

# Computer Information Systems

See “Computer Science” and “Computer Network Engineering and Electronics” sections for additional computer courses.

## Degrees, Certificates and Awards

Associate in Science Degree:

Computer Information Systems

Associate in Science Degree: Computer Information Systems—Emphasis in System Administration

Certificate of Achievement: PC Support and Network Management

Certificate of Achievement: Database Programming and Applications Development

Skills Competency Award: Help Desk and Desktop Support (Level I)

Skills Competency Award: Help Desk and Desktop Support (Level II)

Skills Competency Award: Web Server Administration

Skills Competency Award: Technical Writing

Skills Competency Award: Microsoft Office Development

Skills Competency Award: Microsoft Windows System Administration and Security

Skills Competency Award: Microsoft SQL Server Database Administration

Skills Competency Award: Information Technology Management

Skills Competency Award: Virtualization System Administration

Skills Competency Award: Mobile Device Administration

Skills Competency Award: Access SQL Professional

## Program Description

Computer Information Systems (CIS) provides students with a broad background in the application of computers to the emerging needs of business and industry. CIS courses prepare students for entry-level positions in computer programming, systems analysis,

computer operations and network management, information systems management, and sales and technical information positions.

Santa Barbara City College’s CIS Department offers comprehensive training in these program areas:

1. An occupational A.S. Degree, with a strong emphasis in both computer systems and business studies.
2. An occupational A.S. Degree, with a strong emphasis in system administration.
3. A transfer curriculum in preparation for a 4-year program in Management Information Systems (MIS) or CIS.
4. A Certificate program which provides marketable skills in PC hardware and software support, network management and systems administration.
5. A Certificate program which provides marketable skills in database programming and applications development.
6. A series of Skills Competency Awards in Help Desk and Desktop Support.
7. A Skills Competency Award in Web Server Administration.
8. A Skills Competency Award in Technical Writing.
9. A Skills Competency Award in Microsoft Office Development.
10. A Skills Competency Award in Microsoft Windows System Administration and Security.
11. A Skills Competency Award in Microsoft SQL Server Database Administration.
12. A Skills Competency Award in Information Technology Management.
13. A Skills Competency Award in Virtualization System Administration.
14. A Skills Competency Award in Mobile Device Administration.
15. A Skills Competency Award in Access SQL Professional

The CIS Department also provides introductory and microcomputer courses (electives) for students in programs campus-wide.

### Program Student Learning Outcomes

#### A.S. Degree: Computer Information Systems

1. Describe the role of and explain the value of operating systems, databases, programming and project management in IT.
2. Participate on an IT project team as a programmer, database designer, or system administrator.

#### A.S. Degree: Computer Information Systems - Emphasis in System Administration

1. Describe the role of and explains the value of operating systems, network technologies, and system administration in IT.
2. Participate on an IT team at multiple levels, from help desk specialist, to system administrator, to project leader on a system Implementation.
3. Select and implement appropriate operating system and network technologies for an organization or business enterprise.

#### Database Programming and Applications Development Certificate

1. Create programs that reflect the use of modular design and incorporate event-driven and object-oriented approaches.
2. Use database management systems to retrieve discrete and aggregate data from databases and to insert, update and delete discrete data.
3. Create and implement well-designed databases to reflect enterprise needs.
4. Develop business applications using well-structured programs, normalized databases and a multi-tier architecture.

#### PC Support and Network Management Certificate

1. Design, select and implement essential software, hardware and networking components to satisfy user needs in a business environment.
2. Install and administer desktop and server operating systems.
3. Communicate effectively with users to diagnose and resolve computer-related problems.

### Department Offices

*Division:* Business

Esther Frankel, *Chair* (BC-216, ext. 2224)

Diane Hollems, *Dean*

### Faculty and Offices

Esther Frankel (BC-216, ext. 2224)

### Requirements for A.S. Degree: Computer Information Systems

The Associate Degree will be awarded upon completion of both department *and* college requirements.

#### Department Requirements (24-26 units)

CIS 101 — Introduction to Computers and Information Systems.....	4
CIS/ENG 181 — Technical Writing.....	3
CIS 246 — Management of Information Technology.....	3
CIS 245 — IT Project Management.....	4
COMP 101 — Introduction to Computer Applications.....	4

*Select 6-8 units from the following:*

CIS 117 — Introduction to SQL.....	2
CIS 119 — Intro to Programming Using Visual Basic.....	4
CIS 201 — UNIX/Linux System Administration.....	4
CIS 206 — MS Windows Server System Administration.....	4
CIS 209 — Visual Basic.NET Programming.....	4
CIS 218 — MS Windows Desktop System Admin.....	4
CIS/MKT 220 — Introduction to E-Commerce.....	3
CIS 231 — SQL Server Design and Programming.....	4
CIS 234 — Oracle Design and Programming.....	4
CIS 237 — Advanced SQL Programming.....	2
+CIS 243 — Systems Analysis and Design.....	4
CIS 252 MySQL Design and Programming.....	4
CNEE 101 — Intro to Computer Network Technology.....	3

*+Students who completed CIS 240 are not required to complete CIS 243.*

*Optional*

CIS 290 — Work Experience in Comp Info Systems..... 1-4

*Recommended Institutional Requirements*

COMM 121 or 121H, or 131 or 131H

**Requirements for A.S. Degree: Computer Information Systems - Emphasis in System Administration**

The Associate Degree will be awarded upon completion of both department *and* college requirements.

**Department Requirements (30 units)**

CIS 101 — Introduction to Computers and Information Systems.....	4
CIS 114 — Virtualization Concepts .....	2
CIS/ENG 181 — Technical Writing .....	3
CIS 200 — Windows PowerShell .....	2
CIS 201 — UNIX/Linux System Administration <b>or</b>	
CIS 206 — MS Windows Server System Administration..	4
CIS 218 — MS Windows Desktop System Administration ..	4
CIS 245 — IT Project Management.....	4
CNEE 101 — Introduction to Computer Network Technology .....	3
COMP 101 — Introduction to Computer Applications .....	4

**College Requirements**

For complete information, see “Graduation Requirements” in the *Catalog* Index.

**Certificate of Achievement: PC Support and Network Management**

This Certificate program provides training in preparation for immediate employment in a variety of information systems positions in business, government and industrial settings. It provides skills needed for career entry and/or advancement in such positions as business applications specialist, PC network support technician and information systems/database specialist.

**Department Requirements (36-37 units)**

CIS 101 — Introduction to Computers and Information Systems.....	4
CIS 111 — Computer User Support .....	2
CIS 112 — Help Desk Concepts .....	2
CIS 114 — Virtualization Concepts .....	2
CIS 200 — Windows PowerShell .....	2

CIS 201 — UNIX/Linux System Administration <b>or</b>	
CIS 219 — VMware vSphere System Administration.....	3
CIS 206 — MS Windows Server System Administration.....	4
CIS 218 — MS Windows Desktop System Administration ..	4
CNEE 102 — Fundamentals of PC Support.....	3
CNEE 110 — Networking Essentials.....	3
CNEE 112 — Advanced Computer Support:	
A+ Practical Applications .....	3
COMP 101 — Introduction to Computer Applications .....	4

*Optional:*

CIS 290 — Work Experience in Comp Info Systems .....	1-4
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*Students must complete all department requirements for the certificate with a cumulative grade point average (GPA) of 2.0 or better.*

**Certificate of Achievement: Database Programming and Applications Development**

**Department Requirements 24 units)**

CIS 101 — Introduction to Computers and Information Systems.....	4
CIS 117 — Introduction to SQL .....	2
COMP 111 — Microsoft Access.....	4
Two courses from the following list:	
CIS 231 — SQL Server Design & Programming <b>or</b>	
CIS 234 — Oracle Design & Programming <b>or</b>	
CIS 252 — MySQL Design & Programming .....	8

*Plus six units from the following:*

CIS 232 — SQL Server Database Administration .....	4
CIS 235 — Oracle PL/SQL Programming .....	4
CIS 236 — Oracle Database Administration .....	4
CIS 237 — Advanced SQL Programming .....	2
CIS 251 — Advanced SQL Server Programming .....	4

*Students must complete all department requirements for the certificate with a cumulative grade point average (GPA) of 2.0 or better.*

**Skills Competency Award:  
Help Desk and Desktop Support (Level 1)**

**Department Requirements (12 units)**

CIS 101 — Intro to Computers and Info. Systems .....	4
CIS 111 — Computer User Support .....	2
CIS 112 — Help Desk Concepts .....	2
COMP 101 — Introduction to Computer Applications .....	4

*Students must complete the above courses with a grade of “C” or higher or credit in all courses.*

**Skills Competency Award:  
Help Desk and Desktop Support (Level 2)**

**Department Requirements (12 units)**

CIS 114 — Virtualization Concepts .....	2
CIS 218 — MS Windows Desktop System Administration ...	4
CNEE 102 — Fundamentals of PC Support.....	3
CNEE 112 — Advanced Computer Support: A+ Practical Applications .....	3

*Students must complete the above courses with a grade of “C” or higher or credit in all courses.*

**Skills Competency Award:  
Access SQL Professional**

**Department Requirements (10 units)**

CIS101 — Intro to Computers and Info. Systems .....	4
CIS 117 — Introduction to SQL .....	2
COMP 111 — Microsoft Access.....	4

*Students must complete the above courses with a grade of “C” or higher or credit in all courses*

**Skills Competency Award:  
Web Server Administration**

**Department Requirements (16 units)**

CIS 201 — UNIX/LINUX System Administration .....	4
CIS 206 — MS Windows Server System Administration.....	4
CIS 224 — Apache Web Server Administration .....	2
CNEE 110 — Networking Essentials.....	3
CS 111 — HTML and Webmastering.....	3

*Students must complete the above courses with a grade of “C” or higher or credit in all courses.*

**Skills Competency Award: Technical Writing  
Department Requirements (10 units)**

CIS 101 — Introduction to Computers and Information Systems.....	4
CIS 181/ENG 181 — Tech. and Professional Writing.....	3
GDP 111 — Graphic Design Basics .....	3

*Students must complete the above courses with a grade of “C” or higher or credit in all courses.*

**Skills Competency Award:  
Microsoft Office Development**

**Department Requirements (16 units)**

CIS 101 — Introduction to Computers and Information Systems.....	4
CIS 118/COMP 118 — Visual Basic for Applications Programming.....	4
COMP 109 — Microsoft Excel.....	4
COMP 111 — Microsoft Access.....	4

*Students must complete the above courses with a grade of “C” or higher or credit in all courses.*

**Skills Competency Award:  
Microsoft Windows System  
Administration and Security**

**Department Requirements (15 units)**

CIS 206 — MS Windows Server System Administration.....	4
CIS 221 — MS Windows Server Enterprise Administration ..	4
CNEE 206 — MS Windows Network Infrastructure.....	3
CIS 218 — MS Windows Desktop System Administration ...	4

*Students must complete the above courses with a grade of “C” or higher or credit in all courses.*

**Skills Competency Award: Microsoft  
SQL Server Database Administration**

**Department Requirements (12 units)**

CIS 206 — MS Windows Server System Administration.....	4
CIS 231 — SQL Server Design and Programming .....	4
CIS 232 — SQL Server Database Administration .....	4

*Students must complete the above courses with a grade of “C” or higher or credit in all courses.*

**Skills Competency Award:  
Information Technology Management**

**Department Requirements (13 units)**

BUS 101 — Introduction to Business *or*  
 MGMT 102 — Leadership in Organizations .....3  
 CIS 245 — Information Technology Project Management...4  
 CIS 246 — Management of Information Technology.....3  
 MGMT 101 — Introduction to Management .....3

*Students must complete the above courses with a grade of “C” or higher or credit in all courses.*

**Skills Competency Award: Virtualization System Administration**

**Department Requirements (16 units)**

CIS 114 — Virtualization Concepts .....2  
 CIS 201 — UNIX/Linux System Administration *or*  
 CIS 206 — MS Windows Server System Administration .....4  
 CIS 219 — VMware vSphere System Administration *or*  
 CIS 222 — MS Windows Server Virtualization Administration .....3  
 CIS 225 — Citrix XenApp Administration *or*  
 CIS 226 — Citrix XenDesktop Administration.....3  
 CNEE 110 — Networking Essentials.....3

*Students must complete the above courses with a grade of “C” or higher or credit in all courses.*

**Skills Competency Award:  
Mobile Device Administration**

**Department Requirements (14 units)**

CIS 206 — MS Windows Server System Administration.....4  
 CIS 213 — MS Exchange Server Administration .....3  
 CIS 217 — BlackBerry Enterprise Server System Admin.....3  
 CIS 218 — MS Windows Desktop System Administration ...4

*Students must complete the above courses with a grade of “C” or higher or credit in all courses.*

**Planning a Program of Study**

Students are advised to see a college counselor and a departmental instructor in planning a program of study. Factors to be considered in the plan . . .

1. Academic goals (i.e., occupational degree, transfer, or certificate programs).
2. Career and occupational goals (i.e., programmer, operations analyst, technical support, sales).

**Course Descriptions**

**CIS 101 — Introduction to Computers and Information Systems (4) — CSU, UC\***

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Hours: 72 lecture*

Introduction to the role of computer information systems within modern organizations. Topics include hardware and software functions, programming, systems development and networks. Students use computers for programming, as well as popular microcomputer applications such as word processing, spreadsheets and database management.

*(\*UC Transfer Limit: CIS 101 combined with CS 101: maximum credit, one course)*

**CIS 107 — Database Systems with SQLite (4) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 101*

*Hours: 72 lecture*

Introduction to relational database management concepts using SQLite. Includes database creation, manipulation, modification and reporting; queries using SQL and Query-by-Example (QBE); and database design and normalization.

**CIS 111 — Computer User Support (2) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 101*

*Hours: 36 lecture*

Computer user support methodologies; focus on understanding interpersonal skills required for user support.

**CIS 112 — Help Desk Concepts**

**(2) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 101*

*Hours: 36 lecture*

Introduction to computer help desk methodologies using the ITIL framework.

**CIS 114 — Virtualization Concepts**

**(2) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 218*

*Hours: 36 lecture*

Introduction to virtualization concepts, with an overview of virtualization products. Creation, configuration and management of virtual machines. Provides occupational preparation for information systems professionals, such as PC support personnel, computer programmers, network/systems managers and related technical and operations-administration personnel.

**CIS 117 — Introduction to SQL Programming**

**(2) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 101*

*Hours: 36 lecture*

Using SQL to retrieve, insert, update and delete information from relational databases. Creating row and aggregate functions, inner and outer joins, set operations, subqueries and parameter queries.

**CIS 118/COMP 118 — Visual Basic for Applications Programming**

**(4) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 101 and COMP 109 and 111*

*Hours: 72 lecture*

Customizing and automating Microsoft Office applications, using Visual Basic for Applications (VBA). Recommended for expert Office users and PC support personnel.

**CIS 119 — Introduction to Programming Using Visual Basic**

**(4) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 101*

*Hours: 72 lecture*

Programming concepts for students new to programming. Emphasizes generic techniques and theory, with a secondary emphasis on their implementation in Visual Basic. Covers flowcharting and pseudocode; algorithms and program structure; control structures (sequence, selection and iteration); objects, events and variables; modular design, sub-programs and functions; and file processing.

**CIS 133A/COMP 133A — Visual Basic for Applications: Word**

**(0.5)**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: COMP 132C*

*Hours: 9 lecture*

Automating Word applications, using Visual Basic for Applications programming.

**CIS 133B/COMP 133B — Visual Basic for Applications: Excel**

**(0.5)**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: COMP 134C*

*Hours: 9 lecture*

Automating Excel applications, using Visual Basic for Applications programming.

**CIS 133C/COMP 133C — Visual Basic for Applications: Access**

**(0.5)**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: COMP 135C*

*Hours: 9 lecture*

Automating Access applications, using Visual Basic for Applications programming.

**CIS 180/ENG 180 — Fundamentals of Technical Writing**

**(3) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Hours: 54 lecture*

Writing course designed to teach students the fundamentals of effective written communication in technical fields.

**CIS 181/ENG 181 — Technical and Professional Writing**

**(3) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Hours: 54 lecture*

Writing course designed to teach professional-level written communication in technical fields.

**CIS 200 — Windows PowerShell**

**(2) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 218*

*Hours: 36 lecture*

Automating system administration functions in Windows, using Windows PowerShell.

**CIS 201— UNIX/Linux System Administration**

**(4) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 218 or CS 130*

*Hours: 72 lecture*

Introduction to UNIX and Linux system administration. Occupational preparation for PC support personnel, programmers and network systems managers.

**CIS 206 — MS Windows Server System Administration**

**(4) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 218*

*Hours: 72 lecture*

Introduction to Microsoft Windows Server, with emphasis on system administration. Provides occupational preparation for information systems

professionals, such as PC support personnel, computer programmers, network/systems managers, and related technical and operations administration personnel.

**CIS 209 — Visual Basic.NET Programming**

**(4) — CSU, UC**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 119*

*Hours: 72 lecture*

Windows programming, using Visual Basic.NET forms, controls, menus, procedures, arrays and error-handling techniques. Accessing files and databases. Designed for students familiar with programming concepts, but little or no experience with Visual Basic.NET.

**CIS 213 — MS Exchange Server Administration**

**(3) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 206*

*Hours: 54 lecture*

Introduction to Microsoft Exchange Server, with emphasis on system administration. Provides occupational preparation for information systems professionals, such as PC support personnel, computer programmers, network/systems managers, and related technical and operations/administration personnel.

**CIS 217 — BlackBerry Enterprise Server System Administration**

**(3) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 213*

*Hours: 54 lecture*

Introduction to BlackBerry Enterprise Server system administration. Provides occupational preparation for information systems professionals, such as PC support personnel, network/systems managers and related technical operations-administration personnel.

**CIS 218 — MS Windows Desktop System Administration**

**(4) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 101*

*Hours: 72 lecture*

Introduction to Microsoft Windows desktop system administration. Provides occupational preparation for information systems professionals, such as PC support personnel, computer programmers, network/systems managers and related technical and operations-administration personnel.

### **CIS 219 — VMware vSphere System Administration**

#### **(3) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 114 and either 201 or 206*

*Hours: 54 lecture*

Introduction to VMware vSphere system administration. Provides occupational preparation for information systems professionals, such as PC support personnel, computer programmers, network/systems managers and related technical and operations administration personnel.

### **CIS 220/MKT 220 — Introduction to Electronic Commerce**

#### **(3) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: BUS 101 and COMP 103*

*Hours: 54 lecture*

Survey of electronic commerce and the use of the Internet to conduct business. Introduces such major components as marketing, communications, cyberlaw, operations and technical issues. Includes an interdisciplinary exploration of the issues, trends, opportunities and technologies which shape electronic commerce.

### **CIS 221 —MS Windows Server Enterprise System Administration**

#### **(4) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 206*

*Hours: 72 lecture*

Introduction to Microsoft Windows Server, with emphasis on enterprise system administration. Provides occupational preparation for information systems professionals, such as PC support personnel, computer programmers, network/systems managers, and related technical and operation administration personnel.

### **CIS 222 —MS Windows Server Virtualization Administration**

#### **(3) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 114 and 206*

*Hours: 54 lecture*

Introduction to configuration and administration of Microsoft Windows Server virtualization. Provides occupational preparation for information systems professionals, such as PC support personnel, computer programmers, network/systems managers, and technical and operations administration personnel.

### **CIS 223 — MS Sharepoint Server Administration**

#### **(3) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 206*

*Hours: 54 lecture*

Introduction to Microsoft Sharepoint Server, with emphasis on system administration. Provides occupational preparation for information systems professionals, such as PC support personnel, computer programmers, network/systems managers, and technical and operations administration personnel.

### **CIS 224 — Apache Web Server Administration**

#### **(2) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 201 or 206*

*Hours: 36 lecture*

Installing, configuring and trouble-shooting Apache Web Server on multi-platform environments.

### **CIS 225 — Citrix XenApp Administration**

#### **(3) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 114 and 206*

*Hours: 54 lecture*

Introduction to Citrix XenApp administration. Provides occupational preparation for information systems professionals, such as PC support personnel, computer programmers, network/systems managers and related technical and operations administration personnel.



**CIS 226 — Citrix XenDesktop Administration  
(3) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 114 and 206*

*Hours: 54 lecture*

Introduction to Citrix XenDesktop administration. Provides occupational preparation for information systems professionals, such as PC support personnel, computer programmers, network/systems managers and related technical and operations administration personnel.

**CIS 229 — Advanced Visual  
Basic .NET Programming**

**(4) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 209*

*Hours: 36 lecture*

Developing and distributing advanced Visual Basic.NET applications. Designed for individuals with experience in Visual Basic programming.

**CIS 230 — Active Server Pages  
Using Visual Basic**

**(4) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 117 or 107 and 119*

*Hours: 72 lecture*

Developing Internet and intranet business applications with Active Server Pages and Visual Basic. Accessing databases, managing enterprise data, implementing transaction processing, electronic commerce and Internet mail.

**CIS 231 — SQL Server Design and  
Programming**

**(4) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 117 or 107 and 119*

*Hours: 72 lecture*

Designing and implementing SQL Server databases. Programming in Transact-SQL. Designed for students and professionals seeking Microsoft certification.

**CIS 232 — SQL Server Database Administration  
(4) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 206 and 231*

*Hours: 72 lecture*

Administering, backing up and recovering SQL Server databases. Designed for students and professionals seeking Microsoft certification.

**CIS 234 — Oracle Design and Programming  
(4) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 117 or 107*

*Hours: 36 lecture*

Programming in SQL and creating basic PL/SQL procedures. Designed for students and professionals seeking Oracle certification.

**CIS 235 — Oracle PL/SQL Programming  
(4) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 234*

*Hours: 36 lecture*

Programming PL/SQL procedures, functions, triggers, packages and object types in Oracle's SQL \*Plus and Procedure Builder environments. Designed for students and professionals seeking Oracle certification.

**CIS 236 — Oracle Database Administration  
(4) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 234 and 201 or 206*

*Hours: 72 lecture*

Administering, backing up and recovering Oracle databases. Designed for students and professionals seeking Oracle certification.

**CIS 237 — Advanced SQL Programming  
(2) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 107 or 117*

*Hours: 36 lecture*

Using SQL to clean and consolidate data; perform correlated subqueries and hierarchical retrievals; write SQL queries; and access object-relational data, VARRAYs and nested tables.

**CIS 238 — Data Warehousing**

**(1.5) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 107 or 117*

*Hours: 24 lecture*

Using Microsoft SQL Server to create data warehouses and analyze warehoused data.

**CIS 243 — Systems Analysis and Design**

**(4) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 101*

*Hours: 72 lecture*

Analyzing and designing information systems. Information gathering, cost-benefit analysis, systems modeling techniques and prototyping. Designing databases, user interfaces and software.

**CIS 244 — UML for Business Processes**

**(2) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 107*

*Hours: 36 lecture*

Using Unified Modeling Language (UML) for systems analysis and design.

**CIS 245 — IT Project Management**

**(4) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 101*

*Hours: 72 lecture*

Introduction to information technology project management.

**CIS 246 — Management of Information Technology**

**(3) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 101*

*Hours: 54 lecture*

Introduction to the management of information technology.

**CIS 247 — Managing Information Systems for the Entrepreneur**

**(2) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Hours: 36 lecture*

Introduction to management of information technology for the entrepreneur.

**CIS 251 — Advanced SQL Server Programming**

**(4) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 231*

*Hours: 72 lecture*

SQL Server programming, using advanced features of Transact-SQL. Coding functions, procedures and triggers, using Common Language Runtime integration.

**CIS 252 — MySQL Design and Programming**

**(4) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*Course Advisories: CIS 107 or 117*

*Hours: 72 lecture*

Programming in SQL and creating basic procedures and functions in MySQL. Designed for students and professionals seeking MySQL certification.

**CIS 290 — Work Experience in Computer Information Systems**

**(1-4) — CSU**

*Skills Advisories: Eligibility for ENG 110 or 110H or 110GB*

*75 hours of work experience = 1 unit of credit*

*Hours: 60-300 lab*

Consists of supervised employment for students whose career objectives, course of study and employment complement each other. Students must accomplish specific course objectives. Class meetings on campus are scheduled each semester.