications to design, code, and test interactive Web sites. There is emphasis on learning the programming and scripting languages that connect a database to a Web site.

#### Career Opportunities

Career Opportunities include employment as a Web Developer, Webmaster, Systems Analyst, Web Systems Analyst, IT Analyst, ICT Analyst, Web Database Administrator, Front-end Web Developer, or Web Programmer.

#### Gainful Employment

For more information about program costs, graduation rates, median debt of program graduates, and other important information regarding gainful employment, please visit: <http://www.losrios.edu/gainful-emp-info/gedt.php?major=051591C01>

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

- manage a multi-level Web site hosted on a Web server.
- utilize multiple programs simultaneously in order to develop Web sites.
- recommend a Web scripting language, current markup language or Web authoring software, and cascading style sheets to develop complex Web sites that are uploaded via File Transfer Protocol (FTP) to a Web server.
- research and implement current, valid World Wide Web Consortium (W3C) standards including technical recommendations for markup languages, the Web Accessibility Initiative (WAI), the Web Mobility Initiative (WMI), and other recommendations as they are introduced.
- plan a structured approach to Web site development that identifies the information dissemination needs of a client and organizes the content effectively and efficiently in order to communicate to an identified audience; then develop and implement an appropriate Web solution.
- utilize client-side scripting in order to manipulate interactive objects like navigation bars, forms, rollovers, other event handling, and the control of windows, frames, and layers.
- develop Web solutions that include form validation and processing, server-side programming with hypertext-preprocessor (PHP), CGI scripting with Perl, and database-driven Web development.
- demonstrate proficiency in the process of Web project management on a real-world Web site including design specification, research, production, modification, time estimation, and presentation.
- design, implement, manage, and evaluate data management systems involving custom programming to solve complex business problems.
- estimate the hours needed or cost to develop and deliver the solution to a complex business problem.
- construct code in a currently used Web scripting language.
- demonstrate an understanding of the current technologies and processes of interactive design, motion graphics, and Web site development.
- utilize user experience (UX) and user interface (UI) to enhance customer satisfaction and loyalty by improving the usability, ease of use, and pleasure provided in the interaction between the customer and the product.

Required Program	Units
CISA 323 Database Management using Microsoft Access .....	2
CISA 324 Database Management using SQL.....	2
CISC 310 Introduction to Computer Information Science.....	3
CISC 323 Linux Operating System .....	1
CISC 324 Intermediate Linux Operating System .....	1
CISP 301 Algorithm Design and Implementation.....	4
CISP 350 Database Programming .....	3



## Computer Info Science – Applications (CISA)

CISW 304 Cascading Style Sheets .....	2
CISW 320 Introduction to Web Development .....	3
CISW 370 Designing Accessible Websites.....	1
CISW 400 Client-side Web Scripting .....	4
CISW 410 Middleware Web Scripting.....	4
CISW 470 Web Projects .....	3
GCOM 330 Digital Imaging I.....	3
GCOM 360 User Interface Design.....	3

**Total Units Required** **39**

### Suggested Electives

BUS 300, 310, 330; ENGWR 300, 301; MATH 400, 401, 420

### Associate in Science (A.S.) Degree

The Associate in Science degree may be obtained by completion of the required program, plus general education requirements, plus sufficient electives to meet a 60-unit total.

### Certificate of Achievement

The Certificate of Achievement may be obtained by completion of the required program with grades of "C" or better.

## Web Production Specialist

### Certificate of Achievement

#### Program Information

This certificate prepares students with foundation skills needed to explore a multitude of careers in front-end web development. The Web Production Specialist certificate requires students learn to code HTML and CSS, and use web creation and image editing tools to design, code, edit, and test Web sites. Fundamental concepts of using a Content Management System will also be introduced.

#### Career Opportunities

Web Production Specialist, Web Site Specialist

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

- develop multi-page Web sites communicating a specific message while following language specifications and syntax requirements as recommended by W3C.
- learn to code HTML, HTML5, XHTML and CSS using open source software and web developer tools to manage files and other assets on a Web site.
- use images, graphics and multi-media following standard practices as outlined by W3C, WAI, and WMI.
- learn principles for using a Content Management System (CMS), such as WordPress, for creating and editing Web pages.
- examine technical recommendations for using markup and style sheet languages, following recommendations of the World Wide Web Consortium (W3C), the Web Accessibility Initiative (WAI) and the Web Mobility Initiative (WMI)

Required Program	Units
CISC 306 Introduction to Web Page Creation .....	1
CISC 310 Introduction to Computer Information Science.....	3
CISC 323 Linux Operating System .....	1
CISC 324 Intermediate Linux Operating System .....	1
CISW 304 Cascading Style Sheets .....	2
CISW 320 Introduction to Web Development .....	3
CISW 370 Designing Accessible Websites.....	1
GCOM 330 Digital Imaging I.....	3
GCOM 360 User Interface Design.....	3
<b>Total Units Required</b>	<b>18</b>

### Certificate of Achievement

The Certificate of Achievement may be obtained by completion of the required program with grades of "C" or better.

### CISA 305 Beginning Word Processing 2 Units

*Prerequisite:* CISC 300 or 310 with a grade of "C" or better

*Advisory:* BUSTEC 300.1 or BUSTEC 100.1 with a grade of "C" or better or keyboarding at 28 wpm.

*Course Transferable to CSU*

*Hours:* 27 hours LEC; 27 hours LAB

The course introduces the student, through hands-on operation, to the use of word processing on microcomputers. The course includes basic word processing operations such as terminology and screen formats, dialog boxes, text editing, text formatting, text enhancements, sorting, tables, merging functions, saving and retrieving, and printing text.

### 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 builds upon previous training in the use of word processing programs. The course includes a brief review of basic editing and text concepts, and then covers intermediate software features such as document processing functions, macro programming functions, complex document styles and commands, and table and graphics applications. The course incorporates all word processing features into the production of one final presentation/job portfolio.

### CISA 315 Introduction to Electronic Spreadsheets 2 Units

*Prerequisite:* None.

*Advisory:* BUSTEC 100.1, BUSTEC 300.1, CISC 300, or CISC 310; with a grade of "C" or better.

*Course Transferable to CSU*

*Hours:* 27 hours LEC; 27 hours LAB

This course introduces the use of electronic spreadsheet programs. Topics of the course will include: professional formatting of spreadsheets; writing formulas and functions to perform mathematical operations; creating charts; creating, sorting, and filtering lists; developing what-if models, performing spreadsheet database functions and producing reports. The course introduces 3-D cell referencing, various advanced look up and financial functions, and querying techniques.

### 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 introduces students to the intermediate features of spreadsheet programs. The course will cover macros, data tables and lookup functions, logical expressions as well as advanced file operations, functions, and convenience commands. Students will follow spreadsheet templates and design their own sheets.

**CISA 323 Database Management using Microsoft Access 2 Units**

*Prerequisite:* CISC 300 or 310 with a grade of "C" or better  
*Course Transferable to CSU*  
*Hours:* 27 hours LEC; 27 hours LAB

This course introduces database management systems in a single-user environment. Students will learn to use a Windows-based application, including the full development of an original database. Topics include database objects, data types, data integrity, relational tables, complex queries, forms, reports, sharing data with other Windows applications, and data maintenance. Students who have completed both CISA 320 and CISA 321 may not receive credit for this course.

**CISA 324 Database Management using SQL 2 Units**

*Prerequisite:* CISA 323 with a grade of "C" or better; or CISA 320 and CISA 321 with grades of "C" or better  
*Advisory:* CISC 310 with a grade of "C" or better  
*Course Transferable to CSU*  
*Hours:* 27 hours LEC; 27 hours LAB

This course will extend the capabilities of students who have completed a first course in microcomputer database management, with emphasis on database design, reporting, application building, and utilization of files created using other software. Using Structured Query Language (SQL) in multiple relational database environments, students will design and implement practical database applications. Topics include relational database design, data normalization, administering databases on a server, and creating queries using select statements.

**CISA 340 Presentation Graphics 2 Units**

*Prerequisite:* None.  
*Advisory:* BUSTEC 300.1 or BUSTEC 100.1 or touch typing at 28 wpm, and CISC 300 or CISC 310 with a grade of "C" or better.  
*Course Transferable to CSU*  
*Hours:* 27 hours LEC; 27 hours LAB

This course presents an in-depth look at using computers as a graphics presentation tool to assist oral, written, and on-screen presentations. Topics include system requirements, graphic software, elements of a good presentation, types of graphics, and designing slide show techniques for visual presentations. Methods on how to edit and format presentations, animation, organizational charts, and clips (graphics, sounds, or video) will also be covered. Designing presentations linked to word processing, spreadsheet, or database programs is included. Students will use a variety of computer hardware and software to produce individual and/or group projects.

**CISA 499 Experimental Offering in Computer Information Science – Applications .5-4 Units**

*Prerequisite:* None  
*Course Transferable to CSU*  
*Hours:* 54 hours LEC; 36 hours LAB  
 See Experimental Offerings

**Computer Info Science – Core (CISC)****CISC 90 Computer Skills for New Users 1 Unit**

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

This course introduces the features of the microcomputer to the beginning student. The student will learn how to purchase a computer system, how the computer works, and what computers can do, including a brief overview of Windows operations, word processing, spreadsheets, the use of the Internet, and e-mail. This course does not fulfill the prerequisite requirement for any Computer Information Science course in applications, programming, web page, or networking. This course is non-degree, non-certificate applicable. This course is graded as a Pass/No Pass course only. This course will prepare the student for beginning computer courses.

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

*Prerequisite:* None.  
*Hours:* 162 hours LAB  
 An independent studies project involves an individual student or small group of students in study, research, or activities beyond the regularly offered courses in Computer Information Science.

**CISC 299 Experimental Offering in Computer Information Science – Core .5-4 Units**

*Prerequisite:* None  
*Hours:* 72 hours LEC  
 See Experimental Offerings

**CISC 300 Computer Familiarization 1 Unit**

*Prerequisite:* None.  
*Advisory:* BUSTEC 300.1 or BUSTEC 100.1 with a grade of "C" or better or touch typing at 28 wpm.  
*Course Transferable to CSU*  
*Hours:* 18 hours LEC; 18 hours LAB

This course acquaints students with how computers are used in the home and in business functions. The course emphasizes microcomputers, how they work, how they can be used, and the terminology of the computer world. Microcomputer applications using the Windows environment are presented with hands-on laboratory assignments. This course does not serve as a prerequisite to computer science programming courses, but does serve as a prerequisite/advisory for Computer Information Science application courses. The course is specially designed for students wanting a very general, non-technical, introductory course in computers.

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

*Prerequisite:* CISA 305, CISC 300, CISC 310, or CISC 320 with a grade of "C" or better  
*Course Transferable to CSU*  
*Hours:* 18 hours LEC

This course explains how the Internet works, how to connect to the Internet, and how to use Internet services. Laws that guide the use of the Internet will be covered. Other topics include Internet protocols, e-mail, news groups, discussion lists, connecting to a remote server, file transfer protocol (FTP), World Wide Web (WWW), and emerging technologies.

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

*Prerequisite:* CISC 300 or 310 with a grade of "C" or better  
*Advisory:* CISC 305 with a grade of "C" or better  
*Course Transferable to CSU*  
*Hours:* 18 hours LEC; 18 hours LAB

This course covers the production of Web pages, including formatting, layout, construction, and presentation. A current markup language, such as Extensible HyperText Markup Language (XHTML), is used to format Web pages. Students may also use a Web authoring tool to create Web pages.

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

*Prerequisite:* None.  
*Course Transferable to CSU*  
*Hours:* 18 hours LEC; 18 hours LAB

This course acquaints the student with the fundamentals of micro-computer hardware, software, and computer networking, focusing on widely used hardware and operating system, IBM personal computers, and the Windows operating systems. The fundamentals of the Internet and Internet tools are introduced. This course meets the requirement for MIS 1 at CSUS. This course does not meet the requirements for SCC CIS certificates and degrees.

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

*Prerequisite:* None.  
*Advisory:* CISC 300 with a grade of "C" or better.  
*General Education:* AA/AS Area II(b)  
*Course Transferable to UC/CSU*  
*Hours:* 54 hours LEC

This course examines information systems and their role in business, with focus on productivity softwares, networking, e-commerce, ethics, security, and system infrastructure. Students will apply these concepts and related methods through hands-on projects to develop computer-based solutions to business problems. This course also covers the function and purpose of computer hardware and software, computer programming concepts, employment opportunities, and the social impact of the computer. (C-ID BUS 140; C-ID ITIS 120)

**CISC 320 Operating Systems 1 Unit**

*Prerequisite:* None.  
*Advisory:* CISC 300 or CISC 310 with a grade of "C" or better.  
*Course Transferable to CSU*  
*Hours:* 18 hours LEC; 18 hours LAB

This course introduces the microcomputer operating system. Topics include basic features, file and program management, disk management commands, and menus.

**CISC 323 Linux Operating System 1 Unit**

*Prerequisite:* None.  
*Advisory:* CISC 300 with a grade of "C" or better and ability to touch type.  
*Course Transferable to CSU*  
*Hours:* 18 hours LEC; 18 hours LAB

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

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

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

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

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

*Prerequisite:* None.  
*Advisory:* CISC 320 and CISC 355 with grades of "C" or better  
*Course Transferable to CSU*  
*Hours:* 18 hours LEC; 18 hours LAB

This course introduces local area networks and provides hands-on training in Local Area Network (LAN) applications and administration. Topics include planning, installing, and maintaining a LAN, responsibilities of the system administrator, and human implications.

**CISC 355 Introduction to Data Communications 1.5 Units**

*Prerequisite:* None.  
*Advisory:* CISC 300 or CISC 320 with a grade of "C" or better  
*Course Transferable to CSU*  
*Hours:* 27 hours LEC

This course introduces business data communications. It covers media, telecommunications, protocols, interfaces, and packet switching. The Internet will be used for locating, viewing, printing, and downloading information.

**CISC 360 Information & Communication Technology Essentials (A+) 4 Units**

*Prerequisite:* None.  
*Advisory:* CISC 310, 320, and 351 with grades of "C" or better  
*Course Transferable to CSU*  
*Hours:* 54 hours LEC; 54 hours LAB

This course provides an introduction to the computer hardware and software skills needed to help meet the growing demand for entry-level ICT professionals. The fundamentals of computer hardware and software, as well as advanced concepts such as security, networking, and the responsibilities of an ICT professional, will be introduced. This course will help students prepare for the CompTIA A+ certification exam.

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

*Prerequisite:* None.  
*Course Transferable to UC/CSU*  
*Hours:* 162 hours LAB

This is an independent studies course. The topics are to be arranged between the instructor and the student. UC transfer credit will be awarded only after the course has been evaluated by the enrolling UC campus. The units completed for this course cannot be counted towards the minimum 60 units required for admissions.

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

*Prerequisite: None.*

*Course Transferable to CSU*

*Hours: 18 hours LEC; 300 hours LAB*

This course provides students with opportunities to develop marketable skills in preparation for employment or advancement within their current jobs. Course content includes understanding the application of education to the workforce; completion of required forms, which document the student's progress and hours spent at the work site; and developing workplace skills and competencies. During the course of the semester, the student is required to fulfill an 18 hour orientation and 75 hours of related paid work experience or 60 hours of unpaid work experience for one unit. An additional 75 or 60 hours of related work experience is required for each additional unit. The course may be taken up to 4 times when there is new or expanded learning on the job for a maximum of 16 units.

**CISC 499 Experimental Offering in Computer Information Science – Core .5-4 Units**

*Prerequisite: None*

*Course Transferable to UC/CSU*

*Hours: 54 hours LEC; 36 hours LAB*

See Experimental Offerings. UC transfer credit will be awarded only after the course has been evaluated by the enrolling UC campus. The units completed for this course cannot be counted towards the minimum 60 units required for admissions.

**Computer Info Science – Network (CISN)****CISN 299 Experimental Offering in Computer Information Science – Network .5-4 Units**

*Prerequisite: None*

*Hours: 72 hours LEC*

See Experimental Offerings

**CISN 300 Network Systems Administration 3 Units**

*Prerequisite: None.*

*Advisory: CISC 320 (Windows or Linux) with a grade of "C" or better.*

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

*Course Transferable to CSU*

*Hours: 48 hours LEC; 28 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 share, setting up and managing network printers, backing up servers, monitoring and troubleshooting network resources, and establishing policies and procedures for network operations.

This course covers materials required for the Microsoft Networking examinations. Recertification is required when the operating system has been updated.

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

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

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

*Course Transferable to CSU*

*Hours: 48 hours LEC; 28 hours LAB*

This course continues the further study of systems administration in a client/server network. Topics include configuring the server environment, implementing system policies, implementing and managing fault-tolerant disk volumes, managing applications, managing connectivity for different network and client operating systems, managing remote servers, implementing directory replication and file synchronization, and advanced troubleshooting techniques. Recertification is required when the operating system has been updated.

**CISN 303 Network Administration – Linux Server 3 Units**

*Prerequisite: None.*

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

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

*Course Transferable to CSU*

*Hours: 54 hours LEC; 36 hours LAB*

This course provides coverage of Linux Network Administration. Topics covered include connecting to a network; utilizing network utilities; planning, accessing, and managing file systems; planning and implementing login and file system security; administering and maintaining the user and printer environment; protecting network data; and installing network applications. This course covers material required for software manufacturer's certification.

**CISN 304 Networking Technologies 3 Units**

*Prerequisite: CISC 320 with a grade of "C" or better*

*Advisory: CISC 355 with a grade of "C" or better*

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

*Course Transferable to CSU*

*Hours: 48 hours LEC; 28 hours LAB*

This course introduces the architecture, structure, functions, components, and models of the Internet and other computer networks. The principles and structure of IP (Internet Protocol) addressing and the fundamentals of Ethernet concepts, media, and operations are introduced to provide a foundation for further study of computer networks. It uses the OSI (Open Systems Interconnection) and TCP (Transmission Control Protocol) layered models to examine the nature and roles of protocols and services at the application, network, data link, and physical layers. This course prepares students for the CompTIA Network+ certification exam.

**CISN 306 Advanced Network Systems Administration 3 Units**

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

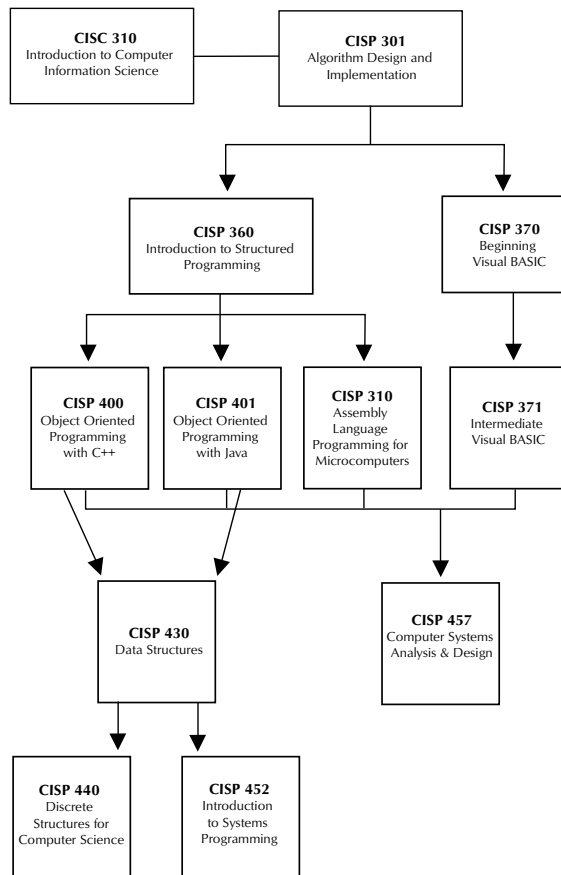
*General Education: AA/AS Area II(b)*

*Course Transferable to CSU*

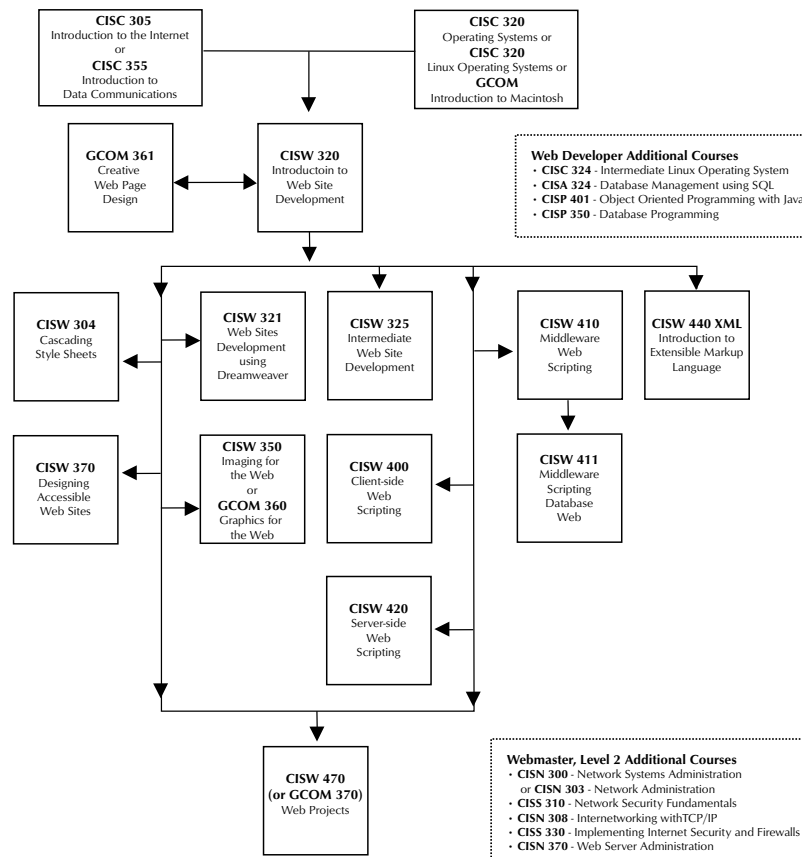
*Hours: 48 hours LEC; 28 hours LAB*

This course covers the administration of a server in an enterprise network. Topics include designing an enterprise network, optimizing network servers for enterprise-related roles, managing enterprise users, groups and resources, planning and implementing connectivity to other networks within the enterprise, server and network optimization, and troubleshooting techniques at the enterprise level. This course covers material required for the Microsoft Networking examinations. Recertification is required when the operating system has been updated.

## Computer Information Science – Sequence of Modern Programming Language Courses



## Computer Information Science – Sequence of Web Courses



- CISN 307 Windows Active Directory Services 3 Units**  
*Prerequisite:* CISC 320 with a grade of "C" or better  
*Course Transferable to CSU*  
*Hours:* 48 hours LEC; 28 hours LAB  
 This course covers installing, configuring, and administering Microsoft Windows Active Directory services. It also focuses on implementing Group Policy and understanding the Group Policy tasks required to manage users and computers. Group Policies are used to configure and manage the user desktop environment, configure and manage software, and implement and manage security settings. Installation and configuration of Domain Naming System (DNS) and Windows Internet Naming System (WINS) is covered, as well as publishing, replication, and the backup of the directory services data base. This course covers material required for the Microsoft Networking examinations. Recertification is required when the operating system has been updated.
- CISN 308 Internetworking with TCP/IP 3 Units**  
*Prerequisite:* CISC 300 with a grade of "C" or better  
*General Education:* AA/AS Area II(b)  
*Course Transferable to CSU*  
*Hours:* 48 hours LEC; 28 hours LAB  
 This course covers the further implementation of the TCP/IP protocol suite in an enterprise network. Topics include installing, configuring, and testing TCP/IP, planning and implementing sub-networks, managing IP address assignments and IP routing, installing, and configuring DNS, TCP/IP network printing, troubleshooting the network with TCP/IP utilities, and planning for IPv6. This course covers material required for the Microsoft Networking examinations.
- CISN 315 Advanced Network Administration 2 Units**  
*Prerequisite:* CISN 303 with a grade of "C" or better  
*General Education:* AA/AS Area II(b)  
*Course Transferable to CSU*  
*Hours:* 36 hours LEC; 18 hours LAB  
 This course covers topics necessary for an experienced network administrator to monitor, maintain, and improve the performance of an existing Local Area Network (LAN). This course covers part of the material required for software manufacturer's certification.
- CISN 320 Designing Windows Directory Services 3 Units**  
*Prerequisite:* CISN 307 with a grade of "C" or better  
*General Education:* AA/AS Area II(b)  
*Course Transferable to CSU*  
*Hours:* 45 hours LEC; 27 hours LAB  
 This course provides students with further knowledge and skills necessary to design a Microsoft Windows directory services infrastructure in an enterprise network. At the end of the course, students will be able to describe guidelines for gathering business and administrative information from an organization and explain how to use the information to design an Active Directory structure for an enterprise; design an Active Directory naming strategy; develop a plan to secure and delegate administrative authority over Active Directory objects based on the administrative model of an organization; identify business needs and scenarios that may require modifications of the Active Directory schema; create an Active Directory design based on administrative Group Policy requirements defined by business needs; design a site topology for a multi-domain organization; and design an Active Directory replication plan based on the site topology design.
- CISN 336 Wireless Technologies 3 Units**  
*Prerequisite:* CISN 341 with a grade of "C" or better  
*General Education:* AA/AS Area II(b)  
*Course Transferable to CSU*  
*Hours:* 54 hours LEC; 20 hours LAB  
 This course on wireless networking focuses on the design, planning, implementation, operation, and troubleshooting of wireless networks. It covers a comprehensive overview of technologies, security, and design best practices with particular emphasis on hands-on skills in set up and troubleshooting; 802.11a and 802.11b technologies, products, and solutions; site surveys; resilient WLAN design, installation, and configuration; WLAN security and vendor interoperability strategies.
- CISN 340 CISCO Networking Academy (CCNA)<sup>™</sup>: Data Communication and Networking 3 Units**  
*Prerequisite:* None.  
*Advisory:* CISC 300 or CISC 310, and CISC 320 with grades of "C" or better.  
*General Education:* AA/AS Area II(b)  
*Course Transferable to CSU*  
*Hours:* 54 hours LEC; 20 hours LAB  
 This course is designed to introduce students to data communication and networking fundamentals. The course covers networking addressing which includes calculations and conversions between binary, decimal, and hexadecimal numbering systems. It also surveys data communication hardware and software components and basic networking concepts. Topics covered include data communication, the OSI Model, IP addressing, routing concepts, LAN media, and network management and analyses. This is the first course in preparation for CISCO CCNA certification examination. SCC is a certified CISCO Networking Academy, and all courses are taught by CISCO Certified Academy Instructors (CCAI). (C-ID ITIS 150)
- CISN 341 CISCO Networking Academy (CCNA)<sup>™</sup>: Networking Theory and Routing Technologies 3 Units**  
*Prerequisite:* CISN 340 with a grade of "C" or better  
*General Education:* AA/AS Area II(b)  
*Course Transferable to CSU*  
*Hours:* 54 hours LEC; 20 hours LAB  
 This course covers networking theory and routing technologies, including OSI Model, beginning router configurations, and routed and routing protocols. This is the second course in preparation for CISCO CCNA certification examination. It continues and expands the study of binary, decimal, and hexadecimal numbering systems to change variable length sub-net mask. SCC is a certified CISCO Networking Academy, and all courses are taught by CISCO Certified Academy Instructors (CCAI).
- CISN 342 CISCO Networking Academy (CCNA)<sup>™</sup>: Advanced Routing and Switching 3 Units**  
*Prerequisite:* CISN 341 with a grade of "C" or better  
*Course Transferable to CSU*  
*Hours:* 54 hours LEC; 20 hours LAB  
 This course provides advanced routing and switching technologies. Topics include advanced router configurations, network management, advanced network design, LAN switching, and VLANs. This is the third course in preparation for CISCO CCNA certification examination. SCC is a certified CISCO Networking Academy, and all courses are taught by CISCO Certified Academy Instructors (CCAI).

**CISN 343      CISCO Networking Academy      3 Units**  
**(CCNA)<sup>™</sup>: Wide Area Network**  
**and Project-Based**

*Prerequisite:* CISN 341 with a grade of "C" or better

*Corequisite:* CISN 342

*Course Transferable to CSU*

*Hours: 54 hours LEC; 20 hours LAB*

This course develops knowledge and skills to design and configure advanced wide area network (WAN) projects using CISCO IOS command set. This is the fourth course in preparation for CISCO CCNA certification examination. SCC is a certified CISCO Networking Academy, and all courses are taught by CISCO Certified Academy Instructors (CCAI).

**CISN 346      Network Design and Projects      3.5 Units**

*Prerequisite:* CISN 341 with a grade of "C" or better

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

*Course Transferable to CSU*

*Hours: 54 hours LEC; 27 hours LAB*

This course covers various state-of-the-art topics to design CISCO network infrastructures to support network services and solutions. Individual topics may include: introduction to voice design concepts; design principles; network structure and IP addressing design concepts; basic campus switching design and WAN design considerations; routing protocol design considerations; introduction to security design concepts; and network management design concepts.

**CISN 350      CISCO Networking Academy      3 Units**  
**(CCNP)<sup>™</sup>: Advanced Router**  
**Configuration**

*Prerequisite:* CISN 343 with a grade of "C" or better or valid CISCO Certified Network Associate (CCNA) certification

*Course Transferable to CSU*

*Hours: 54 hours LEC; 20 hours LAB*

This course develops knowledge and skills in advanced outer configuration using CISCO IOS command set. Topics include advanced IOS command set, network design, scalable routing protocols (OSPF), Enhanced Interior Gateway Routing Protocol (EIGRP), and Border Gateway protocol (BGP). This is the first course in a series of four advanced courses in preparation for CISCO certification examination.

**CISN 351      CISCO Networking Academy      3 Units**  
**(CCNP)<sup>™</sup>: Remote Access**

*Prerequisite:* CISN 343 with a grade of "C" or better or valid CISCO Certified Network Associate (CCNA) certification

*Course Transferable to CSU*

*Hours: 54 hours LEC; 20 hours LAB*

This course develops knowledge and skills in building remote access networks. Topics include design, configuration, enabling on-demand connections, enabling permanent connections, scaling remote access networks and remote access network setup, and management. This is the second course in a series of four advanced courses in preparation for the CISCO certification examination.

**CISN 352      CISCO Networking Academy      3 Units**  
**(CCNP)<sup>™</sup>: Multi-Layer Switching**

*Prerequisite:* CISN 343 with a grade of "C" or better or valid CISCO Certified Network Associate (CCNA) certification

*Course Transferable to CSU*

*Hours: 54 hours LEC; 20 hours LAB*

This course develops knowledge and skills in multi-layer switched networks. Topics include how routing and switching technologies work together, building campus networks using multi-layer switching technologies, using VLAN, improving IP performance, and securing the campus network model. This is the third course in a series of four advanced courses in preparation for the CISCO certification examination.

**CISN 353      CISCO Networking Academy      3 Units**  
**(CCNP)<sup>™</sup>: Internetwork**  
**Troubleshooting**

*Prerequisite:* CISN 343 with a grade of "C" or better or valid CISCO Certified Network Associate (CCNA) certification

*Course Transferable to CSU*

*Hours: 54 hours LEC; 20 hours LAB*

This course develops knowledge and skills in fundamental hardware maintenance and troubleshooting routers and switches. Topics include managing and maintaining networks, troubleshooting tools and methodology, routing and routed protocol troubleshooting, campus switch and VLAN troubleshooting and WAN troubleshooting. This is the fourth course in a series of four advanced courses in preparation for the CISCO certification examination.

**CISN 374      Messaging Server 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 the installation and administration of messaging servers. Topics include the installation, configuration, management, and tuning of mail and messaging services on both servers and clients, mail access protocols, security issues, and Internet connectivity.

**CISN 378      Database Administration for      3 Units**  
**Microsoft SQL Server**

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

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

*Course Transferable to CSU*

*Hours: 45 hours LEC; 27 hours LAB*

This course provides students with the knowledge and technical skills required to install, configure, administer, and troubleshoot the client/server database management system of Microsoft SQL Server. The students will also learn to manage files and databases; choose and configure a login security method; plan and implement database permissions; secure SQL Server in an enterprise network; perform and automate administrative tasks; create custom administrative tools; monitor and optimize SQL Server performance; and replicate data from one SQL Server to another.

**CISN 499      Experimental Offering in      .5-4 Units**  
**Computer Information**  
**Science-Network**

*Prerequisite:* None

*Course Transferable to CSU*

*Hours: 72 hours LEC*

See Experimental Offerings

## Computer Information Science – Programming (CISP)

### CISP 301      **Algorithm Design and Implementation**      **4 Units**

*Prerequisite:* None.

*Advisory:* CISC 310 with a grade of “C” or better, and at least one year of high school algebra or MATH 100 with a grade of “C” or better.

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

*Course Transferable to CSU*

*Hours:* 54 hours LEC; 54 hours LAB

This course provides an introduction to the analysis, design, and implementation of software solutions to simple problems: developing standard algorithms for performing a bubble sort, a linear search of an array, and for data validation. Other topics covered include converting numbers between numbering systems, binary arithmetic including two’s complement subtraction, console and file input/output, and functions.

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

*Prerequisite:* CISP 301 and 360 with grades of “C” or better

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

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC; 54 hours LAB

This is an introductory course in assembly language for the Intel family of microprocessors. Students will write and debug programs that use control structures, subprocedures, bit operations, arrays, and interrupts. Upon completion of the course, students will have a much better understanding of the internal operations of computers. (C-ID COMP 142)

### CISP 320      **COBOL Programming**      **4 Units**

*Prerequisite:* CISP 301 with a grade of “C” or better

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

*Course Transferable to CSU*

*Hours:* 54 hours LEC; 54 hours LAB

This course is an introduction to the COBOL programming language. Course elements include top-down design and structured programming methods. Laboratory assignments cover a variety of input/output techniques including data validation, arithmetic operations, output editing, array processing, control-break concepts, and the creation and update of sequential files.

### CISP 350      **Database Programming**      **3 Units**

*Prerequisite:* CISA 323 with a grade of “C” or better

*Advisory:* Proficiency in any high-level programming language

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

*Course Transferable to UC/CSU*

*Hours:* 36 hours LEC; 54 hours LAB

This is an introductory course to programming in database. The topics include analysis and design, modular programming, screen displays and menus, and multiple databases.

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

*Prerequisite:* CISP 301 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, use of variables and constants, operators, control structures, functions, standard libraries, pointers, arrays, and input/output (including file I/O). (C-ID COMP 112)

### CISP 362      **Programming for Mobile I Devices**      **4 Units**

*Prerequisite:* CISP 301, 360, 400, or 401 with a grade of “C” or better; or experience using any modern, high-level programming language

*Course Transferable to CSU*

*Hours:* 54 hours LEC; 54 hours LAB

This course is an introduction to programming for mobile devices such as cell phones and tablets. Topics include development tools, user interface design, documentation, testing, debugging, and publishing.

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

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

*Advisory:* CISC 323 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 object oriented programming using C++. Topics include differences between C and C++ including declarations, constants, operators, function calling by value and reference, strict type checking; function members and overloading; inheritance and multiple inheritance; derived classes, protected members, and virtual functions. (C-ID COMP 122)

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

*Prerequisite:* CISP 360 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 Object Oriented Programming using the Java language. The student will learn how to design and implement object oriented applications. Topics will include: objects, classes, UML, function overloading, inheritance, static and dynamic class relationships, polymorphism, components, event driven programming, class associations, testing and debugging.

### CISP 430      **Data Structures**      **4 Units**

*Prerequisite:* CISP 400 or 401 with a grade of “C” or better

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

*Course Transferable to UC/CSU*

*Hours:* 54 hours LEC; 54 hours LAB

This course is an introduction to the design and implementation of complex data structures used in large computer applications. List, stack, queue, and tree data structures are implemented using pointers and recursion. Topics include software requirements specification, algorithm analysis, debugging and testing, searching and sorting techniques, and object oriented programming methodology. (C-ID COMP 132)



## Computer Information Science – Security (CISS)

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

*Prerequisite:* CISP 430 and MATH 370 with grades of “C” or better  
*General Education:* AA/AS Area II(b); CSU Area B4; IGETC Area 2  
*Course Transferable to UC/CSU*  
*Hours:* 54 hours LEC

This course introduces the essential discrete structures used in computer science with emphasis on their applications. Topics to be covered include: elementary formal logic and set theory, elementary combinatorics, recursive programming and algorithm analysis, digital logic and switching and combinatorial circuits, and computer arithmetic. Computer programming assignments will be included. (C-ID COMP 152)

### CISP 452 Introduction to Systems Programming 3 Units

*Prerequisite:* CISP 430 with a grade of “C” or better  
*General Education:* AA/AS Area II(b)  
*Course Transferable to UC/CSU*  
*Hours:* 54 hours LEC

This course is an introduction to Systems Programming concepts using the C language. The course covers features of the C language commonly used in Systems Programming. Topics include C preprocessor macros, file systems, shells and shell script programming, make files and Source Code Control Systems (SCCS), and program relocation and linking concepts. Knowledge of the C language and data structures is required.

### CISP 457 Introduction to Systems Analysis and Design 3 Units

*Prerequisite:* CISA 323 and CISC 310 with grades of “C” or better; and any one of the following: CISP 320, CISP 360, CISP 370, CISP 400, or CISP 401 with grade of “C” or better.  
*Course Transferable to CSU*  
*Hours:* 54 hours LEC

The course presents a systematic methodology for analyzing a business problem or opportunity. Students will determine what role, if any, computer-based technologies can play in addressing the business need. Students will also learn how to articulate business requirements for the technology solution and how to specify alternative approaches to acquiring the technology capabilities needed to address the business requirements. Most importantly students will learn how to specify the requirements for the information systems solution among in-house development, development by third-party providers, or purchase commercial-off-the-shelf packages.

### CISP 499 Experimental Offering in Computer Information Science-Programming .5-4 Units

*Prerequisite:* None  
*Course Transferable to UC/CSU*  
*Hours:* 90 hours LEC

See Experimental Offerings. UC transfer credit will be awarded only after the course has been evaluated by the enrolling UC campus. The units completed for this course cannot be counted towards the minimum 60 units required for admissions.

### CISS 300 Introduction to Information Systems Security 1 Unit

*Prerequisite:* None.  
*Course Transferable to CSU*  
*Hours:* 18 hours LEC; 18 hours LAB

This course provides an introduction to network-based and Internet-based security applications and standards. Topics include cryptography, security protocols, network security applications, encryption, hash functions, digital signatures, viruses, and key exchange.

### CISS 301 Ethical Hacking 2 Units

*Prerequisite:* None.  
*Advisory:* CISC 320 or CISS 300 with a grade of “C” or better  
*Course Transferable to CSU*  
*Hours:* 27 hours LEC; 27 hours LAB

This course explores ways in which security for a stand-alone personal computer (PC) and a network-connected PC can be compromised. It introduces basic security concepts, principles, and “best practices.” It also explores ways in which the security of a PC can be checked and evaluated. The course provides a thorough discussion of what and who ethical hackers are and how important they are in protecting corporate and government data from cyber attacks. Internal and external security threats are discussed, including viruses, worms, Trojans, scripts, and other malicious e-mail content. Network vulnerabilities, common exploits, and basic counter measures are also covered.

### CISS 310 Network Security Fundamentals 3 Units

*Prerequisite:* None.  
*Advisory:* CISC 340 or CISC 300 or CISC 304 with a grade of “C” or better  
*Course Transferable to CSU*  
*Hours:* 45 hours LEC; 27 hours LAB

This course provides the fundamental knowledge needed to analyze risks to the system and implement a workable security policy that protects information assets from potential intrusion, damage, or theft. Students will learn which countermeasures to deploy to thwart potential attacks. This course will also prepare students for CompTIA's Security+ Exam.

### CISS 320 Implementing Network Security and Counter Measures 3 Units

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

In this course, students will learn how to evaluate, implement, and manage secure remote-access technologies in order to prevent systems from attack. Topics include risk analysis, choosing and setting up Virtual Private Networks and Intrusion Detection systems.

### CISS 321 Scripting for Cyber Security 3 Units

*Prerequisite:* CISS 301 or 310 with a grade of “C” or better  
*Course Transferable to CSU*  
*Hours:* 45 hours LEC; 27 hours LAB

This course is designed to cover tools that are commonly used by Information Security Professionals. Modern Operating Systems and scripting languages will be discussed as well as utilities and technologies that enable them. Topics including securing, hardening systems, incident response, automating tasks, auditing, and vulnerability assessment will be covered.

**CISS 327 Cisco Networking Academy: 3 Units**  
**CCNA Security:**  
**Implementing Network Security**

*Prerequisite:* CISN 340 and 341 with grades of "C" or better

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

*Course Transferable to CSU*

*Hours:* 54 hours LEC; 20 hours LAB

This course provides the theoretical understanding of network security and the hands-on skills to implement and support network security.

Topics include Cisco switch and router security, Authentication, Authorization, and Accounting (AAA), Access Control Lists (ACLs), Firewalls, Intrusion Prevention System (IPS), and Virtual Private Networks (VPNs). Additionally, the Cisco Adaptive Security Appliance (ASA) and Adaptive Security Device Manager (ASDM) are covered. Sacramento City College is a certified Cisco Networking Academy® and this course prepares students for the Cisco CCNA Security certification exam.

**CISS 330 Implementing Internet 3 Units**  
**Security and Firewalls**

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

*Course Transferable to CSU*

*Hours:* 54 hours LEC; 18 hours LAB

Students will learn how to allow access to key services while maintaining an organization's security, as well as how to implement firewall-to-firewall Virtual Private Networks (VPNs).

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

*Prerequisite:* None.

*Advisory:* CISC 320 and CISS 310; with grades of "C" or better

*Course Transferable to CSU*

*Hours:* 45 hours LEC; 27 hours LAB

This course will provide in-depth explanations of operating system security features as well as step-by-step configuration guides for proper operating system configuration. It also provides the knowledge and skills students will need to know in order to maintain the integrity, authenticity, availability, and privacy of data.

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

*Prerequisite:* None.

*Advisory:* CISC 323 and CISS 310 with grades of "C" or better

*Course Transferable to CSU*

*Hours:* 45 hours LEC; 27 hours LAB

This course provides the knowledge and skills you need to establish security for the Linux platform. It will present in-depth explanations of operating system security features as well as step-by-step configuration guides for proper operating system configuration. This course also will cover the knowledge and skills students will need to maintain the integrity, authenticity, availability, and privacy of data.

**CISS 350 Disaster Recovery 3 Units**

*Prerequisite:* None.

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

*Course Transferable to CSU*

*Hours:* 54 hours LEC

This course presents methods to identify vulnerabilities and implement appropriate countermeasures to prevent and mitigate failure risks for the business enterprise. This course covers but is not limited to an understanding of what disaster recovery is, development of a disaster recovery plan, and development and implementation of Policies and Procedures.

**CISS 356 Introduction to Information 3 Units**  
**Assurance**

*Prerequisite:* None.

*Advisory:* CISC 320 or CISS 300 with a grade of "C" or better

*Course Transferable to CSU*

*Hours:* 45 hours LEC; 27 hours LAB

This course introduces the network security specialist to the various methodologies for attacking a network. Students will be introduced to the concepts, principles, and techniques, supplemented by hands-on exercises, for attacking and disabling a network within the context of properly securing a network. The course will emphasize network attack methodologies with the emphasis on student use of network attack techniques and tools and appropriate defenses and countermeasures. Students will receive course content information through a variety of methods: lecture and demonstration of hacking tools will be used in addition to a virtual environment. Students will experience a hands-on practical approach to penetration testing measures and ethical hacking.

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

*Prerequisite:* CISS 301 or 310 with a grade of "C" or better

*Course Transferable to CSU*

*Hours:* 45 hours LEC; 27 hours LAB

This course is an introduction to the methods used to properly conduct a computer forensics investigation beginning with a discussion of ethics, while mapping to the objectives of the International Association of Computer Investigative Specialists (IACIS) certification. Topics include, but are not limited to, an overview of computer forensics as a profession; the computer investigation process; understanding operating systems boot processes and disk structures; data acquisition and analysis; technical writing; and a review of familiar computer forensics tools.

## Computer Info Science – Web (CISW)

**CISW 299 Experimental Offering in .5-4 Units**  
**Computer Information Science –**  
**Web**

*Prerequisite:* None

*Hours:* 72 hours LEC

See Experimental Offerings

**CISW 304 Cascading Style Sheets 2 Units**

*Prerequisite:* CISW 300 or 320 with a grade of "C" or better

*Course Transferable to CSU*

*Hours:* 27 hours LEC; 27 hours LAB

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

**CISW 320 Introduction to Web Development 3 Units**

*Prerequisite:* CISC 310, 320, or 323 with a grade of "C" or better; or equivalent experience using files and folders on a Personal Computer (PC).

*Advisory:* CISC 306 with a grade of "C" or better

*Course Transferable to CSU*

*Hours:* 54 hours LEC; 18 hours LAB

This course introduces fundamental aspects of coding HTML and CSS. Technical aspects of Web development will be included for using text, images, links, objects, and multi-media on Web pages. Open source developer tools and online resources will be introduced. Websites will be managed locally and on a network using effective file management and file transfer protocols. World Wide Web Consortium (W3C) recommended standards will be emphasized using a structured approach in writing validated, adaptive code for multiple devices: cell, tablet, desktop. CISW 300 may not be used as a course substitution for this course without CISW faculty authorization. Students needing recertification or to meet transfer degree or job requirements must complete a waiver petition prior to the registration date.

**CISW 370 Designing Accessible Websites 1 Unit**

*Prerequisite:* CISW 300, CISW 320, or GCOM 361 with a grade of "C" or better; or equivalent experience designing Web pages with Extensible Hypertext Markup Language (XHTML).

*Course Transferable to CSU*

*Hours:* 18 hours LEC

This course provides an overview of the methods that are used to design accessible Websites, including access tools 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:* A grade of "C" or better in CISP 301 or programming experience in any high level programming language, and a grade of "C" or better in CISW 320 or CISW 300 or equivalent experience hand coding Web pages.

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

*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 and AJAX. Topics include the Document Object Model that defines structured 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 320 or CISW 300 with a grade of "C" or better AND CISP 301 or one programming course with a grade of "C" or better or any programming experience.

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

*Course Transferable to CSU*

*Hours:* 54 hours LEC; 54 hours LAB

This course emphasizes the creation of interactive Websites using the middleware Web scripting environment PHP. Topics include core features of the middleware Web scripting language, embedding server commands in HTML pages, control structures, functions, arrays, form validations, cookies, environmental variables, email applications, and database driven Web applications.

**CISW 470 Web Projects 3 Units**

*Prerequisite:* CISW 320 and GCOM 360 with grades of "C" or better; Students must have completed CISW 400 OR CISW 410 for enrollment in this course.

*Corequisite:* CISW 400 or 410; CISW 400 OR CISW 410 may be taken concurrently with this class.

*Course Transferable to CSU*

*Hours:* 36 hours LEC; 54 hours LAB

This course focuses on Web project management on a real-world website. Emphasis will be placed on the project development life cycle including design specification, research, production, modification, and presentation. Students will learn how to prepare a cost estimate for a project. Web projects utilized in the class will be multifaceted, approaching the complexity that individuals would be expected to encounter in the Web development industry. Students bring their own Web projects to class.

**CISW 498 Work Experience in Web Development 1-3 Units**

*Prerequisite:* CISW 320 and one of CISW 325 or CISW 400 or CISW 410 with grades of "C" or better.

*Course Transferable to CSU*

*Hours:* 16 hours LEC; 300 hours LAB

This course provides students with opportunities to develop marketable Web development skills in preparation for employment or advancement within their current jobs. Course content includes understanding the application of education to the workforce; completion of required forms, which document the student's progress and hours spent at the work site; and developing workplace skills and competencies. During the course of the semester, the student is required to fulfill an 18 hour orientation and 75 hours of related paid work experience or 60 hours of unpaid work experience for one unit. An additional 75 or 60 hours of related work experience is required for each additional unit. The course may be taken up to 3 times when there is new or expanded learning on the job for a maximum of 3 units.

**CISW 499 Experimental Offering in Computer Information Science-Web .5-4 Units**

*Prerequisite:* None

*Course Transferable to CSU*

*Hours:* 54 hours LEC

See Experimental Offering