

Computer Information Science

Overview

Almost all industries of our economy are now tied to technology-driven tools. Those technology-driven tools are Computer Information Science. At Sacramento City College you can learn application development, programming, mark-up and scripting languages, including Open Web platform technologies.

Computer science drives job growth and innovation throughout our economy and society. Computing occupations are the number 1 source of all new wages in the U.S. and make up over half of all projected new jobs in STEM fields, making Computer Science one of the most in-demand college degrees.

Schedule an Appointment with Career Education

The [Career Education \(/academics/career-education\)](#) Transitions Coordinator and Career Education Counselor are available to assist with:

- questions
- program exploration
- college applications
- educational planning

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Associate Degrees

A.S. in Computer Science

This Computer Science program is designed for students preparing for careers in systems analysis and software development. It provides the lower division transfer foundation in programming languages, databases, and operating systems.

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.

Catalog Date: January 1, 2021

Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
CISA 323	Database Management using Microsoft Access	2
CISA 324	Intermediate Database Management using Access	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

COURSE CODE	COURSE TITLE	UNITS
CISP 440	Discrete Structures for Computer Science (3)	3 ¹
or CISP 457	Introduction to Systems Analysis and Design (3)	
A minimum of 6 units from the following:		6
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 457	Introduction to Systems Analysis and Design (3)	
CISS 300	Introduction to Information Systems Security (1)	
CISS 310	Network Security Fundamentals (3)	
CISW 327	Introduction to Web Development coding HTML and CSS (4)	
CISW 400	Client-side Web Scripting (4)	
CISW 410	Middleware Web Scripting (4)	
Total Units:		38

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

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

Student Learning Outcomes

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.

Career Information

Technical positions include: computer operator, computer programmer, systems analyst, database administrator, computer support or help desk specialist, Web developer, and application developer. Computer science is the pillar that innovation relies on throughout the US economy. Employers will continue to see a shortage of qualified candidates for technology and innovative jobs until more students complete coursework in Computer Science.

A.S. in Cybersecurity and Information Assurance

This program prepares IT professionals to apply knowledge and experience in risk management and digital forensics to safeguard infrastructure and secure data through continuity planning and disaster recovery operations. Courses deliver proven methods for information security using software analysis techniques, cloud management, and networking strategies to prevent, detect, and mitigate cyberattacks. This program also provides preparation for several nationally recognized, high demand certifications in the field of Cybersecurity.

Catalog Date: January 1, 2021

Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
CISN 300	Network Systems Administration	3
CISN 340	CISCO Networking Academy (CCNA)™: Data Communication and Networking	3.5
CISN 341	CISCO Networking Academy (CCNA)™: Networking Theory and Routing Technologies	3.5
CISS 310	Network Security Fundamentals	3
CISS 315	Ethical Hacking	3
CISS 316	Cisco Networking Academy™: CCNA Cybersecurity Operations	3
CISS 321	Scripting for Cyber Security	3
CISS 330	Implementing Internet Security and Firewalls	3
CISS 350	Disaster Recovery	3
CISS 360	Computer Forensics and Investigation	3
Total Units:		31

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

Student Learning Outcomes

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

- define best practices for configuring cyber defense and countermeasures.
- compare and contrast the benefits of firewalls vs. intrusion detection devices and software.
- design organizational plans for securing data and while maintaining the confidentiality, integrity, and availability (CIA) of the information transmitted over communication networks.
- analyze security risks mitigation processes to identify, evaluate, prioritize, and prevent potential security threats.
- 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.
- apply cyber defense and countermeasures as appropriate to mitigate potential risks.

Career Information

Networking/security skills and experience are needed for technical support staff, administrators, designers, troubleshooters, and cybersecurity specialists.

A.S. in Information Processing

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.

Catalog Date: January 1, 2021

Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
CISA 305	Beginning Word Processing	2
CISA 306	Intermediate Word Processing	2
CISA 315	Introduction to Electronic Spreadsheets	2
CISA 316	Intermediate Electronic Spreadsheets	2
CISA 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
CISC 351	Introduction to Local Area Networks (1)	1-3.5
or CISCN 340	CISCO Networking Academy (CCNA)tm: Data Communication and Networking (3.5)	
CISC 360	Information & Communication Technology Essentials (A+)	4
CISS 300	Introduction to Information Systems Security (1)	1-3
or CISS 310	Network Security Fundamentals (3)	
Total Units:		23 - 27.5

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

Student Learning Outcomes

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 industry 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.

Career Information

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. Students completing this program may work as office supervisors, office managers, computer support specialists, and information processing specialists.

A.S. in Management Information Science

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.

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 an SCC counselor to select and plan courses for your major. Schools vary widely in terms of the required preparation.

Catalog Date: January 1, 2021

Degree Requirements

COURSE CODE	COURSE TITLE	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
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)	
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 457	Introduction to Systems Analysis and Design (3)	
CISS 300	Introduction to Information Systems Security (1)	
CISS 315	Ethical Hacking (3)	
CISS 310	Network Security Fundamentals (3)	
CISW 327	Introduction to Web Development coding HTML and CSS (4)	
CISW 400	Client-side Web Scripting (4)	
CISW 410	Middleware Web Scripting (4)	
Total Units:		35

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

Student Learning Outcomes

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.

Career Information

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.

A.S. in Network Administration

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.

Catalog Date: January 1, 2021

Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
CISN 300	Network Systems Administration	3
CISN 302	Intermediate Network Systems Administration	3
CISN 306	Advanced Network Systems Administration	3
CISN 307	Windows Active Directory Services	3
CISN 308	Internetworking with TCP/IP	3
CISN 340	CISCO Networking Academy (CCNA)™: Data Communication and Networking	3.5
CISN 341	CISCO Networking Academy (CCNA)™: Networking Theory and Routing Technologies	3.5
CISS 310	Network Security Fundamentals (3)	3
or CISS 315	Ethical Hacking (3)	
A minimum of 5 units from the following:		5
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 303	Network Administration - Linux Server (3)	
CISN 304	Networking Technologies (3)	
CISN 315	Advanced Network Administration - Linux Server (3)	
CISN 316	Virtualization Concepts and Technologies (3.5)	
CISN 320	Designing Windows Directory Services (3)	
CISN 327	Cloud Infrastructure and Services (3.5)	
CISN 346	Network Design and Projects (3.5)	
CISN 374	Messaging Server Administration (3)	
CISS 310	Network Security Fundamentals (3)	
CISS 315	Ethical Hacking (3)	
CISS 316	Cisco Networking Academy™: CCNA Cybersecurity Operations (3)	
CISS 320	Implementing Network Security and Counter Measures (3)	
CISS 321	Scripting for Cyber Security (3)	
CISC 327	Cisco Networking Academy™: CCNA Security: Implementing Network Security (3.5)	
CISS 330	Implementing Internet Security and Firewalls (3)	
CISS 350	Disaster Recovery (3)	
CISC 360	Computer Forensics and Investigation (3)	
Total Units:		30

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

Student Learning Outcomes

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

- demonstrate competency in Windows operating system terminology and commands, account management, 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, 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.

Career Information

Networking skills and experience are needed for network technical support staff, network administrators, network designers, network troubleshooters, and information systems security specialists.

A.S. in Network Design

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.

Catalog Date: January 1, 2021

Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
CISC 320	Operating Systems (1)	1

COURSE CODE	COURSE TITLE	UNITS
or CISC 323	Linux Operating System (1)	
CISN 340	CISCO Networking Academy (CCNA)tm: Data Communication and Networking	3.5
CISN 341	CISCO Networking Academy (CCNA)tm: Networking Theory and Routing Technologies	3.5
CISN 342	CISCO Networking Academy (CCNA)tm: Advanced Routing and Switching	3.5
CISN 343	CISCO Networking Academy (CCNA)tm: Wide Area Network and Project-Based	3.5
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
CISN 300	Network Systems Administration (3)	
CISN 303	Network Administration - Linux Server (3)	
CISN 304	Networking Technologies (3)	
CISN 316	Virtualization Concepts and Technologies (3.5)	
CISN 327	Cloud Infrastructure and Services (3.5)	
CISN 320	Implementing Network Security and Counter Measures (3)	
CISN 321	Scripting for Cyber Security (3)	
Total Units:		33.5

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

Student Learning Outcomes

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.

Career Information

Networking skills and experience are needed for network technical support staff, network administrators, network designers, network troubleshooters, and information systems security specialists.

A.S. in Web Developer

Web Developers are proficient at creating website structure and interactivity. The Web Developer degree requires students design, code, and implement HTML, CSS, and other languages for creating websites to implement database tools and custom applications for the Web. Students will design, code, and test interactive websites with emphasis on learning mark-up, programming and scripting languages for interactivity and connectivity to data on the Web.

Catalog Date: January 1, 2021

Degree Requirements

COURSE CODE	COURSE TITLE	UNITS
CISA 323	Database Management using Microsoft Access	2
CISA 324	Intermediate Database Management using Access	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
CISW 306	Introduction to Web Page Creation and Web Accessibility	2 ¹
CISW 327	Introduction to Web Development coding HTML and CSS	4 ²
CISW 400	Client-side Web Scripting	4
CISW 410	Middleware Web Scripting	4
DDSN 331	Digital Imaging I	3
DDSN 360	User Interface Design	3
A minimum of 3 units from the following:		3³
CISW 498	Work Experience in Computer Information Science - Web (1 - 4)	
Total Units:		39

¹CISC 306 AND CISW 370 may be substituted for this course.

²CISW 320 AND CISW 304 may be substituted for this course.

³Students who previously completed CISW470 may request a course substitution for this course if a comprehensive development project can be presented to illustrate expected competencies of this program.

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

Student Learning Outcomes

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

- manage a multi-level website hosted on a Web server.
- utilize multiple programs simultaneously in order to develop websites.
- recommend a Web scripting language, current markup language or Web authoring software, and cascading style sheets to develop complex websites that are uploaded via File Transfer Protocol (FTP) to a Web server.
- research and implement current, valid World Wide Web Consortium (W3C) standards, including W3C Accessibility Standards.
- plan a structured approach to website 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), and database-driven Web development.
- demonstrate proficiency in the process of Web project management on a real-world website 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 website development.
- describe the relationship between user-centered design concepts, user interface (UI) design, user experience (UX) design, and usability testing.

Career Information

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, and Web Programmer.

Certificates of Achievement

Web Production Specialist Certificate

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 websites. Fundamental concepts of using a Content Management System will also be introduced.

Catalog Date: January 1, 2021

Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
CISC 305	Introduction to the Internet	1
CISC 310	Introduction to Computer Information Science	3
CISC 323	Linux Operating System	1
CISC 324	Intermediate Linux Operating System	1
DDSN 331	Digital Imaging I	3
DDSN 360	User Interface Design	3
CISW 306	Introduction to Web Page Creation and Web Accessibility	2 ¹
CISW 327	Introduction to Web Development coding HTML and CSS	4 ²
Total Units:		18

¹CISC 306 AND CISW 370 may be substituted for this course.

²CISW 320 AND CISW 304 may be substituted for this course.

Student Learning Outcomes

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

- develop multi-page websites communicating a specific message while following language specifications and syntax requirements as recommended by the World Wide Web Consortium (W3C).
- learn to code HTML (Hypertext Markup Language), HTML5, XHTML (Extensible HyperText Markup Language), and CSS (Cascading Style Sheets) using open-source software and Web developer tools to manage files and other assets on a website.
- use images, graphics and multi-media following standard practices as outlined in the W3C Recommended Standards, including W3C Accessibility Standards.
- 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 W3C Accessibility Standards.
- demonstrate an understanding of visual hierarchy and scale through successful completion of a comprehensive final project.
- conceive and design effective site maps, wireframes, navigation, user interfaces, and prototypes.
- describe the relationship between user-centered design concepts, user interface (UI) design, user experience (UX) design, and usability testing.

- demonstrate the use of current technologies and processes of user interface and responsive website design.

Career Information

Students completing this program will have skills needed for entry-level positions for building and editing pages for the Web. Students will be able to: build a personal website for a client, create and edit blogs, setup for a simple site using a content management system such as WordPress, and have technical skills that will support small business or other entities for entry-level positions in Web page editing and development.

Advanced CISCO Networking Certificate

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.

Catalog Date: January 1, 2021

Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
CISN 303	Network Administration - Linux Server (3)	3-3.5
or CISN 346	Network Design and Projects (3.5)	
CISS 316	Cisco Networking Academy™: CCNA Cybersecurity Operations	3
CISS 327	Cisco Networking Academy™: CCNA Security: Implementing Network Security	3.5
CISN 342	CISCO Networking Academy (CCNA)™: Advanced Routing and Switching	3.5
CISN 350	CISCO Networking Academy (CCNP)™: Advanced Router Configuration	3.5
CISN 352	CISCO Networking Academy (CCNP)™: Multi-Layer Switching	3.5
CISN 353	CISCO Networking Academy (CCNP)™: Internetwork Troubleshooting	3.5
Total Units:		23.5 - 24

Student Learning Outcomes

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

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

Career Information

Networking skills and experience are needed for network technical support staff, network administrators, network designers, network troubleshooters, and information systems security specialists.

Computer Science Certificate

This Computer Science program is designed for students preparing for careers in systems analysis and software development. It provides the lower division transfer foundation in programming languages, databases, and operating systems.

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.

Catalog Date: January 1, 2021

Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
CISA 323	Database Management using Microsoft Access	2
CISA 324	Intermediate Database Management using Access	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

COURSE CODE	COURSE TITLE	UNITS
CISP 440	Discrete Structures for Computer Science (3)	3 ¹
or CISP 457	Introduction to Systems Analysis and Design (3)	
A minimum of 6 units from the following:		6
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 457	Introduction to Systems Analysis and Design (3)	
CISS 300	Introduction to Information Systems Security (1)	
CISS 310	Network Security Fundamentals (3)	
CISW 327	Introduction to Web Development coding HTML and CSS (4)	
CISW 400	Client-side Web Scripting (4)	
CISW 410	Middleware Web Scripting (4)	
Total Units:		38

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

Student Learning Outcomes

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.

Career Information

Technical positions include: computer operator, computer programmer, systems analyst, database administrator, computer support or help desk specialist, Web developer, and application developer. Computer science is the pillar that innovation relies on throughout the US economy. Employers will continue to see a shortage of qualified candidates for technology and innovative jobs until more students complete coursework in Computer Science.

Cybersecurity and Information Assurance Certificate

This certificate prepares IT professionals to apply knowledge and experience in network security, risk management, intrusion detection, remediation, and digital forensics to safeguard infrastructure and secure data and business operations. Courses deliver proven methods for information security using software analysis techniques, and networking strategies to prevent, detect, and mitigate cyber attacks. This program also provides preparation for several nationally recognized, high demand certifications in the field of Cybersecurity.

Catalog Date: January 1, 2021

Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
CISN 300	Network Systems Administration	3
CISN 340	CISCO Networking Academy (CCNA)™: Data Communication and Networking	3.5
CISN 341	CISCO Networking Academy (CCNA)™: Networking Theory and Routing Technologies	3.5
CISS 310	Network Security Fundamentals	3
CISS 315	Ethical Hacking	3
CISS 316	Cisco Networking Academy™: CCNA Cybersecurity Operations	3
CISS 321	Scripting for Cyber Security	3
CISS 330	Implementing Internet Security and Firewalls	3
CISS 350	Disaster Recovery	3
CISS 360	Computer Forensics and Investigation	3
Total Units:		31

Student Learning Outcomes

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

- define best practices for configuring cyber defense and countermeasures.
- analyze security risks mitigation processes to identify, evaluate, prioritize, and prevent potential security threats.
- 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.

Career Information

Networking and security skills and experience are needed for technical support staff, administrators, designers, troubleshooters, and cybersecurity systems security specialists.

Data Science Certificate

This certificate is designed for students who aspire to master the essential knowledge and skills required for the storage, discovering, analyzing, visualizing, and application of big data. Students will learn to derive value from vast amounts of data and apply big data analytics techniques to make effective data-driven decisions.

Catalog Date: January 1, 2021

Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
[CISA 323	Database Management using Microsoft Access (2)	3-4
and CISA 324]	Intermediate Database Management using Access (2)	
or CISP 350	Database Programming (3)	
CISP 301	Algorithm Design and Implementation	4
CISP 357	Introduction to Big Data	4
CISP 358	Data Analysis	4
CISP 359	Big Data Analytics	4
Total Units:		19 - 20

Student Learning Outcomes

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

- explain how big data is useful in business or career.
- demonstrate understanding of the five Vs of big data (volume, velocity, variety, veracity, and value).
- evaluate the core concepts behind big data problems, applications, and systems.
- analyze big data using statistical methods and techniques.
- apply big data analytics techniques for effective data-driven decision-making.

Career Information

Successful completion of the program will provide students job opportunities in data science. Data science-related job titles such as data scientist, data analyst, big data analyst, business analyst, and SAS programmer are all possible job opportunities. The top five industries hiring big data-related expertise include Professional, Scientific and Technical Services, Information Technologies, Manufacturing, Finance and Insurance and Retail Trade.

Front-end Web Developer Certificate

Front-end Web Developers are proficient at creating website structure with some interactivity. Emphasis is on learning HTML, CSS, JavaScript, and user interface, user experience design.

Catalog Date: January 1, 2021

Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
CISC 305	Introduction to the Internet	1
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 306	Introduction to Web Page Creation and Web Accessibility	2 ¹
CISW 327	Introduction to Web Development coding HTML and CSS	4 ²
CISW 400	Client-side Web Scripting	4
DDSN 331	Digital Imaging I	3
DDSN 360	User Interface Design	3
Total Units:		26

¹CISC 306 AND CISW 370 may be substituted for this course.

²CISW 320 AND CISW 304 may be substituted for this course.

Student Learning Outcomes

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

- manage a multi-level website hosted on a Web server.
- utilize multiple programs simultaneously in order to develop websites.
- research and implement current, valid World Wide Web Consortium (W3C) standards, including W3C Accessibility Standards.
- plan a structured approach to website 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 the use of current technologies and processes of user interface and responsive website design.
- conceive and design effective website wireframes, navigation, user interfaces, and Web page prototypes.
- describe the relationship between user-centered design concepts, user interface (UI) design, user experience (UX) design, and usability testing.

Career Information

Career Opportunities could include employment in front-end Web Development or Web Production. This certificate provides foundation skills needed to work toward becoming a Web Developer.

Information Processing Specialist Certificate

This certificate builds upon a previous background in the use of microcomputer application programs as evidenced by the student previously completing the Information Processing Technician certificate. 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 or database management, this certificate also provides the student with hands-on training in hardware support and maintenance.

Catalog Date: January 1, 2021

Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
CISA 305	Beginning Word Processing	2
CISA 306	Intermediate Word Processing	2
CISA 315	Introduction to Electronic Spreadsheets	2
CISA 316	Intermediate Electronic Spreadsheets	2
CISA 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
CISC 351	Introduction to Local Area Networks (1)	1 - 3.5
or CISC 340	CISCO Networking Academy (CCNA)tm: Data Communication and Networking (3.5)	
CISC 360	Information & Communication Technology Essentials (A+)	4
CISS 300	Introduction to Information Systems Security (1)	1 - 3
or CISS 310	Network Security Fundamentals (3)	
Total Units:		23 - 27.5

Student Learning Outcomes

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.

Career Information

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. Students completing this program may work as secretaries, office workers, first line supervisors, administrative analysts, information resource personnel, or lead administrative specialists.

Information Processing Technician Certificate

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.

Catalog Date: January 1, 2021

Certificate Requirements

COURSE CODE	COURSE TITLE	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 310	Introduction to Computer Information Science	3
Total Units:		14

Student Learning Outcomes

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.

Career Information

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. Students completing this program may work as health information technicians, customer or client service representatives, and customer support specialists.

Management Information Science Certificate

The Management Information Science Certificate 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.

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 an SCC counselor to select and plan courses for your major. Schools vary widely in terms of the required preparation.

Catalog Date: January 1, 2021

Certificate Requirements

COURSE CODE	COURSE TITLE	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
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)	
CISC 324	Intermediate Linux Operating System (1)	
CISC 355	Introduction to Data Communications (1.5)	
CISC 360	Information & Communication Technology Essentials (A+) (4)	

COURSE CODE	COURSE TITLE	UNITS
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 457	Introduction to Systems Analysis and Design (3)	
CISS 300	Introduction to Information Systems Security (1)	
CISS 315	Ethical Hacking (3)	
CISS 310	Network Security Fundamentals (3)	
CISW 327	Introduction to Web Development coding HTML and CSS (4)	
CISW 400	Client-side Web Scripting (4)	
CISW 410	Middleware Web Scripting (4)	
Total Units:		35

Student Learning Outcomes

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.

Career Information

Computer skills and experience are needed for technical support staff, end-user consultants, network administrators, database specialists, information systems managers and specialists, programmers and analysts, software specialists, systems analysts, technical writers, information systems security specialists, and webmasters.

Network Administration Certificate

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.

Catalog Date: January 1, 2021

Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
CISN 300	Network Systems Administration	3
CISN 302	Intermediate Network Systems Administration	3
CISN 306	Advanced Network Systems Administration	3
CISN 307	Windows Active Directory Services	3
CISN 308	Internetworking with TCP/IP	3
CISN 340	CISCO Networking Academy (CCNA)tm: Data Communication and Networking	3.5
CISN 341	CISCO Networking Academy (CCNA)tm: Networking Theory and Routing Technologies	3.5
CISS 310	Network Security Fundamentals (3)	3
or CISS 315	Ethical Hacking (3)	
A minimum of 5 units from the following:		5
CISC 310	Introduction to Computer Information Science (3)	
CISC 320	Operating Systems (1)	
CISC 323	Linux Operating System (1)	
CISC 360	Information & Communication Technology Essentials (A+) (4)	
CISN 303	Network Administration - Linux Server (3)	
CISN 304	Networking Technologies (3)	
CISN 315	Advanced Network Administration - Linux Server (3)	
CISN 316	Virtualization Concepts and Technologies (3.5)	

COURSE CODE	COURSE TITLE	UNITS
CISN 320	Designing Windows Directory Services (3)	
CISN 327	Cloud Infrastructure and Services (3.5)	
CISN 342	CISCO Networking Academy (CCNA)tm: Advanced Routing and Switching (3.5)	
CISN 343	CISCO Networking Academy (CCNA)tm: Wide Area Network and Project-Based (3.5)	
CISN 374	Messaging Server Administration (3)	
CISN 378	Database Administration for Microsoft SQL Server (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 315	Ethical Hacking (3)	
CISS 321	Scripting for Cyber Security (3)	
CISS 330	Implementing Internet Security and Firewalls (3)	
CISS 350	Disaster Recovery (3)	
Total Units:		30

Student Learning Outcomes

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

- demonstrate competency in Windows operating system terminology and commands, account management, 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, 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.

Career Information

Networking skills and experience are needed for network technical support staff, network administrators, network designers, network troubleshooters, and information systems security specialists.

Network Design Certificate

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.

Catalog Date: January 1, 2021

Certificate Requirements

COURSE CODE	COURSE TITLE	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	3.5
CISN 341	CISCO Networking Academy (CCNA)tm: Networking Theory and Routing Technologies	3.5
CISN 342	CISCO Networking Academy (CCNA)tm: Advanced Routing and Switching	3.5
CISN 343	CISCO Networking Academy (CCNA)tm: Wide Area Network and Project-Based	3.5
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
CISN 300	Network Systems Administration (3)	
CISN 303	Network Administration - Linux Server (3)	
CISN 304	Networking Technologies (3)	
CISN 316	Virtualization Concepts and Technologies (3.5)	
CISN 327	Cloud Infrastructure and Services (3.5)	
CISS 320	Implementing Network Security and Counter Measures (3)	
CISS 321	Scripting for Cyber Security (3)	
CISS 327	Cisco Networking Academy™: CCNA Security: Implementing Network Security (3.5)	
Total Units:		33.5

Student Learning Outcomes

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 Shortest Path First (OSPF).

- construct and configure access lists.
- compare and contrast types of network media.
- demonstrate competency in Windows operating system terminology and commands, account management, and file management and storage.
- demonstrate working knowledge of principles in computer networking and data management, information systems security, or web server administration depending, on the electives chosen.

Career Information

Networking skills and experience are needed for network technical support staff, network administrators, network designers, network troubleshooters, and information systems security specialists.

PC Support Certificate

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 communications networks. 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.

Catalog Date: January 1, 2021

Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
BUS 310	Business Communications (3)	3-4
or ENGWR 300	College Composition (3)	
or ENGWR 488	Honors College Composition and Research (4)	
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 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)	1-3
or CISS 315	Ethical Hacking (3)	
Total Units:		23.5 - 26.5

Student Learning Outcomes

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.

Career Information

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.

Programming Certificate

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

Catalog Date: January 1, 2021

Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
BUS 310	Business Communications (3)	3 - 4
or ENGWR 300	College Composition (3)	
or ENGWR 488	Honors College Composition and Research (4)	
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
Total Units:		22 - 23

Student Learning Outcomes

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.

Career Information

Students earning a Programming Certificate of Achievement are qualified to pursue entry level positions as software designers and engineers, systems analysts, and software testers.

Web Developer Certificate

Web Developers are proficient at creating website structure and interactivity. The Web Developer certificate requires students design, code and implement HTML, CSS, and other languages for creating websites to implement database tools and custom applications for the Web. Students will design, code, and test interactive websites with emphasis on learning mark-up, programming and scripting languages for interactivity and connectivity to data on the Web.

Catalog Date: January 1, 2021

Certificate Requirements

COURSE CODE	COURSE TITLE	UNITS
CISA 323	Database Management using Microsoft Access	2
CISA 324	Intermediate Database Management using Access	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
CISW 306	Introduction to Web Page Creation and Web Accessibility	2 ¹
CISW 327	Introduction to Web Development coding HTML and CSS	4 ²
CISW 400	Client-side Web Scripting	4
CISW 410	Middleware Web Scripting	4
DDSN 331	Digital Imaging I	3
DDSN 360	User Interface Design	3
A minimum of 3 units from the following:		3 ³
CISW 498	Work Experience in Computer Information Science - Web (1 - 4)	
Total Units:		39

¹CISC 306 AND CISW 370 may be substituted for this course.

²CISW 320 AND CISW 304 may be substituted for this course.

³Students who previously completed CISW 470 may request a course substitution for this course if a comprehensive development project can be presented to illustrate expected competencies of this program.

Student Learning Outcomes

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

- manage a multi-level website hosted on a Web server.
- utilize multiple programs simultaneously in order to develop websites.
- recommend a Web scripting language, current markup language or Web authoring software, and cascading style sheets to develop complex websites that are uploaded via File Transfer Protocol (FTP) to a Web server.
- research and implement current, valid World Wide Web Consortium (W3C) standards, including W3C Accessibility Standards.
- plan a structured approach to website 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), and database-driven Web development.
- demonstrate proficiency in the process of Web project management on a real-world website 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 website development.
- describe the relationship between user-centered design concepts, user interface (UI) design, user experience (UX) design, and usability testing.

Career Information

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, and Web Programmer.

Computer Information Science - Applications (CISA) Courses

CISA 305 Beginning Word Processing

Units:	2
Hours:	27 hours LEC; 27 hours LAB
Prerequisite:	CISC 300 or 310 with a grade of "C" or better
Advisory:	BUS 107 with a grade of "P" or ability to touch type at 28 wpm.
Transferable:	CSU
Catalog Date:	January 1, 2021

The course introduces the student, through hands-on activities, 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.

Student Learning Outcomes

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

- create a professional quality document by evaluating needs, entering and editing text, making corrections, and saving in various formats.
- demonstrate the ability to edit and format documents using word processing commands and features.
- demonstrate usage of the mail merge functions.

CISA 306 Intermediate Word Processing

Units:	2
Hours:	27 hours LEC; 27 hours LAB
Prerequisite:	CISA 305 with a grade of "C" or better; completed within five years prior to enrollment in CISA 306.
Transferable:	CSU
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- design and complete presentation quality documents essential in business using intermediate and advanced word processing commands and features.
- merge a main document with a data source file.
- record and run a macro.
- use word processing commands and features to create Web pages such as: creating and editing hyperlinks, applying background effects, and saving a word processing document as a Web page.
- plan and create online forms and tables for efficient data display and input data into customized forms.
- analyze and complete a multi-page business document including creating table of contents, adding indexes, and embedding and linking a spreadsheet object.

CISA 315 Introduction to Electronic Spreadsheets

Units:	2
Hours:	27 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 300 or 310 with a grade of "C" or better; BUS 107 with a grade of "P" or ability to touch type at 28 wpm.
Transferable:	CSU

Catalog Date: January 1, 2021

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.

Student Learning Outcomes

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

- use an electronic spreadsheet application to plan, construct, test, and evaluate professional looking worksheets that include text, numbers, formulas, and functions.
- format a worksheet using standard layouts, formats, styles, and themes, special number formats, and conditional formatting.
- analyze data and apply mathematical functions of the program for building financial and data analysis spreadsheets; perform basic worksheet analysis using What-If, Goal Seek, and VLOOKUP procedures.
- utilize relative and absolute addressing when working with worksheets.
- design, create, and revise embedded as well as stand-alone charts based on commonly used standards.
- apply advanced spreadsheet features to analyze and manage data using such tools as data tables, PivotTables, and PivotCharts.
- manage multiple workbooks and worksheets using templates as well as consolidating, linking, and 3-D cell referencing procedures.

CISA 316 Intermediate Electronic Spreadsheets

Units: 2
Hours: 27 hours LEC; 27 hours LAB
Prerequisite: CISA 315 with a grade of "C" or better; completed within five years prior to enrollment in CISA 316.
Transferable: CSU (Effective SP15)
Catalog Date: January 1, 2021

This course introduces students to the intermediate features of spreadsheet programs. The course covers 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.

Student Learning Outcomes

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

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

CISA 323 Database Management using Microsoft Access

Units: 2
Hours: 27 hours LEC; 27 hours LAB
Prerequisite: CISC 300 or 310 with a grade of "C" or better
Transferable: CSU
Catalog Date: January 1, 2021

This course introduces database management systems in a single-user environment. 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.

Student Learning Outcomes

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

- analyze needs and determine appropriate data structure and solutions essential for business or professional environments.
- create tables, queries, forms, and reports.
- formulate multiple table queries with complex criteria.
- design forms for data entry and data views.
- interpret data with crosstab queries and reports.
- build tables by importing delimited data and export data for sharing with other users.
- design and implement multiple table data management systems involving custom forms, reports, and labels.
- manage database objects, including backup and repair.

CISA 324 Intermediate Database Management using Access

Units: 2
Hours: 27 hours LEC; 27 hours LAB

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
Transferable:	CSU
Catalog Date:	January 1, 2021

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. 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.

Student Learning Outcomes

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

- use and debug macros.
- develop and update modules using Visual Basic for Applications (VBA).
- demonstrate techniques used for data normalization.
- utilize the fundamental vocabulary and constructs of Structured Query Language (SQL).
- create queries and subqueries using select statements in SQL.
- manage and develop security measures for database systems in a business environment.

CISA 340 Presentation Graphics

Units:	2
Hours:	27 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 300 or 310 with a grade of "C" or better; BUS 107 with a grade of "C" or better or the ability to touch type at 28 wpm.
Transferable:	CSU
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- plan, prepare, and present on-screen effective presentations for business, professional, or personal purposes using basic design principles and concepts.
- edit presentations to include basic and advanced enhancements.
- link or embed existing files into presentations, including graphic, word processing, spreadsheet, audio, and video files.

CISA 499 Experimental Offering in Computer Information Science - Applications

Units:	0.5 - 4
Prerequisite:	None.
Transferable:	CSU
Catalog Date:	January 1, 2021

Computer Information Science - Core (CISC) Courses

CISC 299 Experimental Offering in Computer Information Science - Core

Units:	0.5 - 4
Prerequisite:	None.
Catalog Date:	January 1, 2021

CISC 300 Computer Familiarization

Units:	1
Hours:	18 hours LEC
Prerequisite:	None.
Advisory:	BUS 107 with a grade of "P" or ability to touch type at 28 wpm.
Transferable:	CSU
Catalog Date:	January 1, 2021

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 homework assignments. This course does not serve as a prerequisite to computer science programming courses but does serve as a prerequisite and advisory for Computer Information Science application courses. The course is specially designed for students wanting a very general, non-technical, introductory course in computers.

Student Learning Outcomes

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

- define common computer terminology and demonstrate an understanding of hardware components, types of software, Windows and Office commands.
- use basic computer and Windows functions including navigation, icons, menus, ribbons, creating folders and subfolders, and copying and moving files.
- use an Office application to create new files, save, edit, format, enter data, and print.
- understand the use of the Internet including search engines, web browsers, email, privacy and security, and managing a digital footprint.

CISC 305 Introduction to the Internet

Units:	1
Hours:	18 hours LEC
Prerequisite:	CISC 300, 310, or 320 with a grade of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

This course explains how the Internet works and how to effectively use basic internet services. Topics include browser basics, search engines and search techniques, e-mail, the World Wide Web (WWW), internet security, internet resources, the Cloud, social networking, and building basic Web pages using Hypertext Markup Language (HTML). The course includes the review of laws that guide the use of the Internet and intellectual property on the Web. Other topics include Internet protocols, news groups, discussion lists, connecting to a remote server, (S)FTP (Secure File Transfer Protocol), and current emerging technologies.

Student Learning Outcomes

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

- describe the structure of the Internet, the Domain Name System (DNS), and connectivity options.
- identify the tools and protocols for connecting to remote servers, such as telnet, transmission control protocol/internet protocol (TCP/IP), secure file transfer protocol (S)FTP, and the World Wide Web (WWW).
- describe the laws and international guidelines for use of the Internet in business, professional, or personal settings.
- experiment with the use of asynchronous communication tools, such as e-mail, discussion lists, and discussion boards.
- explain the use of synchronous communication, such as instant messenger and chat rooms, including the limitations of bandwidth and security.
- describe different types of protocols, (S)FTP, HTTP, and HTTPS. Use multiple browser applications to access and use the World Wide Web.
- examine the security and privacy issues related to using the Internet, including e-commerce, cloud computing, social media such as Facebook, Twitter, LinkedIn, and other platforms, your digital footprint and methods for monitoring your digital footprint, and understanding the threats or harm from a digital footprint and/or using online tools.
- locate information stored on the Internet, determine the validity of online resources versus peer reviewed library subscription databases, download and store files, and use the correct syntax for citing Internet resources.
- create a simple Web page using HTML.

CISC 310 Introduction to Computer Information Science

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	CISC 300 with a grade of "C" or better
Transferable:	CSU; UC
General Education:	AA/AS Area II(b)
C-ID:	C-ID BUS 140; C-ID ITIS 120
Catalog Date:	January 1, 2021

This course examines information systems and their role in business, with a 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.

Student Learning Outcomes

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

- explain how a computer system works, including identification of the various hardware components.
- compare storage formats for different types of digital data (character, numeric, audio, and video).
- differentiate between systems software and applications software.
- differentiate between the most commonly used computer operating systems.
- demonstrate use of an operating system and various utility software, such as anti-virus software and file management software.
- demonstrate use of productivity software (word processing, spreadsheets, database, presentation graphics, and email).
- demonstrate use of cloud-based applications and cloud-based file storage.
- design and create a simple Web page.
- differentiate between categories of programming languages.
- design and create a simple computer program.
- convert numbers between the decimal and binary numbering systems.
- differentiate between types of careers in the computer information science field.
- explain the phases of the System Development Life Cycle.

CISC 320 Operating Systems

Units:	1
Hours:	9 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 300 or CISC 310 with a grade of "C" or better.
Transferable:	CSU
Catalog Date:	January 1, 2021

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

Student Learning Outcomes

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

- explain the purpose of operating systems and become familiar with Windows OS terms and navigation.
- apply custom Windows OS settings and notifications.
- create folders (directories), subfolders (sub-directories), libraries by using the Windows file management utility and demonstrate how to share files and folders with others.
- create, rename, compress, move, copy and delete files on an internal or external storage device using the Windows file management utility and the Windows command prompt.
- practice with Windows applications, utilities and the Task Manager.
- utilize the Internet safely and efficiently.
- create and manage user accounts and settings.
- manage peripheral devices, network connections, and power options.
- explain how to protect the computer and data on the computer.

CISC 323 Linux Operating System

Units:	1
Hours:	9 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 300 with a grade of "C" or better and ability to touch type.
Transferable:	CSU
Catalog Date:	January 1, 2021

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

Student Learning Outcomes

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

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

CISC 324 Intermediate Linux Operating System

Units:	1
Hours:	9 hours LEC; 27 hours LAB
Prerequisite:	CISC 323 with a grade of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

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

Student Learning Outcomes

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

- set up a Linux and Microsoft Windows dual booting system with a business, professional, or personal setting.
- set up, configure, and troubleshoot a boot loader.
- utilize advanced Bourne Again Shell (BASH), Command Line Interface (CLI) utilities to inspect and maintain the system and its hardware.
- compare C shell, K shell, and BASH.
- implement decision making logic in scripts.
- create BASH script files utilizing looping structures: do, while, until.

- create BASH script files implementing decision making logic using: if, for, case and nesting.
- describe the use of text stream editor and filters such as awk and sed.
- compose a regular expression for use by the grep utility.

CISC 351 Introduction to Local Area Networks

Units:	1
Hours:	9 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 320 and CISC 355 with grades of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- describe the requirements for a Local Area Network (LAN) and the devices that may reside on a LAN as used in business or professional environments.
- discuss the advantages of a LAN and the factors to be considered when planning and implementing a network.
- distinguish among topologies, types of cabling, standards, and access methods.
- describe the major functions required for day-to-day system administration (e.g., creating a directory substructure, network users and groups, login scripts, trustee rights, custom menus, and print queues.).
- examine the advantages and disadvantages of peer-to-peer LANs versus domain-based LANs.

CISC 355 Introduction to Data Communications

Units:	1.5
Hours:	27 hours LEC
Prerequisite:	None.
Advisory:	CISC 300 or CISC 320 with a grade of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- describe the difference between data communications and telecommunications and the role of regulatory and standard-setting agencies within in the communication industry.
- identify the basic hardware, media, and software components used within a data communications system.
- explain how basic system components are structured in local, metro, and wide area data communication systems.
- describe the importance of software in a data communication system and compare the common protocols used in local area, wide area, and wireless networks.
- describe the purpose of local area networks and compare them to wide area and metropolitan area networks.
- apply the principles of OSI(Open Systems Interconnect) and IEEE 802 layered communications models to the design and troubleshooting of local and wide area network.
- explain the basic components and techniques used to create virus secure data communications system.
- evaluate the performance of a data communications system within an application environment.

CISC 360 Information & Communication Technology Essentials (A+)

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	None.
Advisory:	CISC 310, 320, and 351 with grades of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- identify the hardware and software components of a modern computer system.
- assemble hardware and software components based on customer requirements (SLO #01).

- operate personal and mobile computer hardware, and software for end users using the most common operating systems(SLO #02).
- discuss and relate the phases of the System Development Life Cycle.
- define, prepare, and install appropriate applications and operating system software based upon customer requirements within real or virtual environments.
- use the general commands and features of office productivity, operating system, and email software.
- demonstrate effective data organization and management techniques using appropriate digital media.
- demonstrate basic data networking and security/forensics techniques (SLO #03).
- install and configure network adapters for effective operation upon local and wide area networks.
- demonstrate basic virtualization, desktop, imaging, and deployment operations (SLO #04).
- diagnose, record, and resolve common hardware and software issues or customer concerns while applying timely and effective troubleshooting techniques (SLO #05).
- operate search engines, browsers, and related web tools to effectively find and utilize secure World Wide Web information or resources.
- practice appropriate customer support techniques (SLO #06).
- demonstrate knowledge of the changing workplace, the work-site team and environment, and ethical behavior.

CISC 362 Microcomputer and Applications Support

Units:	2
Hours:	27 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISA 305, CISA 315, and CISC 320 with grades of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

This course is an in-depth investigation of the technical, business, soft, and self-management skills technicians need to provide effective customer service and support in an information technology (IT) environment. Customer service and problem solving skills needed for success in a small or large business environment are introduced.

Student Learning Outcomes

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

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

CISC 495 Independent Studies in Computer Information Science - Core

Units:	1 - 3
Hours:	54 - 162 hours LAB
Prerequisite:	None.
Transferable:	CSU
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- engage in intellectual inquiry in the computer information science area beyond that required in order to pass a course of study.
- design and discuss a proposal of study with supervising instructor qualified in the discipline.
- utilize information resources to gather data and other related information.
- prepare a final report or project incorporating research data and findings.

CISC 498 Work Experience in Computer Information Science - Core

Units:	1 - 4
Hours:	18 hours LEC; 60 - 300 hours LAB
Prerequisite:	None.
Transferable:	CSU
Catalog Date:	January 1, 2021

This course provides students with opportunities to develop marketable CIS 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 complete 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. Only one Work Experience course may be taken per semester.

Student Learning Outcomes

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

- acquire practical workplace skills and knowledge in the workplace.
- evaluate his/her competency in the following career/life planning process: self-awareness; career awareness; decision making and goal setting; job search and workplace success; balanced lifestyle.
- improve the his/her potential for promotion in the workplace.
- demonstrate skills to conduct him/herself in a professional manner in the workplace.

CISC 499 Experimental Offering in Computer Information Science - Core

Units:	0.5 - 4
Prerequisite:	None.
Transferable:	CSU
Catalog Date:	January 1, 2021

Computer Information Science - Maker (CISM) Courses

CISM 299 Experimental Offering in Computer Information Science - Maker

Units:	0.5 - 4
Prerequisite:	None.
Catalog Date:	January 1, 2021

CISM 499 Experimental Offering in Computer Information Science - Maker

Units:	0.5 - 4
Prerequisite:	None.
Catalog Date:	January 1, 2021

Computer Information Science - Networking (CISN) Courses

CISN 299 Experimental Offering in Computer Information Science - Networking

Units:	0.5 - 4
Prerequisite:	None.
Catalog Date:	January 1, 2021

CISN 300 Network Systems Administration

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 320 (Windows or Linux) with a grade of "C" or better.
Transferable:	CSU
General Education:	AA/AS Area II(b)
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- build a network using a Windows Network Operating System.
- utilize the administrative tools of a network using the Windows Network Operating System.
- define and monitor resource sharing including printers using the Windows Network Operating System.
- create and manage user and group accounts using the Windows Network Operating System.
- audit network security by monitoring file usage and user activity using the Windows Network Operating System.
- explain a system backup and how to restore files as needed using the Windows Network Operating System.
- diagnose and troubleshoot network resources using the Windows Network Operating System.
- create a client/server environment using a Windows Network Operating System Windows.
- evaluate policies and procedures used for network operations.

CISN 302 Intermediate Network Systems Administration

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	CISN 300 with a grade of "C" or better
Transferable:	CSU
General Education:	AA/AS Area II(b)
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- set up details of a network operating system.
- manage computer system policies.
- select and implement support file systems.
- apply and manage fault-tolerance on network servers.
- evaluate and support network applications and services.
- set up network protocols.
- associate inter-operation with different network and client operating systems.
- analyze and troubleshoot directory replications and file synchronization.
- evaluate and optimize the network server boot process.
- use the network operating system's troubleshooting tools to solve advanced network problems.

CISN 303 Network Administration - Linux Server

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 323 with a grade of "C" or better
Transferable:	CSU
General Education:	AA/AS Area II(b)
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- audit and perform basic server functions on a Linux Local Area Network.
- create and manage effective file and security systems for a Linux network.
- measure Linux network memory usage.
- assess and determine the appropriate network services necessary to give full functionality to a Linux Local Area Network.
- distinguish between the graphical system used by Linux and command line.
- analyze the hardware components of your computer system.
- apply the correct file permissions for groups and users.

CISN 304 Networking Technologies

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 320 with a grade of "C" or better; CISC 355 with a grade of "C" or better
Transferable:	CSU
General Education:	AA/AS Area II(b)
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- describe and differentiate the devices and services used to support communications in data networks and the Internet.
- describe the role of protocol layers in data networks.
- evaluate the importance of addressing and naming schemes at various layers of data networks in IPv4 and IPv6 environments.
- design, calculate, and apply subnet masks and addresses to fulfill given requirements in IPv4 and IPv6 networks.
- explain fundamental Ethernet concepts such as media, services, and operations.
- build a simple Ethernet network using routers and switches.
- manipulate common network utilities to verify small network operations and analyze data traffic.

CISN 306 Advanced Network Systems Administration

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	CISN 300 with a grade of "C" or better
Transferable:	CSU
General Education:	AA/AS Area II(b)
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- define the placement and roles of servers in an enterprise network.
- locate and plan user access to enterprise network resources.
- plan and implement user profiles across networks.
- plan and implement permissions in the enterprise.
- plan and implement trust relationships between servers.
- audit and support network applications and services across multiple networks.
- employ tools to monitor and optimize network services and enterprise network traffic.
- assess and troubleshoot inter-connected networks and network servers.

CISN 307 Windows Active Directory Services

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	CISC 320 with a grade of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- design and evaluate network architecture, topology, interdependencies, and constraints in relation to an Active Directory domain.
- evaluate and implement a plan to install, configure, and administer an Active Directory domain controller.
- analyze and implement a plan to install, configure, administer, and evaluate group policy in an Active Directory environment.
- evaluate and manage Active Directory forests, trees, domains, and operational units.
- analyze and implement a plan to install, configure, and administer Domain Naming System (DNS) services and settings.
- develop and implement a plan to publish, backup, and replicate the Active Directory database.

CISN 308 Internetworking with TCP/IP

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	CISN 300 with a grade of "C" or better
Transferable:	CSU
General Education:	AA/AS Area II(b)
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- apply and configure TCP/IP.
- test the TCP/IP configuration using TCP/IP utilities.
- develop and implement TCP/IP sub-networks.
- manage IP address assignments using DHCP and WINS.
- install and configure the Domain Name System (DNS) in the enterprise network.
- assess and troubleshoot the network with TCP/IP utilities.
- plan and evaluate the future implementation of IPv6.

CISN 315 Advanced Network Administration - Linux Server

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	CISN 303 with a grade of "C" or better
Transferable:	CSU
General Education:	AA/AS Area II(b)
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- demonstrate how to partition hard drives and install a Linux operating system so that it coexists with other operating systems.
- access network storage using Server Message Blocks(SMB).
- evaluate and secure files with Access Control Lists(ACLs).
- enable, audit, and manage network security and monitoring.
- create and manage network defined users and groups.
- install and configure Network File System (NFS) for sharing directories and files between Linux client workstations.
- manage network communication using firewalls.
- analyze, and troubleshoot the linux boot process.

CISN 316 Virtualization Concepts and Technologies

Units:	3.5
Hours:	54 hours LEC; 27 hours LAB
Prerequisite:	CISN 300 or 340 with a grade of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

This course covers the knowledge and skills necessary to understand and implement Virtualization environments. The core concepts of creating and managing virtual machines, network servers, and network design are presented. The benefits associated with virtualization such as fault tolerance and high availability will also be covered.

Student Learning Outcomes

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

- assess and classify for appropriateness of use server virtualization products and desktop virtualization products.
- recognize server functionality needs and determine whether proposed virtual environment can meet the functional objective.
- migrate physical to virtual servers.
- prepare and implement resources designed to be shared by multiple virtual machines.

CISN 320 Designing Windows Directory Services

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	CISN 307 with a grade of "C" or better
Transferable:	CSU
General Education:	AA/AS Area II(b)
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- research data to identify customer requirements to design the network infrastructure.
- evaluate Active Directory and network requirements.
- define scope of work for a network infrastructure project.
- review network architecture, topology, interdependencies, and constraints.
- demonstrate Active Directory design creation.
- audit Active Directory design reviews.
- design an Active Directory replication plan based on the site topology design.

CISN 327 Cloud Infrastructure and Services

Units:	3.5
Hours:	54 hours LEC; 27 hours LAB
Prerequisite:	CISN 300 or 340 with a grade of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

This course covers cloud deployment and service models, cloud infrastructure, and the key considerations in migrating to cloud computing. This course also provides the required technology essentials across all domains; including server, storage, networking, applications, and databases to help develop a strong understanding of virtualization and cloud computing technologies.

Student Learning Outcomes

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

- identify the Classic Data Center (CDC).
- describe the Virtualized Data Center (VDC) including techniques, resources, and storage virtualization.
- explain VDC Networking components, technologies and how desktop and applications are virtualized.
- describe "Business Continuity" including fault tolerance and data integrity issues.
- discuss the different models of cloud computing including the infrastructure and service creation.
- describe the security issues in the cloud infrastructure and cloud migration issues.

CISN 336 Wireless Technologies

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	CISN 341 with a grade of "C" or better
Transferable:	CSU
General Education:	AA/AS Area II(b)
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- demonstrate understanding of wireless radio technologies and topologies.
- demonstrate understanding of IEEE 802.11 wireless standards.
- assess locations, configure and install wireless access points, bridges, adapters, and antennas.
- design, install, configure, monitor, and maintain wireless technologies using CLI and web-based Device Manager.
- identify wireless security threats and vulnerabilities.
- demonstrate understanding of proper site survey techniques and safety practices.
- configure monitoring technologies such as Syslog, SNMP and logging understand vertical and horizontal wireless implementations and uses.
- troubleshoot wireless installation and configuration.

CISN 340 CISCO Networking Academy (CCNA)™: Data Communication and Networking

Units:	3.5
Hours:	54 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 300 or CISC 310, and CISC 320 with grades of "C" or better.
Transferable:	CSU

General Education:	AA/AS Area II(b)
C-ID:	C-ID ITIS 150
Catalog Date:	January 1, 2021

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).

Student Learning Outcomes

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

- communicate between local and remote computers using TCP/IP protocol.
- describe the equipment and use, terminology, and procedures required for data communication and Internetworking.
- describe the hardware and software used in popular networks.
- demonstrate ability to operate a network as system manager.
- differentiate between various network architectures and select appropriate network structure for various applications.
- calculate and convert between base 2, base 10, and base 16 networking systems.

CISN 341 CISCO Networking Academy (CCNA)™: Networking Theory and Routing Technologies

Units:	3.5
Hours:	54 hours LEC; 27 hours LAB
Prerequisite:	CISN 340 with a grade of "C" or better
Transferable:	CSU
General Education:	AA/AS Area II(b)
Catalog Date:	January 1, 2021

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).

Student Learning Outcomes

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

- demonstrate a knowledge of the underlying technologies utilized in modern networking.
- utilize various protocols across an Internet composed of different topologies.
- share devices and information on a network.
- perform calculations to combine network numbering blocks to develop a functional super networking address system.

CISN 342 CISCO Networking Academy (CCNA)™: Advanced Routing and Switching

Units:	3.5
Hours:	54 hours LEC; 27 hours LAB
Prerequisite:	CISN 341 with a grade of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

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).

Student Learning Outcomes

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

- configure a wide area network.
- install and maintain a multi-protocol routed network.
- configure and maintain network bridging and switching devices.
- implement network security concepts.
- transport network data across current popular publicly switched telephone system protocols.
- troubleshoot enterprise networks.

CISN 343 CISCO Networking Academy (CCNA)™: Wide Area Network and

Project-Based

Units:	3.5
Hours:	54 hours LEC; 27 hours LAB
Prerequisite:	CISN 341 with a grade of "C" or better
Corequisite:	CISN 342
Transferable:	CSU
Catalog Date:	January 1, 2021

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).

Student Learning Outcomes

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

- maintain LAN bridges, routers, switches, and PSTN (Publically Switched Telephone Network).
- implement WAN protocols such as PPP (Point-to-Point Protocols) and Spanning Tree algorithms.
- create virtual networks on switched devices.

CISN 346 Network Design and Projects

Units:	3.5
Hours:	54 hours LEC; 27 hours LAB
Prerequisite:	CISN 341 with a grade of "C" or better
Transferable:	CSU
General Education:	AA/AS Area II(b)
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- identify customer business needs and network requirements, structure, design, and considerations.
- assess the existing WAN and LAN, and identify connectivity and performance issues.
- introduce, design, and explain security design and network management design concepts and solutions that suit customer needs.
- plan and verify the implementation of the network design.

CISN 350 CISCO Networking Academy (CCNP)™: Advanced Router Configuration

Units:	3.5
Hours:	54 hours LEC; 27 hours LAB
Prerequisite:	CISN 343 with a grade of "C" or better or valid CISCO Certified Network Associate (CCNA) certification
Transferable:	CSU
Catalog Date:	January 1, 2021

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).

Student Learning Outcomes

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

- evaluate the key information router needed to route data.
- describe the key requirements for scalable routing protocols.
- evaluate OSPF operations and configuration.
- explain the differences between the possible types of areas, routers, and link-state advertisements (LSAs).
- evaluate how EIGRP supports large networks.
- describe BGP features and operations.
- evaluate the functions of access lists and how routing updates can be optimized.
- select and configure the different ways to control routing update traffic.
- explain IP private addresses and Network Address Translation (NAT).

CISN 351 CISCO Networking Academy (CCNP)™: Remote Access

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	CISN 343 with a grade of "C" or better or valid CISCO Certified Network Associate (CCNA) certification
Transferable:	CSU
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- evaluate and determine the proper WAN type to use and identify site requirements and solutions.
- select CISCO remote access solutions and assemble WAN components.
- configure asynchronous connections and modem configurations.
- describe, evaluate and configure PPP architecture, link control protocol options, callback, and compression.
- configure and evaluate ISDN architecture, protocol layers, dial-on-demand routing, static routing, and default routing.
- configure and maintain frame relay, topologies, traffic shaping, and on-demand routing.
- troubleshoot network address translation issues.

CISN 352 CISCO Networking Academy (CCNP)™: Multi-Layer Switching

Units:	3.5
Hours:	54 hours LEC; 27 hours LAB
Prerequisite:	CISN 343 with a grade of "C" or better or valid CISCO Certified Network Associate (CCNA) certification
Transferable:	CSU
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- explain the key characteristics of various switching technologies, LAN switching, and the hierarchical model of network design.
- determine legacy media types, fast and gigabit Ethernet, and bandwidth needs.
- configure VLANs, trunking protocols, configuration, and pruning.
- configure STP operations, processes, and redundant links.
- configure MLS processes, and flow masks.
- configure HSRP, IGMP, and IP multi-cast routing.

CISN 353 CISCO Networking Academy (CCNP)™: Internetwork Troubleshooting

Units:	3.5
Hours:	54 hours LEC; 27 hours LAB
Prerequisite:	CISN 343 with a grade of "C" or better or valid CISCO Certified Network Associate (CCNA) certification
Transferable:	CSU
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- explain legacy media types, layer 2 protocols, network management software, and router diagnostic commands.
- configure TCP/IP using diagnostic tools, and debug commands.
- troubleshoot LAN switches, VLANs, frame relays, and ISDN.
- configure AppleTalk, show and debug commands.
- configure Novell, show and debug commands.
- troubleshoot EIGRP, OSPF, and BGP.

CISN 374 Messaging Server Administration

Units:	3
Hours:	45 hours LEC; 27 hours LAB

Prerequisite:	CISN 300 with a grade of "C" or better.
Transferable:	CSU
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- construct the configuration of a messaging server.
- develop and implement strategies for installation, administration, and security.
- install and configure messaging server software for clients and message recipients.
- configure address lists and accounts.
- manage users, distribution lists, and Public and Private Information Stores.
- monitor server performance.

CISN 378 Database Administration for Microsoft SQL Server

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	CISN 300 with a grade of "C" or better
Transferable:	CSU
General Education:	AA/AS Area II(b)
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- develop and implement installation of SQL Server.
- describe the upgrade process for an installed SQL Server.
- develop and implement administrative procedures.
- evaluate software installation options that are appropriate for the environment.
- set up Microsoft SQL Server following given specifications.
- verify and troubleshoot the installation of SQL Server.
- develop and implement security procedures.
- analyze system performance to baseline using performance tools.
- set up system backups and restore data.

CISN 499 Experimental Offering in Computer Information Science - Networking

Units:	0.5-4
Prerequisite:	None.
Transferable:	CSU
Catalog Date:	January 1, 2021

Computer Information Science - Programming (CISP) Courses

CISP 301 Algorithm Design and Implementation

Units:	4
Hours:	54 hours LEC; 54 hours LAB
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.
Transferable:	CSU; UC
General Education:	AA/AS Area II(b)
Catalog Date:	January 1, 2021

This course provides an introduction to the analysis, design, and implementation of software solutions to simple problems using console input and output. Students develop and implement standard algorithms for performing such things as a bubble sort, a linear search of an array, and data validation. Other programming topics covered include file input/output and functions. Additional topics covered include converting numbers between numbering systems, binary addition, and binary subtraction.

Student Learning Outcomes

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

- analyze simple problems to fully understand the scope and desired outcome.
- create algorithms for solving simple problems demonstrating use of variables, constants, and the proper use of control structures such as simple sequence, selection, and iteration.
- document algorithms using structure charts, pseudocode, and flowcharts.
- implement, test, and debug a program, based on a documented algorithm, which uses each of the following fundamental programming constructs: basic computation, simple console and file input/output, standard conditional and iterative structures, and functions.
- explain their understanding of high to low level language translation.
- create a test data document that states the testing criteria to thoroughly test a program for completeness and accuracy.
- evaluate the completeness and accuracy of a program in accordance with test data previously created.
- demonstrate the mechanics of parameter passing.
- demonstrate a bubble sort, a linear search of an array, and data validation algorithms.
- convert values between binary, decimal, and hexadecimal number systems in order to understand how data are represented in a computer and interpret ASCII values.
- perform addition of binary numbers and subtraction of binary numbers using two's complement.

CISP 310 Assembly Language Programming for Microcomputers

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CISP 301 and 360 with grades of "C" or better
Transferable:	CSU; UC
General Education:	AA/AS Area II(b)
C-ID:	C-ID COMP 142
Catalog Date:	January 1, 2021

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 an increased understanding of the internal operations of computers.

Student Learning Outcomes

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

- describe and explain the architecture of microprocessors.
- design and create programs in microcomputer assembly language.
- manipulate binary, octal, hexadecimal, and ASCII data.
- use interrupts to perform basic input/output operations.

CISP 320 COBOL Programming

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CISP 301 with a grade of "C" or better
Transferable:	CSU
General Education:	AA/AS Area II(b)
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- apply structured programming techniques.
- create program code for each division of a COBOL program.
- test, debug, and execute COBOL programs.
- create and process sequential files and perform table searches.
- utilize industry standard COBOL programming language techniques.
- develop and execute programs that are properly documented.
- demonstrate proper programming techniques for program efficiency and ease of maintenance.

CISP 350 Database Programming

Units:	3
Hours:	54 hours LEC
Prerequisite:	CISA 323 or CISP 301 with a grade of "C" or better
Advisory:	Proficiency in any high-level programming language
Transferable:	CSU; UC
General Education:	AA/AS Area II(b)
Catalog Date:	January 1, 2021

This is an introductory course in database programming. Topics include data modeling and database normalization. Structured Query Language (SQL) and Procedural Language (PL)/SQL will be used to design, develop, and deploy beautiful, responsive, database-driven web applications.

Student Learning Outcomes

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

- design databases conforming to normalization guidelines.
- distinguish between Data Definition Language (DDL) and Data Manipulation Language (DML).
- create and maintain relational databases.
- construct queries and table joins using SQL.
- evaluate PL/SQL script algorithms to achieve desired output.

CISP 357 Introduction to Big Data

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CISP 301 with a grade of "C" or better
Advisory:	BUS 310 with a grade of "C" or better
Transferable:	CSU; UC
Catalog Date:	January 1, 2021

This is an introductory course covering important terminology, concepts, and computer languages commonly used in big data analytics and data science. Specific topics include converting raw data to data sets, importing and exporting data, and data set reconstruction.

Student Learning Outcomes

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

- explain big data and the various phases of data processing.
- explain the processing of massive storage for any kind of data.
- build programs in commonly used languages for data analytics, data mining, and data science.

CISP 358 Data Analysis

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CISP 357 with a grade of "C" or better
Transferable:	CSU; UC
Catalog Date:	January 1, 2021

This course covers statistical modeling, analysis of variance, regression, and categorical data analysis. Students will explore and summarize data, apply multiple comparison techniques in ANOVA, use chi-square statistics to detect associations among categorical variables, and fit multiple logistic regression models. Emphasis is on fitting models, verifying the model assumptions, and using alternative analysis strategies when necessary.

Student Learning Outcomes

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

- evaluate linear regression models.
- apply logistic regression analysis.
- apply the analysis of variance.
- build computer programs to generate descriptive statistics and explore data with graphs.
- Explain statistical inference, Analysis of Variance, regression, and categorical data analysis.

CISP 359 Big Data Analytics

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CISP 357 with a grade of "C" or better
Transferable:	CSU; UC
Catalog Date:	January 1, 2021

This course covers techniques for predicting outcomes with supervised machine learning, unearthing patterns in customer behavior, and analyzing structured, unstructured, and big data.

Student Learning Outcomes

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

- predict outcomes with supervised machine learning techniques.
- identify patterns in customer behavior with unsupervised techniques.
- analyze structured, unstructured, and big data.

- apply big data analytics techniques for effective data-driven decision-making.

CISP 360 Introduction to Structured Programming

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CISP 301 with a grade of "C" or better
Transferable:	CSU; UC
General Education:	AA/AS Area II(b)
C-ID:	C-ID COMP 112
Catalog Date:	January 1, 2021

This course is an introduction to structured programming and objects. Topics include program design, documentation, testing, and debugging as well as use of variables and constants, operators, control structures, functions, standard libraries, pointers, arrays, and input/output (including file I/O), classes, and objects.

Student Learning Outcomes

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

- analyze problem descriptions and develop efficient algorithms for solving problems.
- design algorithms using the control structures of structured programming.
- express algorithms to solve simple and complex problems using a high-level language.
- develop a modular design for a software implementation to solve a problem.
- design and use classes and objects.
- compare procedural and object-oriented approaches to problem solving.

CISP 362 Programming for Mobile Devices I

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CISP 301, 360, 400, or 401 with a grade of "C" or better; or experience using any modern, high-level programming language
Transferable:	CSU
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

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

CISP 400 Object Oriented Programming with C++

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CISP 360 with a grade of "C" or better.
Advisory:	CISC 323 with a grade of "C" or better
Transferable:	CSU; UC
General Education:	AA/AS Area II(b)
C-ID:	C-ID COMP 122
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- compare and contrast Structured and Object Oriented software design methodologies.
- design and implement Object Oriented software applications using Unified Modeling Language and the C++ language.
- design and implement reusable software components using Inheritance, Containment, or Polymorphism (overload, overrides, templates, virtual or pure virtual classes, and generic classes).

CISP 401 Object Oriented Programming with Java

Units:	4
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Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CISP 360 with a grade of "C" or better
Transferable:	CSU; UC
General Education:	AA/AS Area II(b)
Catalog Date:	January 1, 2021

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, Unified Modeling Language, function overloading, inheritance, static and dynamic class relationships, polymorphism, components, event driven programming, class associations, testing and debugging.

Student Learning Outcomes

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

- compare and contrast Structured and Object Oriented software design methodologies.
- design and implement Object Oriented software applications using Unified Modeling Language (UML) and the Java language.
- design and implement reusable software components using Inheritance, Containment, or Polymorphism (Abstract Classes, Interfaces).
- design and implement event driven, Graphical User Interface based software applications.

CISP 430 Data Structures

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CISP 400 or 401 with a grade of "C" or better
Transferable:	CSU; UC
General Education:	AA/AS Area II(b)
C-ID:	C-ID COMP 132
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- analyze problem spaces and create a Software Requirements Specification (SRS).
- design and implement complex software systems using Object Oriented software development methodologies.
- analyze program efficiency using O-Notation.
- use pointers and recursion to implement list, stack, queue, and tree data structures.

CISP 440 Discrete Structures for Computer Science

Units:	3
Hours:	54 hours LEC
Prerequisite:	CISP 400 or 401 with a grade of "C" or better; MATH 370 with a grade of "C" or better
Transferable:	CSU; UC
General Education:	AA/AS Area II(b); CSU Area B4; IGETC Area 2
C-ID:	C-ID COMP 152
Catalog Date:	January 1, 2021

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, algorithm analysis, digital logic, combinatorial circuits, and computer arithmetic. Computer programming assignments will be included.

Student Learning Outcomes

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

- explain the basic notions of logical proofs, including propositions, conditional propositions, logical equivalence, quantifiers, and mathematical induction.
- describe the fundamentals of sets and relations, including definitions and common uses in computer science of sets, sequences and strings, relations, and functions.
- use basic counting methods including permutations and combinations; apply probability to results.
- define the basic concepts of analysis and complexity of algorithms; implementation and efficiency of recursive algorithms.
- interpolate computer arithmetic including real number representation, binary representation, modular arithmetic, and basic arithmetic algorithms.
- examine the fundamentals of digital logic including Boolean algebra, logic gates, combinational circuits, circuit design methodology, circuit minimization, switches, and transistors.
- identify the essential discrete structures used in computer science programs and applications.
- analyze various methods of tree and graph traversals; examine graph and tree algorithms and their application to solving practical problems.
- understand the concepts of Linear Recurrences, Fibonacci numbers, Dependent (Bayes) probability, Independent (binomial) probability, Pascal's Triangle, the Binomial theorem, Pascal's Identity, and the Master Theorem.

CISP 457 Introduction to Systems Analysis and Design

Units:	3
Hours:	54 hours LEC

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.
Transferable:	CSU
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- articulate the types of business needs that can be addressed using information technology-based solutions.
- initiate, specify, and prioritize information systems projects to determine various aspects of feasibility of these projects.
- clearly define problems, opportunities, or mandates that initiate projects.
- use at least one specific methodology for analyzing a business scenario (problem or opportunity), model it using formal technique, and specify requirements for a system which enables productive change in business processes.
- within the context of the methodologies learned, write clear and concise business requirements documents and convert them into technical specifications.
- communicate effectively with various organizational stakeholders to collect information using a variety of techniques and convey proposed solution characteristics to them.
- manage information systems projects using formal project management methods.
- articulate various systems acquisition alternatives, including the use of packaged systems (such as Enterprise Resource Planning [ERP], Customer Relationship Management [CRM], Supply Chain Management [SCM], etc.) and outsourced design and development resources.
- use contemporary Computer-Aided Software Engineering (CASE) tools in process and data modeling.
- compare the acquisition alternatives systematically.
- incorporate principles leading to high levels of security and user experience from the beginning of the systems development process.
- design high-level logical system characteristics (user interface design, design of data and information requirements).
- analyze and articulate ethical, cultural, and legal issues and their feasibility among alternative solutions.

CISP 499 Experimental Offering in Computer Information Science - Programming

Units:	0.5 - 4
Prerequisite:	None.
Transferable:	CSU
Catalog Date:	January 1, 2021

Computer Information Science - Security (CISS) Courses

CISS 300 Introduction to Information Systems Security

Units:	1
Hours:	18 hours LEC
Prerequisite:	None.
Transferable:	CSU
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- differentiate among the various aspects of internal Local Area Network (LAN) and Internet security.
- define the effect of network intruders and viruses.
- compare different methods of electronic mail security.
- assess the current information on TCP/IP security.
- examine the use and importance of firewalls.
- analyze the use and function of cryptography, authentication, and digital signatures in network security.

CISS 310 Network Security Fundamentals

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISN 300, 303, and 340 with grades of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- examine different methods of common network attacks
- analyze the benefits of authentication and complex password techniques.
- examine the tangible and intangible costs of breaches to an organization's security, network resources, and proprietary information.
- implement protective measures and evaluate the adequacy of physical site security relative to risk.
- configure operating system security and evaluate its effectiveness.
- compare and contrast different intrusion detection procedures, software programs, and methodologies.

CISS 315 Ethical Hacking

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 320 or CISS 300 with a grade of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

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. Formerly known as CISS 301.

Student Learning Outcomes

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

- describe the tools and methods a "hacker" uses to break into a computer or network.
- practice and use safe techniques on the World Wide Web.
- defend a computer and a LAN against a variety of different types of security attacks using a number of hands-on techniques.
- identify ports, protocols and services.
- construct software configuration settings that will assist in protecting the PC.

CISS 316 Cisco Networking Academy™: CCNA Cybersecurity Operations

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISN 340 and CISS 310 with grades of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

This course equips students with the knowledge and skills needed by today's organizations that are challenged with rapidly detecting cybersecurity breaches and effectively responding to security incidents. The CCNA Cybersecurity Operations curriculum provides an introduction to the knowledge and skills needed for a Security Analyst working with a Security Operations Center team. CCNA Cyber Ops covers core security skills needed for monitoring, detecting, investigating, analyzing and responding to security events, thus protecting systems and organizations from cybersecurity risks, threats, and vulnerabilities.

Student Learning Outcomes

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

- implement and manage Cisco secure networks.
- implement network perimeter defense.
- analyze threats and vulnerabilities to networks.

CISS 320 Implementing Network Security and Counter Measures

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	CISS 310 with a grade of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

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

Student Learning Outcomes

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

- evaluate security fundamentals.
- explain how to set up Virtual Private Networks (VPN).
- explain the different types of Intrusion Detection systems (IDS).
- analyze the methods to protect a network from Distributed Denial of Service (DDoS) attacks.
- apply cyber defense methods to prepare a system to repel attacks.

CISS 321 Scripting for Cyber Security

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	CISN 340, CISS 310, or CISS 315 with a grade of "C" or better
Transferable:	CSU
General Education:	AA/AS Area II(b)
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- assess and write simple scripts.
- describe the basic techniques used to create scripts for automating system administration tasks.
- modify current security application scripts for a specific network environment.
- evaluate scripting languages for different tasks.

CISS 327 Cisco Networking Academy™: CCNA Security: Implementing Network Security

Units:	3.5
Hours:	54 hours LEC; 27 hours LAB
Prerequisite:	CISN 340 and 341 with grades of "C" or better
Advisory:	CISS 310 with a grade of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- explain network threats, mitigation techniques, and the basics of securing a network.
- describe security threats facing modern network infrastructures.
- configure Cisco routers and switches for security.
- explain and configure ACLs to filter traffic.
- describe methods for implementing secure communications to ensure integrity, authenticity, and confidentiality.
- explain how IPsec VPNs operate.
- test network security and create a technical security policy.

CISS 330 Implementing Internet Security and Firewalls

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	CISS 310 with a grade of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

The firewall has emerged as a primary tool used to prevent unauthorized access. 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).

Student Learning Outcomes

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

- describe the elements of computer-based data communication.
- define management's role in the development, maintenance, and enforcement of information security policy, standards, practices, procedures, and guidelines.
- identify limitations of firewalls.
- define personal firewalls.
- identify and implement different firewall strategies.
- define the role encryption plays in a firewall architecture.
- recommend best practices for effective configurations and maintenance of Virtual Private Networks (VPNs).
- describe user, client, and session authentication.

CISS 341 Implementing Windows Operating System Security

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 320 and CISS 310; with grades of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- evaluate network security from the perspective of the Microsoft Windows client operating system.
- assess how to secure data using a Microsoft Windows operating system.
- demonstrate use of the tools required to configure client operating system services.
- differentiate, describe, and configure file sharing services and file system security permissions in accordance with best security practices.
- compare and contrast the roles of security, ethics, and privacy management issues regarding data storage.
- define and differentiate user rights and file permissions in terms of security.

CISS 342 Implementing Linux Operating System Security

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 323 and CISS 310 with grades of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

This course provides the knowledge and skills needed 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.

Student Learning Outcomes

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

- evaluate network security from the perspective of a Linux/UNIX client operating system.
- assess how to secure data using a Linux/UNIX operating system.
- demonstrate use of the tools required to configure client operating system services.
- examine and configure network services in accordance with best current security practices.
- differentiate and describe file sharing services and file system security permissions.
- evaluate and describe the relationships between major network services.
- configure an appropriate file encryption method to optimize security on a multi-user workstation.
- demonstrate knowledge of user and file security.

CISS 350 Disaster Recovery

Units:	3
Hours:	54 hours LEC
Prerequisite:	None.
Advisory:	CISS 310 with a grade of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- develop a disaster recovery plan system.
- assess disaster recovery risks in the enterprise.
- develop disaster recovery policies and procedures.
- analyze and establish disaster recovery roles across departments in an organization.
- illustrate inter-organizational relationships and disaster recovery plans.
- analyze and establish disaster recovery communications policies and procedures.
- discuss disaster recovery policies and procedures.
- assess disaster recovery needs, threats, and solutions.

CISS 356 Introduction to Information Assurance

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 320 or CISS 300 with a grade of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- describe the tools and methods a "hacker" uses to break into a computer or network.
- describe how the fundamental concepts of cyber defense can be used to provide system security.
- list the fundamental concepts of the Information Assurance discipline.
- analyze and describe network and computer attacks.
- analyze the process of incident response.
- outline the elements of business continuity.

CISS 360 Computer Forensics and Investigation

Units:	3
Hours:	45 hours LEC; 27 hours LAB
Prerequisite:	CISS 310 or 315 with a grade of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

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.

Student Learning Outcomes

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

- define computer forensic concepts as a profession.
- summarize how to prepare for a computer investigation.
- analyze how data is stored and managed by an operating system.
- assess and compare computer forensic tools used in investigations.
- validate the evidence during the analysis process.
- create and prepare detailed procedures for crime scene incident processing and develop a plan for data acquisition.
- demonstrate forensic investigation data acquisition procedures.
- describe and compare graphic image recovery methods to develop high tech reports.
- differentiate common operating systems' boot procedures and disk structures.
- create and prepare detailed procedures for crime scene incident processing.
- describe the importance of network forensics.

Computer Information Science - Web (CISW) Courses

CISW 299 Experimental Offering in Computer Information Science - Web

Units:	0.5 - 4
Prerequisite:	None.
Catalog Date:	January 1, 2021

CISW 306 Introduction to Web Page Creation and Web Accessibility

Units:	2
Hours:	27 hours LEC; 27 hours LAB
Prerequisite:	None.
Advisory:	CISC 305 or 310 with a grade of "C" or better
Transferable:	CSU
Catalog Date:	January 1, 2021

This course introduces foundation concepts of coding HTML, CSS, and using a content management system for the production of Web pages. Web page creation will include formatting, layout, construction, and presentation. The current version of markup language will be introduced, as identified by the World Wide Web Consortium (W3C). This course also introduces methods used to design accessible websites for people with disabilities. Students will design and develop pages accessible to people with disabilities, in accordance with the W3C Accessibility Standards. This includes understanding how to perceive, understand, navigate, and interact with the Web. This course explores software tools to assist visual, auditory, physical, speech, cognitive, and neurological disabilities, and has students experience using pages on the Web using software or open-source tools to illustrate various tools used to view Web pages for accessibility. Current legal requirements for accessible websites, including the Americans with Disabilities Act (ADA) and Section 508, are emphasized and implemented in project work produced in this course.

Students who have successfully completed CISC 306 and CISW 370 are not eligible to take this course.

Student Learning Outcomes

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

- code using an ASCII text editor and apply the correct syntax for HTML and CSS code. Formulate current coding structure, content, and presentation for generating accessible websites.
- use open-source tools and resources for Web development.
- manage files on a Web server using software utilities, operating systems, and file transfer protocols such as (S)FTP (Secure File Transfer Protocol).
- use the Content Management System (CMS), WordPress, to build a multi-page website.
- describe the current legal requirements for designing websites for people with disabilities.
- evaluate the accessibility levels of various types of websites utilizing various hardware and software tools.
- interpret accessibility standards and guidelines as outlined in W3C Accessibility Standards, including Web Content Accessibility Guidelines (WCAG) 2.1 and/or all current Web Content Accessibility Guidelines.
- research and test specialized browsers used for accessibility across multiple platforms; research and test current open-source tools available for creating accessible sites; introduce specialized software and other tools used for Web accessibility.

CISW 327 Introduction to Web Development coding HTML and CSS

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	None.
Corequisite:	CISW 306
Advisory:	CISC 310 with a grade of "C" or better; Students should be confident in managing files and folders and working on the Internet.
Transferable:	CSU; UC
General Education:	AA/AS Area II(b)
Catalog Date:	January 1, 2021

This course teaches foundations of coding HTML and CSS. Technical aspects of Web development are included for using text, images, links, objects, forms, tables, and multi-media on Web pages. CSS will be implemented using inline, embedded and external styles, media queries, selectors, web fonts, pseudo-classes, pseudo-elements, and other CSS techniques to apply advanced features for the presentation of 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, accessible, and adaptive code for multiple devices: cell, tablet and desktop. Students taking this course should have fundamental skills in file management and be familiar with fundamental operating system skills-sets for success in this course. Students who have successfully completed CISW 320 and CISW 304 are not eligible to take this course.

Student Learning Outcomes

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

- write HTML code using the correct syntax and correct structure for a Web page.
- write CSS code using the correct syntax to control page layout and visual details for Web pages; use inline, embedded, and external styles.
- write valid and well-formed code to implement cross-platform compatibility while maintaining recommended standards of W3C (World Wide Web Consortium).
- analyze existing websites for style, structure, and usability in multiple browsers and multiple devices including: cell phones, tablets, and desktops.
- develop websites composed of multiple pages demonstrating effective information architecture and site navigation.
- validate code to meet recommended standards of the World Wide Web Consortium (W3C).
- use open-source text editor(s) for developers.
- write valid and well-structured code for inline, embedded, and external Cascading Style Sheets (CSS) and demonstrate proper use of the priority scheme when creating cascading style sheets.
- differentiate between using a class and using an identifier to apply to specific sites or pages in accordance with W3C (World Wide Web Consortium) recommended standards.
- demonstrate proficiency in using The Box Model and CSS positioning to position and layer objects on Web pages.
- apply responsive design techniques for multiple platforms, including cell phones, tablets, and desktops.

CISW 400 Client-side Web Scripting

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CISW 327 with a grade of "C" or better; or equivalent experience hand-coding Web pages; AND CISW 301 with a grade of "C" or better or equivalent programming experience
Transferable:	CSU
General Education:	AA/AS Area II(b)
Catalog Date:	January 1, 2021

This course emphasizes client-side software development skills used to create interactive, data-driven websites, and Web applications with JavaScript. Topics include core language features and common design patterns, event handling, using the Document Object Model to dynamically modify Web pages, form validation, sending and receiving data with AJAX and JSON, and facilitating development with commonly-used frameworks such as jQuery.

Student Learning Outcomes

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

- describe the role of client-side programming in the development of interactive, data-driven websites and Web applications, and list common tasks.
- use fundamental structured- and object-oriented programming concepts (control structures, functions, arrays, classes) as implemented by JavaScript in the creation of Web-based projects.
- develop (analyze, design, implement, and test) an interactive Web-based project that uses client-side JavaScript with event handling, potentially aided by commonly-used frameworks such as jQuery.
- choose and implement common design patterns used to facilitate client-side development (e.g., factory, composite, facade).
- process submitted form data using client-side techniques, including the use of "sticky forms" to identify and permit user-correction of invalid data.
- create applications that use Document Object Model methods, AJAX, and JSON to exchange data with a server and dynamically modify Web pages.

CISW 410 Middleware Web Scripting

Units:	4
Hours:	54 hours LEC; 54 hours LAB
Prerequisite:	CISW 327 with a grade of "C" or better; OR equivalent experience hand-coding Web pages; AND CISW 301 with a grade of "C" or better or equivalent programming experience
Transferable:	CSU
General Education:	AA/AS Area II(b)
Catalog Date:	January 1, 2021

This course emphasizes server-side software development skills used to create interactive, data-driven websites and Web applications with a middleware scripting language or framework such as PHP, ASP.NET, or Django. Topics include core language features and common design patterns, use of the HTTP and CGI protocols to send and receive data, form validation, cookies and sessions, and database interaction.

Student Learning Outcomes

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

- describe the role of server-side programming in the development of interactive, data-driven websites and Web applications and list common tasks.
- use fundamental structured- and object-oriented programming concepts (control structures, functions, arrays, classes) as implemented by a particular middleware scripting language in the creation of Web-based projects.
- develop (analyze, design, implement, and test) an interactive website that allows users to view and manage database content that is interrelated in a one-to-many and/or many-to-many fashion.
- choose and implement common design patterns used to facilitate server-side development (e.g., model-view-controller, active record, data mapper).
- process submitted form data using server-side techniques, including the use of "sticky forms" to identify and permit user-correction of invalid data.
- describe the use of cookies and sessions in Web-based applications and use them to create applications that involve user authentication and authorization.

CISW 498 Work Experience in Computer Information Science - Web

Units:	1 - 4
Hours:	54 - 216 hours LAB
Prerequisite:	CISW 327 and either CISW 400 or CISW 410 with grades of "C" or better.
Transferable:	CSU
General Education:	AA/AS Area III(b)
Catalog Date:	January 1, 2021

This course provides students with opportunities to further develop their 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 development of Web projects. Course content includes understanding the application of education to the workforce; responsibilities of an intern or employee in a workforce setting; completion of Title 5 Education Code documents (i.e. Student Application, Learning Objectives, Time Sheet, and Evaluation), that document the student's progress and hours spent in the workplace; and development of workplace soft skills and employability skills relevant to the 21st century workplace. The student must have a job, volunteer, or internship position related to Web development secured to remain enrolled in the course. The student will be required to attend an orientation at the beginning of the course and complete a minimum of 75 hours to a maximum of 300 hours of paid work; or a minimum of 60 hours to a maximum 240 hours of unpaid work per unit per semester. This course may be taken up to 4 times when there is new or expanded learning on the job for up to 16 units. Only one Work Experience course may be taken per semester.

Student Learning Outcomes

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

- demonstrate knowledge of Web development concepts learned in the classroom in actual conditions found in the workplace.
- acquire practical workplace skills and knowledge in the workplace.
- evaluate their competency in the following career/life planning process: self-awareness; career awareness; decision making and goal setting; job search and workplace success; balanced lifestyle.
- improve their potential for promotion in the workplace.
- demonstrate skills for professional standards in the workplace.

CISW 499 Experimental Offering in Computer Information Science - Web

Units: 0.5 - 4
Prerequisite: None.
Catalog Date: January 1, 2021

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