COMPUTER AND INFORMATION SCIENCE

See Business Office Technology for specific Microsoft applications (Word, Excel, PowerPoint, etc.).

CAREER OPPORTUNITIES

Communications Specialist
Computer Game Programmer
Computer Graphics Designer
Computer Hardware Specialist
Computer Help Desk Technician
Computer Maintenance Technician
Computer Software Technician
*Computer Systems Engineer
*Computing Analyst
Cyber Café Owner
*Database Manager
GIS (Geographic Information Systems) Specialist
Information Specialist
*Information Systems Programmer
LAN/WAN Manager
Manufacturer's Representative
Multimedia Designer
Network Administrator
*Network Analyst
Network Consultant
Network Control Technician
Network Training and Support Specialist
*Programmer Analyst
Sales and Service
*Scientific Programmer
Software Consultant
*Software Engineer/Designer
*Systems Analyst
*Systems Programmer
Technical Support Representative
*Telecommunications Programmer
Telecommunications Technician
*Telecommunications Technical Engineer
Training Specialist
Virtual Reality Developer
Web Master
Web Page Designer

*Bachelor Degree or higher required

Course Equivalencies:

The following Cuyamaca and Grossmont College courses are considered similar enough to be treated as equivalent. Modification of Major forms are not required.

Cuyamaca Course	*Similar Grossmont Course*
CIS 105	CSIS 172
CIS 110	CSIS 110
CIS 120	CSIS 114
CIS 140	CSIS 174
CIS 190	CSIS 112
CIS 191	CSIS 113
CIS 211	CSIS 134
CIS 212	CSIS 133
CIS 215	CSIS 135
CIS 216	CSIS 136
CIS 240	CSIS 276
CIS 291	CSIS 213
CS 119	CSIS 119
CS 180	CSIS 288
CS 181	CSIS 296
CS 182	CSIS 293
CS 280	CSIS 289
CS 281	CSIS 297
CS 282	CSIS 294
GD 222	CSIS 137

I. NETWORKING, SECURITY AND SYSTEM ADMINISTRATION

This degree program prepares students for careers in computer networking or system administration and related fields. Upon completion, students may find entry level positions as computer support technicians, junior network administrators, junior system administrators, hardware technicians, data/voice/video cabling technicians, network project managers, designers/estimators or technical support personnel. The major prepares students to work as team members in an information technology group which designs, evaluates, tests, installs and maintains corporate networks. Preparation for the following industry certifications: A+, Network+, Security+, Linux+, Microsoft Certified Technician (MCT) in Windows and Windows Server (active directory, network infrastructure and applications infrastructure), Linux Profession Institute Certification Level 2, Certified Wireless Network Administrator (CWNA) and/or CCNA (Cisco Certified Network Associate).

Program Learning Outcomes

Upon successful completion of this program, students will be able to:

A. Enterprise Networking

- Describe and demonstrate the ability to install, configure, upgrade, diagnose and troubleshoot a personal computer and its associated networking hardware and system software.
- Install, test, certify, secure, and troubleshoot copper, optical fiber, and wireless telecommunications infrastructures by constructing a system in accordance with industry standards.
- Configure, test, and troubleshoot network topologies consisting of routers, switches, wireless routers, VoIP equipment and PCs using: the Cisco IOS CLI; IP addressing; interior gateway protocols; HDLC, PPP and Frame-Relay WAN.

B. Enterprise System Administration

- Describe and demonstrate the ability to install, configure, upgrade, diagnose and troubleshoot a personal computer and its associated networking hardware and system software.
- Install, test, certify, secure, and troubleshoot copper, optical fiber, and wireless telecommunications infrastructures by constructing a system in accordance with industry standards.
- Configure, test, and troubleshoot a Linux and a Windows server, including directory services, networking, print services, server security, remote access, DNS, DHCP, web server, file server, mail server, FTP server, file systems, partitions, logical volumes, server/network performance, and data backup and recovery.

Associate in Science Degree Requirements:

Core Curriculum:

Course	*Title*	*Units*
CIS 120	Computer Maintenance and A+ Certification	3
CIS 121	Network Cabling Systems	3
CIS 125	Network+ Certification	3
CIS 161	Fundamentals of Telecommunications	3
CS 119	Program Design and Development	3
CS 119L	Program Design and Development Lab	1
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Areas of Emphasis:

A. Enterprise Networking

CIS 190	Windows Operating System	3
or		
CIS 191	Linux Operating System	3
CIS 201	Cisco Networking Academy I	3
CIS 202	Cisco Networking Academy II	3
CIS 203	Cisco Networking Academy III	3
CIS 204	Cisco Networking Academy IV	3
CIS 209	Cisco Networking Academy IX	3
or		
CIS 263	Fundamentals of Network Security	3
CIS 261	Convergent/Unified Technologies and Degree Capstone	3
CIS 262	Wireless Networking	3
or		
CIS 210	Cisco Networking Academy–Voice	4
		24-25
	Total Required Including Core Classes	40-41
	Plus General Education Requirement	

B. Enterprise System Administration

CIS 140	Databases	3
or		
CIS 162	Technical Diagramming Using Microsoft Visio	2
CIS 190	Windows Operating System	3
CIS 191	Linux Operating System	3
CIS 261	Convergent/Unified Technologies and Degree Capstone	3
CIS 263	Fundamentals of Network Security	3
CIS 290	Windows Server–Installing and Configuring	2
CIS 291	Linux System Administration	3
CIS 293	Windows Server–Administering	2
CIS 294	Windows Server–Advanced Configuration	2
		23-24
	Total Required Including Core Classes	39-40
	Plus General Education Requirement	

Certificate of Achievement

Students who complete only the courses required for the major including an area of emphasis qualify for a Certificate in Networking, Security and System Administration in that area of emphasis. An official request must be filed with the Admissions and Records Office prior to the deadline as stated in the Academic Calendar.

II. WEB DEVELOPMENT

This degree program equips students with the essential coding, programming, and design skills needed to build websites and applications for desktop and mobile platforms. Students gain practical experience using state of the art web development technology to prepare for entry-level positions as web developers. The curriculum is continually updated to respond to rapidly changing industry trends.

Program Learning Outcomes

Upon successful completion of this program, students will be able to:

- Write valid HTML and CSS code to create web content, structure and presentation.
- Code and debug JavaScript and jQuery to develop interactive web pages.
- Code and debug PHP and MySQL to develop dynamic (database-integrated) web applications.
- Integrate industry-standard technologies and design principles to develop sites that are attractive, usable, and functional on multiple platforms and devices, including mobile devices.

Associate in Science Degree Requirements:

Course	Title	Units
CIS 140	Databases	3
CIS 211	Web Development I	3
CIS 213	Web Development II	3
CIS 215	JavaScript Web Programming	3
CIS 218	Introduction to Web Programming	3
CIS 219	PHP/MySQL Dynamic Web-Based Applications	3
GD 105	Fundamentals of Digital Media	3
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Select one of the following:

CIS 225	Web Development Capstone	3
CIS 267	Directed Work Experience in CIS	1-4
		1-4

Select two of the following:

CIS 191	Linux Operating System	3
CS 119	Program Design and Development	3
and		
CS 119L	Program Design and Development Lab	1
CS 182	Introduction to Java Programming	4
GD 126	Photoshop Digital Imaging	3
GD 130	Professional Business Practices	3
GD 217	Web Graphics	3
GD 222	Web Animation	3
		6-8
	Total Required	28-33
	Plus General Education Requirements	

Certificate of Achievement

Students who complete only the major requirements above qualify for a Certificate in Web Development. An official request must be filed with the Admissions and Records Office prior to the deadline as stated in the Academic Calendar.

CERTIFICATES OF SPECIALIZATION:

These certificates offer specific training for either entry-level positions or to augment related programs such as Computer Network Administration, Web Development, Business Office Technology or Graphic Design. The certificates are designed to demonstrate a relatively narrow expertise or skill area that may be used to attain a computer industry "niche" job.

Students who complete the requirements below qualify for a certificate in that area of emphasis. An official request must be filed with the Admissions and Records Office prior to the deadline as stated in the Academic Calendar.

I. CISCO CERTIFIED NETWORK ASSOCIATE

Certificate Learning Outcomes

Upon successful completion of this certificate, students will be able to:

- Describe the operational characteristics and troubleshooting techniques for: the OSI and TCP/IP networking models; general LAN design; network routers, switches, and wireless routers; the RIP, EIGRP, and OSPF interior gateway protocols (IGP); network switching principles including VLANs, inter-VLAN routing, VTP, STP and security; the HDLC, PPP and Frame-Relay WAN protocols; network security using Access Control Lists (ACL); NAT; and DHCP.
- Plan and design basic network topologies including switches and routers in a multiprotocol internetwork using LAN and WAN interfaces, networking addressing techniques, and terminology.
- Configure, test, and troubleshoot network topologies consisting of routers, switches, wireless routers, and PCs using: the Cisco IOS CLI; ip addressing; interior gateway protocols; HDLC, PPP and Frame-Relay WAN protocols; VLANs; NAT; DHCP; router and switch security techniques.

Certificate Requirements:

Course	Title	Units
CIS 201	Cisco Networking Academy I Exploration	3
CIS 202	Cisco Networking Academy II	3
CIS 203	Cisco Networking Academy III	3
CIS 204	Cisco Networking Academy IV	3
CIS 209	Cisco Networking Academy IX	3
	Total Required	15

II. CISCO NETWORK PROFESSIONAL

Certificate Learning Outcomes

Upon successful completion of this certificate, students will be able to:

- Describe advanced routing, switching, and troubleshooting concepts for complex enterprise networks including; enterprise network design, development, and maintenance; advanced routing protocols; VPN technologies; IPv6 ; advanced VLAN topologies; high availability and redundancy protocols; and LAN security protocols and techniques.
- Configure, diagnose, and troubleshoot complex enterprise router and switch networking solutions including: network performance; advanced routing protocols; VPNs; IPv6; advanced VLAN topologies; high availability and redundancy protocols; and LAN security.

Certificate Requirements:

Course	Title	Units
CIS 205	Cisco Networking Academy V	3
CIS 206	Cisco Networking Academy VI	3
CIS 207	Cisco Networking Academy VII	3
CIS 208	Cisco Networking Academy VIII	3
	Total Required	12

III. COMPUTER PROGRAMMING

Certificate Learning Outcomes

Upon successful completion of this certificate, students will be able to:

- Develop a software solution following the systems development life cycle (SDLC) including problem analysis, solution design, implementation, testing, evaluation and recommendation for improvement.
- Be proficient in at least one high-level programming language and an ability to use that language to implement software solutions in a variety of settings following the SDLC.
- Recognize the need to maintain currency with software industry changes in the computing profession.

Certificate Requirements:

Course	Title	Units
CS 119	Program Design and Development	3
CS 119L	Program Design and Development Lab	1
CS 181	Introduction to C++ Programming	4
or		
CS 182	Introduction to Java Programming	4
CS 281	Intermediate C++ Programming and Fundamental Data Structures	4
or		
CS 282	Intermediate Java Programming and Fundamental Data Structures	4
	Total Required	12

IV. COMPUTER SUPPORT TECHNICIAN

Certificate Learning Outcomes

Upon successful completion of this certificate, students will be able to:

- Describe and demonstrate the ability to install, configure, upgrade, diagnose and troubleshoot a personal computer and its associated networking hardware and system software.

Certificate Requirements:

Course	Title	Units
CIS 120	Computer Maintenance and A+ Certification	3
CIS 121	Network Cabling Systems	3
CIS 125	Network+ Certification	3
CIS 190	Windows Operating System	3
CIS 191	Linux Operating System	3
	Total Required	15

V. WEB DESIGN

Certificate Learning Outcomes

Upon successful completion of this certificate, students will be able to:

- Write valid HTML and CSS code to create web content, structure and presentation.
- Integrate industry-standard technologies and design principles to develop sites that are attractive, usable, and functional on multiple platforms and devices, including mobile devices.

Certificate Requirements:

Course	Title	Units
CIS 211	Web Development I	3
CIS 213	Web Development II	3
CIS 225	Web Development Capstone	3
GD 126	Photoshop Digital Imaging	3
GD 217	Web Graphics	3
	Total Required	15

VI. WEB PROGRAMMING

Certificate Learning Outcomes

Upon successful completion of this certificate, students will be able to:

- Write valid HTML and CSS code to create web content, structure and presentation.
- Code and debug JavaScript and jQuery to develop interactive web pages.
- Code and debug PHP and MySQL to develop dynamic (database-integrated) web applications.

Certificate Requirements:

Course	Title	Units
CIS 211	Web Development I	3
CIS 213	Web Development II	3
CIS 215	JavaScript Web Programming	3
CIS 218	Introduction to Web Programming	3
CIS 219	PHP/MySQL Dynamic Web-Based Applications	3
	Total Required	15