

COMPUTER INFORMATION SYSTEMS

Sylvania Campus
 Technology Classroom Building (TCB), Room 312
 971-722-4287 or 971-722-4393

www.pcc.edu/programs/computer-info/

CAREER AND PROGRAM DESCRIPTION

Computer Information Systems are the lifeblood of the 21st century. The mainstream languages, tools, technologies and techniques used in your training will allow you to pursue careers in either the computer networking or information software fields. On the networking side, computer configuration, network installation, network systems administration, security, forensics and wireless networking are some of your choices. On the software side, your career choices include all phases of application development, database programming, software quality assurance, Health Informatics and project management on both desktop and World Wide Web platforms.

Computer Information Systems AAS Degree: This degree prepares students for computer information systems related careers. Students will take classes in the CIS Department that include software analysis, design, programming (in two or more languages), database modeling, Windows or Unix operating systems, data communications and an extensive selection of electives. (In order to follow the recommended sequence of courses, students should be ready to enter WR 121 and MTH 95.)

CIS: Network Administration AAS Degree: This degree prepares students for computer networking related careers. Students will take classes in the CIS Department including data communications, Windows and Linux network administration, network security and an extensive selection of electives. Students earning this degree will be well on their way to several network administration certifications from Microsoft and Comp TIA. (In order to follow the recommended sequence of courses, students should be ready to enter WR 121 and MTH 95.)

Computer Information Systems One-Year Certificate: This certificate provides students with a foundation in computer information systems concepts. Students seeking this certificate often have various primary roles in their organizations and are taking on additional responsibilities involving information systems. All required courses in this program apply toward the credits needed to obtain an AAS degree in Computer Information Systems or CIS Network Administration. (In order to follow the recommended sequence of courses, students should be ready to enter WR 121 and MTH 60.)

Computer Information Systems: E-Commerce One-Year Certificate: This certificate prepares students for careers in Internet based commerce including web server administrator, webmaster, E-Commerce manager, help desk/user support specialist, web technologist and web developer. Specialists in these positions, with both a business and technical perspective, will be able to resolve multitier E-Commerce issues involving connectivity, security and scalability. Students must have a strong CIS background before beginning this certificate. This may be accomplished by obtaining a CIS AAS degree or by equivalent industry experience. In order to follow the recommended sequence of courses, students should be ready to enter WR 227 (professional and technical writing) and MTH 60.

Readiness for all Computer Information System degrees and certificates can be demonstrated through the math placement test and documented previous college level work for the WR 121 requirement. Those students with insufficient background to enter at this level may need to extend the time it takes to complete the program. CIS Department advisors will provide information regarding options to those students who may need to take preparatory course work.

DEGREES AND CERTIFICATES OFFERED

Associate of Applied Science Degree

- Computer Information Systems
- Computer Information Systems:
 - Network Administration Option
 - Health Informatics

One-Year Certificate

- Computer Information Systems
- Computer Information Systems: E-Commerce

Less than One-Year Certificate: Career Pathway

- Windows Network Security
- Linux/Unix Network Security
- Network Administration
- Microsoft Server Administration
- Linux Server Administration
- Web Application Development
- Oracle and SQL
- Java Application Programming
- Database Design and SQL
- VB.Net Application Programming

COMPUTER INFORMATION SYSTEMS AAS DEGREE

Minimum 94 credits. Students must also meet Associate Degree Comprehensive Requirements and Associate of Applied Science Requirements. Students must complete a total of sixteen credits of General Education. Some courses specified within the program may be used as General Education. Students should consult with program advisors for course planning.

Computer Information Systems Degree Credit Summary

CIS Program Electives	36
CIS	32
CIS Programming Electives	8
Remaining General Education	8
CIS Program Business Electives	6
WR	4
	Credit Total 94

Computer Information Systems Courses

CIS	120	Computer Concepts I*	4
CIS	121	Computer Concepts II*	4
CIS	122	Software Design*	4
CIS	140M	Operating Systems I: Microsoft	4
		or	
CS	140U	Introduction to UNIX	(4)
CIS	179	Data Communication Concepts I	4
CIS	244	Systems Analysis	4
CIS	275	Data Modeling and SQL Introduction	4
WR	121	English Composition	4

WR 122	English Composition	4	CIS 280D	CE: Application Development	varied
or			CIS 284	Network Security	4
WR 227	Technical and Professional Writing I	(4)	CIS 286	Computer Forensics	4
CIS Program Electives ¹		36	CIS 287I	Web Server Administration	4
CIS Programming Electives ²		8	CIS 287M	Microsoft Server Security	4
Remaining General Education		8	CIS 288M	Microsoft Network Administration	4
CIS Program Business Electives ³		6*	CIS 289M	Microsoft Active Directory Administration	4

*Could be used as General Education

¹CIS Program Electives - 36 credit hours total, 20 credits must be at the 200 level.

²For the Computer Information Systems AAS Degree, eight credits of Programming electives must be a two-term sequence from the Programming Elective List.

³Choose from the CIS Program Business Electives List.

NETWORK ADMINISTRATION AAS DEGREE

Minimum 94 credits. Students must also meet Associate Degree Comprehensive Requirements and Associate of Applied Science Requirements. Students must complete a total of sixteen credits of General Education. Some courses specified within the program may be used as General Education. Students should consult with program advisors for course planning.

Network Administration Degree Credit Summary

Network Admin Degree Electives	36
CIS	28
Remaining General Education	8
WR	8
CIS Program Business Electives	6
CIS Programming Electives	4
CS	4
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Credit Total	94

Network Administration Degree Courses

CIS 120	Computer Concepts I*	4
CIS 121	Computer Concepts II*	4
CIS 122	Software Design*	4
CIS 140M	Operating Systems I: Microsoft	4
CIS 145	Microcomputer Hardware and Troubleshooting	4
CIS 179	Data Communication Concepts I	4
CIS 244	Systems Analysis	4
CS 140U	Introduction to UNIX	4
WR 121	English Composition	4
WR 122	English Composition	4
or		
WR 227	Technical and Professional Writing I	(4)
Network Administration Degree Electives ¹		36
Remaining General Education		8
CIS Program Business Electives ²		6
CIS Programming Electives ¹		4

*Could be used as General Education

¹Network Administration Electives - 36 credit hours total, 20 credits must be at the 200 level.

²Choose from the CIS Program Business Electives List.

Computer Information Systems

Network Administration Degree Electives

CIS 178	Applied Internet Concepts	4
CIS 187I	Web Technical Administration	4
CIS 188	Introduction to Wireless Networking	4
CIS 189	Wireless Security	4
CIS 240L	Linux Installation and Configuration	4
CIS 240M	Managing a Windows Server Environment	4
CIS 278	Data Communications Concepts II	4
CIS 279L	Linux Network Administration	4

HEALTH INFORMATICS AAS DEGREE

Minimum 96 credits. Students must also meet Associate Degree Comprehensive Requirements and Associate of Applied Science Requirements. Students must complete a total of sixteen credits of General Education. Some courses specified within the program may be used as General Education. Students should consult with program advisors for course planning.

Health Informatics Degree Credit Summary

CIS	28
Health Informatics Degree Electives	17
Remaining General Education ¹	16
HIM	14
CIS/CS	12
BA	7
MP	2
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Credit Total	96

Health Informatics Courses

BA 205	Solving Communication Problems with Technology	4
BA 211	Principles of Accounting I	3
CIS 122	Software Design* ¹	4
or		
CIS 133B	Introduction to Visual Basic.Net Programming	(4)
or		
CIS 133J	Java Programming I	(4)
or		
CS 161	Computer Science I* ¹	(4)
CIS 125D	Database Application Development I	4
CIS 135T	XML and HL7	4
or		
CIS 233B	Intermediate Visual Basic.Net Programming	(4)
or		
CIS 233J	Java Programming II	(4)
or		
CS 162	Computer Science II* ¹	(4)
CIS 140M	Operating Systems I: Microsoft	4
or		
CS 140U	Introduction to UNIX	(4)
CIS 179	Data Communication Concepts I	4
CIS 244	Systems Analysis	4
CIS 245	Project Management-Information System	4
CIS 275	Data Modeling & SQL Introduction	4
CIS 276	Advanced SQL	4
CIS 280D	CE: Application Development	4
or		
CIS 277H	Health Informatics Environment Simulation	(4)
HIM 110	Health Information Technology	4
HIM 182	Health Care Delivery Systems	3
HIM 283	Health Information Systems	4
HIM 285	Healthcare Financing & Compliance	3

MP	109	Basic Medical Terminology	2
Health Informatics Electives			17
Remaining General Education			8

*Could be used as General Education

¹ If used as General Education, an additional eight credits of electives must be taken to meet minimum degree requirements.

Health Informatics Degree Electives

BA	224	Human Resource Management	3
BA	255	Project Management- Business Environments	4
BI	112	Cell Biology for Health Occupations*	5
BI	121	Introduction to Human Anatomy & Physiology I*	4
BI	122	Introduction to Human Anatomy & Physiology II*	4
BI	231	Human Anatomy & Physiology I*	4
BI	232	Human Anatomy & Physiology II*	4
BI	233	Human Anatomy & Physiology III*	4
CS	140U	Introduction to UNIX	4
CIS	140M	Operating Systems I: Microsoft	4
CIS	145	Microcomputer Hardware and Troubleshooting	4
CIS	188	Introduction to Wireless Networking	4
CIS	189	Wireless Security	4
CIS	225	End User Support	4
CIS	240L	Linux Installation & Configuration	4
CIS	240M	Managing a Windows Server Environment	4
CIS	277D	Database Security	4
CIS	277O	Advanced Database Concepts in Oracle	4
CIS	277T	Web Business Intelligence Development	4
CIS	278	Data Communications Concepts II	4
CIS	279L	Linux Network Administration	4
CIS	284	Network Security	4
CIS	288M	Microsoft Network Administration	4
CIS	289M	Microsoft Active Directory Administration	4
HIM	271	Quality Improvement In Healthcare	3
HIM	274	Quality Improvement in Healthcare-Lab	1
HIM	281	Data Management & Analysis I	3
HIM	286	Data Management & Analysis I-Lab	2
MP	110	Basic Medical Terminology II	2
MP	111	Medical Terminology	4
MSD	279	Project Management-Intro	4
OS	220	Business Editing Skills	4
WR	122	English Composition	4
WR	227	Technical & Professional Writing I	4

COMPUTER INFORMATION SYSTEMS ONE-YEAR CERTIFICATE

Minimum 46 credits. Students must meet all certificate requirements.

Computer Information Systems Certificate Credit Summary

CIS	12
CIS Program Electives	12
WR	8
CIS/CIS	4
PSY	4
CAS/DRF/CIS Program Elective	3
CIS Program Business Electives	3
Credit Total 46	

Computer Information Systems Certificate Courses

CIS	120	Computer Concepts I	4
CIS	121	Computer Concepts II	4
CIS	122	Software Design	4
CIS	140M	Operating Systems I: Microsoft	4
or			
CS	140U	Introduction to UNIX	(4)
PSY	201	Introduction to Psychology - Part I	4
WR	121	English Composition	4
WR	227	Technical and Professional Writing I	4
CAS	216	Beginning Word	3
or			
CIS Program Electives ¹			(4)
or			
DRF	126	Introduction to AutoCAD	(3)
CIS Program Electives ¹			12
CIS Program Business Electives ²			3

¹See the Computer Information Systems Program Electives List

²Choose from CIS Program Business Electives List

Optional cooperative education work experience placements are available. For more information, see a CIS Department advisor.

E-COMMERCE ONE-YEAR CERTIFICATE

Minimum 48 credits. Students must meet all certificate requirements.

E-commerce Certificate Credit Summary

Track A Design and Development

Track A Electives	20
CIS	17
PSY	4
WR	4
CIS E-Com Business Electives	3
Credit Total 48	

E-Commerce Track A Courses

CIS	225	End User Support	4
CIS	243	E-ssentials of E-Commerce Info Systems	4
CIS	244	Systems Analysis	4
CIS	275	Data Modeling and SQL Introduction	4
CIS	280D	CE: Application Development	1
PSY	201	Introduction to Psychology	4
WR	227	Technical and Professional Writing I	4
E-Commerce Business Electives			3
Track A	Design and Development Electives		20

Track A: Design and Development Electives

CAS	110	Introduction to Web Graphics Using Fireworks ¹	1
CAS	175	Introduction to Flash ¹	3
CAS	211D	Intermediate Dreamweaver ¹	3
CAS	213	Enhancing Web Pages with Javascript ¹	4
CIS	233B	Intermediate VB.NET	4
CIS	233J	Java Programming II	4
CIS	233S	Internet Web Page Scripting	4
CIS	234B	Advanced VB.NET Programming	4
CIS	234J	Java Programming III	4
CIS	234S	Web Application Development Using .NET	4
CIS	276	Advanced SQL	4
CIS	277D	Database Security	4
CIS	277O	Advanced Database Concepts – Oracle	4
CIS	277T	Web Business Intelligence Development	4

CIS	280D	CE: Application Development	1
MM	130	MM Graphics Video & Audio Production ¹	3
MM	230	Graphics for Multimedia ¹	4

¹Note: Maximum of eight credits will apply.

E-commerce Certificate Credit Summary

Track B Administrative

Track B Electives	20
CIS	17
PSY	4
WR	4
E-Com Business Electives	3
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Credit Total	48

CIS:E-Commerce Track B Courses

CIS	225	End User Support	4
CIS	243	E-ssentials of E-Commerce Info Systems	4
CIS	244	Systems Analysis	4
CIS	275	Data Modeling and SQL	4
CIS	280D	CE: Application Development	1
PSY	201	Intro to Psychology	4
WR	227	Technical and Professional Writing I	4
E-Commerce Business Electives			3
Track B	Administration Electives		20

Track B: Administration Electives

CAS	225	Introduction to PHP	4
CAS	275	Intermediate Flash	3
CIS	179	Data Communication Concepts I	4
CIS	240L	Linux Installation and Configuration	4
CIS	240M	Managing a Windows Server Environment	4
CIS	279L	Linux Network Administration	4
CIS	280D	CE: Application Development	1
CIS	2871	Web Server Administration	4
CIS	288M	Microsoft Network Administration	4
CIS	289M	Microsoft Active Directory Administration	4

E-Commerce Business Electives

BA	203	Intro to International Business	3
BA	206	Management Fundamentals	3
BA	223	Principles of Marketing	3
BA	226	Business Law I	4

COMPUTER INFORMATION SYSTEMS: CAREER PATHWAY CERTIFICATES

DATABASE DESIGN AND SQL: CAREER PATHWAY CERTIFICATE

Minimum 12 credits. The Database Design and SQL Certificate is a Career Pathway. All courses are contained in the Computer Information Systems AAS Degree.

CIS	125D	Database Application Development	4
CIS	275	Data Modeling and SQL Introduction	4
CIS	276	Advanced SQL	4

MICROSOFT SERVER ADMINISTRATION: CAREER PATHWAY CERTIFICATE

Minimum 24 credits. The Microsoft Server Administration Certificate is a Career Pathway. All courses are contained in the Network Administration AAS Degrees.

CIS	140M	Operating Systems I: Microsoft	4
CIS	179	Data Communication Concepts I	4
CIS	240M	Managing a Windows Server Environment	4
CIS	287M	Microsoft Server Security	4
CIS	288M	Microsoft Network Administration	4
CIS	289M	Microsoft Active Directory Administration	4

LINUX/UNIX SERVER NETWORK SECURITY: CAREER PATHWAY CERTIFICATE

Minimum 28 credits. The Linux/Unix Server Administration Certificate is a Career Pathway. All courses are contained in the Network Administration AAS Degree.

CIS	179	Data Communication Concepts I	4
CIS	189	Wireless Security	4
CIS	240L	Linux Installation and Configuration	4
CIS	279L	Linux Network Administration	4
CIS	284	Network Security	4
CIS	286	Computer Forensics	4
CS	140U	Introduction to UNIX	4

WINDOWS NETWORK SECURITY: CAREER PATHWAY CERTIFICATE

Minimum 36 credits. The Windows Network Security Certificate is a Career Pathway. All courses are contained in the Network Administration AAS Degree.

CIS	140M	Operating Systems I: Microsoft	4
CIS	179	Data Communication Concepts I	4
CIS	189	Wireless Security	4
CIS	240M	Managing a Windows Server Environment	4
CIS	284	Network Security	4
CIS	286	Computer Forensics	4
CIS	287M	Microsoft Server Security	4
CIS	288M	Microsoft Network Administration	4
CIS	289M	Microsoft Active Directory Administration	4

JAVA APPLICATION PROGRAMMING: CAREER PATHWAY CERTIFICATE

Minimum 16 credits. The Java Application Programming Certificate is a Career Pathway. All courses are contained in the Computer Information Systems AAS Degree.

CIS	122	Software Design	4
CIS	133J	Java Programming I	4
CIS	233J	Java Programming II	4
CIS	234J	Java Programming III	4

**NETWORK ADMINISTRATION:
CAREER PATHWAY CERTIFICATE**

Minimum 16 credits. The Network Administration Certificate is a Career Pathway. All courses are contained in the Network Administration AAS Degree.

CIS	179	Data Communication Concepts I	4
CIS	188	Introduction to Wireless Networking	4
CIS	189	Wireless Security	4
CIS	278	Data Communication Concepts II	4

**VB.NET APPLICATION PROGRAMMING:
CAREER PATHWAY CERTIFICATE**

Minimum 16 credits. The VB.Net Application Programming Certificate is a Career Pathway. All courses are contained in the Computer Information Systems AAS Degree.

CIS	122	Software Design	4
CIS	133B	Introduction to Visual Basic.NET Programming	4
CIS	233B	Intermediate Visual Basic.NET Programming	4
CIS	234B	Advanced Visual Basic.NET Programming	4

**LINUX SERVER ADMINISTRATION:
CAREER PATHWAY CERTIFICATE**

Minimum 16 credits. The Linux Server Administration Certificate is a Career Pathway. All courses are contained in the Network Administration AAS Degree.

CIS	179	Data Communication Concepts I	4
CIS	240L	Linux Installation and Configuration	4
CIS	279L	Linux Network Administration	4
CS	140U	Introduction to UNIX	4

**ORACLE AND SQL:
CAREER PATHWAY CERTIFICATE**

Minimum 12 credits. The Oracle and SQL Certificate is a Career Pathway. All courses are contained in the Computer Information Systems AAS Degree.

CIS	276	Advanced SQL	4
CIS	277O	Advanced Database Concepts – Oracle	4
CIS	277T	Web Business Intelligence Development	4

**WEB APPLICATION DEVELOPMENT:
CAREER PATHWAY CERTIFICATE**

Minimum 16 credits. The Web Application Development Certificate is a Career Pathway. All courses are contained in the Computer Information Systems AAS Degree.

CIS	195P	PHP Web Development I	4
CIS	233S	Internet Web Page Scripting	4
CIS	234S	Web Application Development Using .NET	4
CIS	295P	PHP Web Development II	4

Computer Information Systems Programming Electives

CS 161 and CS 162 Computer Science sequence	8
CIS 133B and CIS 233B Visual Basic.NET sequence	8
CIS 133J and CIS 233J JAVA Programming sequence	8

Computer Information Systems Program Electives

CIS	125D	Database Application Development I	4
CIS	133B	Introduction to Visual Basic.NET Programming	4
CIS	133J	Java Programming I	4
CIS	135T	XML and HL7	4
CIS	140M	Operating Systems I: Microsoft	4
CIS	140S	PerlScript Programming	1
CIS	145	Microcomputer Hardware and Troubleshooting	4
CIS	178	Applied Internet Concepts	4
CIS	179	Data Communication Concepts I	4
CIS	185	Computer and Ethics	3
CIS	187I	Web Technical Administration	4
CIS	188	Introduction to Wireless Networking	4
CIS	189	Wireless Security	4
CIS	195P	PHP Web Development I	4
CIS	225	End User Support	4
CIS	233B	Intermediate Visual Basic.NET Programming	4
CIS	233J	Java Programming II	4
CIS	233S	Internet Web Page Scripting	4
CIS	234B	Advanced Visual Basic.NET Programming	4
CIS	234J	Java Programming III	4
CIS	234N	C# Programming	4
CIS	234S	Web Application Development Using .NET	4
CIS	240L	Linux Installation and Configuration	4
CIS	240M	Managing a Windows Server Environment	4
CIS	243	E-essentials of E-Commerce Information Systems	4
CIS	244	Systems Analysis	4
CIS	245	Project Management-Information Systems	4
CIS	246	Structured Systems Design	4
CIS	275	Data Modeling and SQL Introduction	4
CIS	276	Advanced SQL	4
CIS	277D	Database Security	4
CIS	277O	Advanced Database Concepts in Oracle	4
CIS	277T	Web Business Intelligence Development	4
CIS	278	Data Communication Concepts II	4
CIS	279L	Linux Network Administration	4
CIS	280D	CE: Application Development ¹	4
CIS	284	Network Security	4
CIS	286	Computer Forensics	4
CIS	287I	Web Server Administration	4
CIS	288M	Microsoft Network Administration	4
CIS	289M	Microsoft Active Directory Administration	4
CIS	295P	PHP Web Development II	4
CS	133U	Introduction to C	4
CS	140U	Introduction to UNIX	4
CS	160	Exploring Computer Science*	4
CS	161	Computer Science I*	4
CS	162	Computer Science II*	4
CS	201	Computer Systems	4
CS	260	Data Structures	4
CS	261	Programming Systems	4
EET	178	PC Architecture for Technicians	4

**Could be used as General Education*

¹A maximum of four CIS 280D credits can be applied toward the CIS degree. Additional credits, up to a maximum of eight, may be applied toward the degree, but must be approved by a CIS Department advisor.

Computer Information Systems Program Business Electives

BA	203	Introduction to International Business	3
BA	206	Management Fundamentals	3
BA	211	Principles of Accounting I	3
BA	212	Principles of Accounting II	3
BA	213	Principles of Accounting III	4
BA	215	Basic Cost Accounting	3
BA	222	Financial Management	3
BA	223	Principles of Marketing	3
BA	226	Business Law I	4
BA	227	Business Law II	3
BA	234	International Marketing	3
BA	240	Non-Profit Financial Management and Accounting	4
BA	242	Introduction to Investments	3
BA	244	Introduction to Records Management	3
BA	250	Small Business Management	3
BA	251	Office Management	3
EC	201	Principles of Economics: Microeconomics*	4
EC	202	Principles of Economics: Macroeconomics*	4
EC	203	Principles of Economics: Applications to Economic Issues*	4

* Could be used as General Education

COURSE DESCRIPTIONS

CIS 100 TEKnology - High Tech Career Exploration 4.00 Explores high tech careers including education, ethics, and work environment. Assess individual skills, abilities and attitudes. Presents high technology disciplines through class discussions, presentation by professionals, mentoring, and hands-on activities. Create a written plan to help them prepare for a career in high technology. Note: Not an elective toward a CIS degree or certificate. Audit available.

CIS 100A Technology-High Tech - Career Exploration I 2.00 Introduces high tech careers including education, ethics, and work environment. Assess individual skills, abilities and attitudes. Presents high technology disciplines through class discussions, presentation by professionals, mentoring, and hands-on activities. Explores a plan to help prepare for a career in high technology. English communication skills necessary. Note: This elective course will not count towards a CIS degree or certificate. A student cannot receive credit for both CIS 100 (A and B) and CIS 100. Audit available.

CIS 100B Technology - High Tech Career Exploration II 2.00 Continues high tech career exploration including education, ethics, and work environment. Assesses individual skills, abilities and attitudes. Presents high technology disciplines through class discussions, presentation by professionals, mentoring, and hands-on activities. Complete a written plan to help prepare for a career in high technology. English communication skills necessary. Recommended: CIS 100A. Note: This elective course will not count toward a CIS degree or certificate. A student cannot receive credit for both CIS 100 (A and B) and CIS 100. Audit available.

CIS 120 Computer Concepts I 4.00 Introduces computing fundamentals from the past into the future, utilizes key applications to solve practical problems, and explores the benefits and risks of living online. Designed for the student who is already computer literate with the MS Office applications, e-mail, and the Internet and focuses on applying this literacy to practical IT applications. Provides a foundation to pursue an IT pathway and helps prepare students for the IC3 certification. Prerequisites: WR 115, RD 115 and MTH 20 or equivalent placement test scores. Recommend: basic computer skills equivalent to CAS 133 or BA 131. Audit available.

CIS 121 Computer Concepts II 4.00 Evaluate, select and apply computer technology to solve practical problems. Use Internet technologies. Organize and display information using a database. Address ethical issues. Recommended: CIS 120 or equivalent. Prerequisites: WR 115, RD 115 and MTH 20 or equivalent placement test scores. Audit available.

CIS 122 Software Design 4.00 Illustrates the importance of software design as part of the software development life cycle. Prepares student to take programming courses, by giving examples of well-designed software projects. Student is expected to design small programming projects, and code the projects to prove the design. Basic logic constructs, modularity and an introduction to object design are included. Additional lab hours may be required. Recommended: CIS 120 or CAS 133 or BA 131. Prerequisites: WR 115, RD 115, and MTH 20 or equivalent placement test scores. Audit available.

CIS 125D Database Application Development I 4.00 Concepts of a client-based relational database management system (RDBMS) and application of such systems to the business environment. Topics include database management issues, database design, creating and maintaining databases, creating forms, queries and reports. Design, create and maintain a database system. Recommended: CIS 121 or instructor permission. Audit available.

CIS 133B Introduction to Visual Basic.NET Programming 4.00 Introduces design, implementation and testing of software using Visual Basic.NET. Structured design techniques emphasized throughout. Write and test a final Visual Basic.NET program that solves a business-oriented problem. Recommended: CIS 122; or instructor permission. Audit available.

CIS 133J Java Programming I 4.00 Introduces object-oriented and programming concepts from a software engineering and project oriented perspective. Includes collection processing, UML class diagrams, unit testing, Java API, program documentation, debugging, and use of an Integrated Development Environment. Recommended: Placement into WR 121 and CIS 122 or instructor permission. Audit available.

CIS 135D Database Application Development II (VBA) 4.00 Design, development and implementation of a complete database application using Visual Basic for Applications (VBA). Covers Access Object Model, user interfaces, object variables, ADO automation, databases on a server, and COM add-ins. Thorough documentation and structured programming techniques will be emphasized. Recommended: CIS 133B or CIS 125D or instructor permission. Audit available.

CIS 135T XML and HL7 4.00 Presents design and creation of basic XML documents, namespaces, validation of an XML document using DTDs (Document Type Definitions) and schemas, importing and including XML schema domain information, XML schema intrinsic and user-defined data types, and combining XML with XHTML and Cascading Style Sheets. Discusses the advantages and disadvantages of XML design formats of Flat Catalog, Russian Doll and Venetian Blind. Introduces HL7. Recommend: CIS122 or instructor permission. Audit available.

CIS 140D Operating System: Microcomputers 4.00 Provides the basic concepts of Linux and Windows operating systems. Includes basic operating system functions, file/folder management, disk partitioning and formatting, operating system and application installation, and system configuration. See www.pcc.edu/cis. Recommended: CIS 120 or instructor permission. Audit available.

CIS 140M Operating Systems I: Microsoft 4.00 A first course in Microsoft operating systems administration including installation, configuration, and management. Command line and GUI tools used to organize, manage and maintain the file system are covered. Additionally students are introduced to users, groups, printing, profiles policies and the registry. Recommended: CIS 120 Audit available.

CIS 140S Perl Script Programming 1.00 Prepares students to install and configure Perl on Linux; design, implement, and test Perl scripts; debug Perl scripts; and locate, read and integrate information from a variety of technical sources. Recommended: Experience writing shell scripts and using Unix regular expressions as covered in CS 140U or equivalent. Audit available.

CIS 145 Microcomputer Hardware and Troubleshooting 4.00 Students will learn to identify, remove, and install standard components of a PC style micro-computer, including motherboards, CPUs, RAM, hard drives, removable media drives and power supplies. Additional topics include BIOS, CMOS, the boot process, video displays, printers, and home networking. Audit available.

CIS 178 Applied Internet Concepts 4.00 Introduces the Internet from a user's perspective, with emphasis on productive, professional access. Topics include how to connect to the Internet, how to communicate with others, how to find and share information productively, as well as educational, business and social issues related to the Internet. Recommended: CIS 120 or instructor permission. Audit available.

CIS 179 Data Communication Concepts I 4.00 Provides basic concepts of data communications, networking and connectivity. Explores hardware, connectivity, signaling, addressing, network topologies, communication protocols, network designs, switching, management, TCP/IP protocols, security and standards with emphasis on the OSI reference model. Recommended: CIS 120 or instructor permission. Audit available.

CIS 185 Computers and Ethics 3.00 Discusses the ethical and social issues around the use of computer technology. Computer use has created unique ethical issues that are not addressed in traditional ethics. For computer professionals and even casual computer users, it's imperative not only to explore what we can do with computer technology, but our ethical responsibilities in using that technology. CIS 185 and PHL 185 cannot both be taken for credit. Recommended: CIS 120; or instructor permission and college-level reading and writing. Prerequisite: WR 121 or instructor permission. Audit available.

CIS 187I Web Technical Administration 4.00 Internet connections, file transfers, e-mail notifications, and security systems. Investigates web system logs, web content backup strategies, and issues of web user accessibility and web site performance. Linux and Windows server operating system installations, configuration, and management in a virtual environment will be required. Command line commands and GUI tools will be used to organize, manage, and maintain the file system and web server software. Recommended: CIS 121 and CIS 122 or instructor permission. Audit available.

CIS 188 Introduction to Wireless Networking 4.00 Introduces the student to wireless networking theory and its practical application. Explores a variety of current and emerging wireless Local, Metropolitan and Wide Area Networking technologies. Topics may include: WiFi (802.11a/b/g/n), Bluetooth, WiMAX (802.16), 3G Cellular, and others. Includes hands-on design of wireless networks and the configuration of wireless Access Points. Recommend: CIS 179. Audit available.

CIS 189 Wireless Security 4.00 Introduces the student to wireless security intrusion, policies, tools, and solutions. Recommend prior knowledge: CIS 179 and CIS 188 Wireless Networking. Audit available.

CIS 195P PHP Web Development I 4.00 Introduces student to the server-side scripting language, PHP, and its use in the development of Web sites. Topics include web server, PHP and MySQL database installation, scripting, techniques, database manipulation, user authentication, tracking and session management and e-Commerce techniques. Recommend: Completion of CIS 122 and CAS 213 or CIS 233S or equivalent experience; concurrent enrollment in CAS 206 and CIS 178 or equivalent experience. Audit available.

CIS 225 End User Support 4.00 Prepares computer professional for providing training and support to end users. Includes the roles and responsibilities of the end-user support person; characteristics of the adult learner; and strategies and techniques for developing instruction, teaching technical subject matter and providing ongoing technical support. Recommended: CIS 120, WR 227, and three additional CIS courses or instructor permission. Additional lab hours may be required. Audit available.

CIS 233B Intermediate Visual Basic.NET Programming 4.00 Continues Visual Basic.NET programming sequence utilizing arrays, sorting, relational database access and data structures. Structured design techniques emphasized throughout. Recommended: CIS 133B or instructor permission; CIS 275 or instructor permission. CIS 275 may be taken concurrently. Audit available.

CIS 233J Java Programming II 4.00 Continues object-oriented programming from a software engineering and project oriented perspective. Includes class design, coupling and cohesion, refactoring, inheritance, advanced collections, abstract classes, interfaces, introduction to GUI building, introduction to Java database connectivity, and error handling. Recommended: (CIS 133J or CS 161) and CIS 275; or instructor permission.

CIS 233S Internet Web Page Scripting 4.00 Provides the foundation to build real-world, browser independent, web applications using client-side technologies including HTML, DHTML, Cascading Stylesheets and Javascript. Although the primary focus is on W3C Standards, Internet Explorer and Netscape specific extensions are discussed. A functioning website is built using the content presented in the course. Recommended: Proficiency in a modern programming language (CIS 133B, 133J or CS 161); or instructor permission. Audit available.

CIS 234B Advanced Visual Basic.NET Programming 4.00 Continues the Visual Basic.NET Programming sequence utilizing relational database access, multiple document interface and software objects and classes. Structured design techniques emphasized throughout. Recommended: CIS 233B, 275; or instructor permission. Audit available.

CIS 234J Java Programming III 4.00 Learn to use Java/J2EE to build scalable n-tiered web applications. Covers servlets, JSP, JDBC database connectivity, Enterprise JavaBeans, and SOAP Web Services Technologies. Learn advanced Apache Tomcat web server configuration including how to secure web resources, authenticate users and mask URLs. Recommended: CIS 233J or instructor permission. Audit available.

CIS 234N C# Programming 4.00 Presents an accelerated introduction to object-oriented programming in C# focusing on language features supported by .NET frameworks using the Visual Studio IDE and NUnit. Includes design, code and test projects involving namespaces; simple, abstract anonymous and partial classes; structures, enums and interfaces; delegates and events; exceptions; class, instance and anonymous methods, properties and indexers; LINQ, streams, generic collections, ADO databases, timers, and multithreading. Recommended: Experience with UML class diagrams, object-oriented concepts and a two-course sequence (or proficiency) in an object-oriented programming language. Audit available.

CIS 234S Web Application Development Using .NET 4.00 Provides the necessary knowledge to create real-world web applications using server-side technologies, including ASP.NET, VB.NET, and database access with ADO.NET. Although the primary focus is on the concepts, a business web-site is developed utilizing the presented material. Recommended: CIS 233S. Audit available.

CIS 240L Linux Installation and Configuration 4.00 Designed to prepare students for an entry-level position as an administrator of a system utilizing the Linux operating system. Focuses on knowledge and skills necessary for day-to-day operations on a Linux system using the command line. Recommended: CS 140U. Audit available.

CIS 240M Managing a Windows Server Environment 4.00 The first of a three-term sequence designed to prepare students for an entry-level position as a system administrator of a network utilizing Microsoft's Windows operating systems. The course focuses on the knowledge and skills necessary to design, install, configure and manage a workgroup or domain consisting of Microsoft Windows servers and workstations. Recommended: CIS 140M. Audit available.

CIS 243 E-ssentials of E-Commerce Information Systems 4.00 Encompasses the multi-faceted aspects of e-commerce information systems. Combines study of network, database and programming concepts with hands on skills. Provides a framework for the analysis of information system based e-commerce solutions to issues surrounding B2B, B2C, and intra-organizational trade. Provides a solid background in critical issues and technologies related to e-commerce. Recommended: CIS 120 and one programming class or instructor permission. Audit available.

CIS 244 Systems Analysis 4.00 Provides overview of the system development life cycle (SDLC) emphasizing analytical techniques to develop the correct definition of business problems and user requirements. Students will prepare a feasibility assessment and develop system requirements for an assigned project. Recommended: One class in a high-level programming language and WR 227. One 200-level business administration course. Additional lab hours may be required. Audit available.

CIS 245 Project Management - Information Systems 4.00 Study practical approaches for managing, planning, organizing and implementing Information Systems projects using modern management techniques. Complete hands-on projects requiring management of project resources, scope, time-line, cost, scheduling, human and other resources. Use Microsoft Project and other project monitoring tools. This course is one of the Project Management series that includes CAS 220, MSD 279, and BA 255. Project management is a broad term that can include many areas of business. Recommend: CIS 122, MSD 279, and CAS 220. Audit available.

CIS 246 Structured Systems Design 4.00 Provides overview of the system development life cycle (SDLC), emphasizing analytical techniques to develop a project from a previously prepared requirements document through a structured design to a final implementation. Students will prepare a formal design statement and implement the project in a computer language of their choice. Recommended: Two classes in a high-level programming language, CIS 233S, CIS 244 and CIS 275 or instructor permission. Audit available.

CIS 275 Data Modeling and SQL Introduction 4.00 Introduces the design, uses, and terminology of a database management system. Includes data modeling using Entity Relationship modeling tools and Semantic Object modeling tools, normalization rules, relational database terminology, program/query development, multi-user database issues (including the Internet) and data administration. Recommended: CIS 122. One high-level programming language course (CIS 133B, CIS 133J, CS 161) or equivalent or instructor permission. Audit available.

CIS 276 Advanced SQL 4.00 Focuses on design, development and implementation of SQL programming for all types of relational database applications including client/server and Internet databases. Learn to write complicated interactive and embedded SQL statement and learn the implications of multi-user database applications. Recommended: CIS 275; two-term programming language sequence; or instructor permission. Audit available.

CIS 277D Database Security 4.00 Covers all aspects of securing a database. Uses Oracle database security to explain concepts in an relational database. Topics covered include: the importance of a database policy, identification and authorization methods (including web applications), securing connection pools and proxy authorization, identity management and enterprise users, authorizations and auditing, fine-grained access control (including application contexts security, views, row-level security, virtual private database, Oracle label security and database encryption). Recommended: CIS 276. Additional lab hours may be required. Audit available.

CIS 277H Health Informatics Environment Simulation 4.00 Develop career objectives by solving projects in a simulated Health Informatics environment. Projects may include, but will not be limited to the following topics: data mining, work flow analysis, user interface evaluation, and other database, networking and programming applications. An overview of the Health Informatics degree will be covered. Prerequisite: CIS 135T, CIS 140M and CIS 275. Audit available.

CIS 277O Advanced Database Concepts in Oracle 4.00 Covers concepts with Oracle including PL/SQL programming concepts review. Includes design considerations for PL/SQL program units and packages. Advanced interface methods, features for PL/SQL, performance and tuning, and advanced features of Oracle supplied packages also covered. Recommended: CIS 276. Audit available.

CIS 277T Web Business Intelligence Application Development 4.00 Introduces fundamentals of Oracle Application Express 3.0, Web Application Development and Business Intelligence reporting using the newest ANSI 99 standard's features for SQL and DML. Covers fundamentals of Web Business Intelligence reporting and Web User Interface development. Recommend: CIS 276 or equivalent database experience. Audit available.

CIS 278 Data Communication Concepts II 4.00 Provides in-depth concepts of data communications, and networking. Explores network architectures, complex network designs and network hardware configuration. Includes a close look at network/telephone company interfaces. Work will principally be done in the laboratory. Students will have the opportunity to configure operating Cisco routers and other data communication equipment in order to build functional networks. Recommended: CIS 179. Audit available.

CIS 279L Linux Network Administration 4.00 First term of a sequence designed to prepare students for an entry-level position as a system administrator of a network utilizing the Linux network operating system. Networking, TCP/IP, DNS, DHCP, NFS and Samba are covered. Recommend: CIS 240L Audit available.

CIS 280D Cooperative Education: Application Development Develop career objectives by linking their course work with off-campus learning experiences in computer information systems of the public/private sector organizations. Department permission required.

CIS 284 Network Security 4.00 Preparation for an entry level position as a network administrator, the course focuses on the knowledge and skills necessary to maintain system security and to install, configure and maintain a local area network with common internet applications. Use of Open Source software and CompTIA's Security+ certification are emphasized. Recommended: CIS 240M; or CIS 279L. Audit available.

CIS 285 Security Tools 4.00 Prepares network administrators to apply information security concepts and Open Source applications to manage security in Windows and Linux/Unix information systems. Topics include analysis and management tools, firewalls and packet filters, port and vulnerability scanners, sniffers, intrusion detection, encryption, wireless and forensics. Recommended: CIS 284 Audit available.

CIS 286 Computer Forensics 4.00 Introduces computer security administrators to computer forensics. Topics include setup and use of an investigator's laboratory, computer investigations using digital evidence controls, processing crime and incident scenes, performing data acquisition, computer forensic analysis, e-mail investigations, image file recovery, investigative report writing, and expert witness testimony. Maps to the IACIS certification. Recommend: CIS 240L or CIS 240M Audit available.

CIS 287I Web Server Administration 4.00 Provides aspiring systems administrators with the knowledge and skill sets to install, configure, implement, and manage a web server. A variety of operating systems will be explored. Course does not cover publishing Web page content. Recommended: CIS 278 and either CIS 279M or CIS 279L. Audit available.

CIS 287M Microsoft Server Security 4.00 Prepares IT security professionals working in medium to large computing environments to implement authorization and authentication strategies, use certificates and certificate authorities, use Encrypting File System, create secure baselines, use Software Update Services enhance data transmission security, wireless network security, perimeter security and secure remote access. The primary focus will be Windows Server with some client content. Maps to Microsoft certification exam. Prerequisite: CIS 240M or instructor permission. Audit available.

CIS 288M Microsoft Network Administration 4.00 Second of a three-term sequence designed to prepare students for an entry-level position as a system administrator of a network utilizing Microsoft's network operating system. Focuses on the knowledge and skills necessary to design, install, configure, and administer a network infrastructure that uses Microsoft Windows Server products. Recommended: CIS 240M or instructor permission. CIS 289M may be taken concurrently. Audit available.

CIS 289M Microsoft Active Directory Administration 4.00 Third of a three-term sequence designed to prepare students for an entry-level position as a system administrator of a network utilizing Microsoft's network operating system. Focuses on the knowledge and skills necessary to design, install, configure, and administer an enterprise network using Microsoft Windows Active Directory. Also focuses on implementing Group Policies and understanding Group Policy tasks required to centrally manage users and computers. Recommended: CIS 240M, or instructor permission. CIS 288M may be taken concurrently. Audit available.

CIS 295P PHP Web Development II 4.00 Introduces the advanced capabilities and features of PHP for Web site development. Topics include using the object-oriented features of PHP, developing applications for security and portability, advanced features of MySQL, creating efficient applications by implementing business logic within the database itself using stored procedures and triggers. Recommend: Completion of CIS 195P and CIS 125D or equivalent experience; concurrent enrollment in CIS 275 or equivalent experience. Audit available.