Colorado State University
GLOBAL CAMPUS

ITS410: Database Management

Credit Hours: 3

Contact Hours: This is a 3-credit course, offered in accelerated format. This means that 16 weeks of material is covered in 8 weeks. The exact number of hours per week that you can expect to spend on each course will vary based upon the weekly coursework, as well as your study style and preferences. You should plan to spend 14-20 hours per week in each course reading material, interacting on the discussion boards, writing papers, completing projects, and doing research.

Course Description and Outcomes

Course Description:
This course teaches students to design, implement, and use database management systems. Students gain a working knowledge of available software packages, concepts of query languages, software integration services, and security considerations. Students will also learn fundamentals of structured query language (SQL) in developing common queries and reports. Access to a Windows-based operating system is required for this class.

Course Overview:
This course provides database administrators and other newcomers to SQL Server 2012 with the knowledge and skills needed to install, configure, manage, secure, and maintain Microsoft® SQL Server 2012 databases and servers.

This course also provides an in-depth understanding of the issues most commonly encountered by Microsoft® support on various topics discussed in the modules, along with their current status, solutions, and workarounds.

The goal of this course is to provide students, as future IT professionals and managers, with detailed knowledge of, and hands-on simulated experience with, database management systems and SQL Server. Students will gain a firm understanding of how to manage and maintain databases, as well as hone the skills needed to make effective decisions as database administrators. The course maps to Microsoft 70-462: Administering Microsoft SQL Server 2012/2014.

Course Learning Outcomes:

1. Install, configure, and deploy a Microsoft® SQL Server 2012.
2. Create and manage Microsoft® SQL Server 2012 Databases.
3. Explain the process of SQL Server database performance monitoring and optimization.
4. Describe best practices for SQL Server security.
5. Summarize the backup and recovery process of SQL Server databases.

Participation & Attendance

Prompt and consistent attendance in your online courses is essential for your success at CSU-Global Campus. Failure to verify your attendance within the first 7 days of this course may result in your withdrawal. If for some reason you would like to drop a course, please contact your advisor.

Online classes have deadlines, assignments, and participation requirements just like on-campus classes. Budget your time carefully and keep an open line of communication with your instructor. If you are having technical problems, problems with your assignments, or other problems that are impeding your progress, let your instructor know as soon as possible.

Course Materials

Textbook Information is located in the CSU-Global Booklist on the Student Portal.

Course Schedule

Due Dates

The Academic Week at CSU-Global begins on Monday and ends the following Sunday.

- Discussion Boards: The original post must be completed by Thursday at 11:59 p.m. MT and Peer Responses posted by Sunday 11:59 p.m. MT. Late posts may not be awarded points.
- Opening Exercises: Take the opening exercise before reading each week's content to see which areas you will need to focus on. You may take these exercises as many times as you need. The opening exercises will not affect your final grade.
- Mastery Exercises: Students may access and retake mastery exercises through the last day of class until they achieve the scores they desire.
- Critical Thinking: Assignments are due Sunday at 11:59 p.m. MT.

Week #	Readings	Assignments
1	• Chapters 1 & 2 in *MCSA Guide to Microsoft SQL Server 2012* • Installing SQL Server Guide	• Discussion (25 points) • Opening Exercise (0 points) • Mastery Exercise (10 points) • Critical Thinking (60 points)
2	• Chapter 3 in *MCSA Guide to Microsoft SQL Server 2012*	• Discussion (25 points) • Opening Exercise (0 points) • Mastery Exercise (10 points) • Critical Thinking (60 points)
3	• Chapter 4 in *MCSA Guide to Microsoft SQL Server 2012*	• Discussion (25 points) • Opening Exercise (0 points) • Mastery Exercise (10 points) • Critical Thinking (60 points)
4	• Chapter 5 in *MCSA Guide to Microsoft SQL Server 2012*	• Discussion (25 points)

		• Opening Exercise (0 points) • Mastery Exercise (10 points) • Critical Thinking (70 points)
5	• Chapter 6 in *MCSA Guide to Microsoft SQL Server 2012*	• Discussion (25 points) • Opening Exercise (0 points) • Mastery Exercise (10 points) • Critical Thinking (60 points)
6	• Chapter 7 in *MCSA Guide to Microsoft SQL Server 2012*	• Discussion (25 points) • Opening Exercise (0 points) • Mastery Exercise (10 points) • Critical Thinking (60 points)
7	• Chapters 8 & 9 in *MCSA Guide to Microsoft SQL Server 2012*	• Discussion (25 points) • Opening Exercise (0 points) • Mastery Exercise (10 points)
8	• Chapter 10 in *MCSA Guide to Microsoft SQL Server 2012*	• Discussion (25 points) • Opening Exercise (0 points) • Mastery Exercise (10 points) • Portfolio (350 points)

Assignment Details

This course includes the following assignments/projects:

Module 1

CRITICAL THINKING ASSIGNMENT (60 points)

For this Critical Thinking Assignment, you will complete the hands-on activity, **Project 2-1:** Installing SQL Server 2012, listed on p. 71 of the *MCSA guide to Microsoft® SQL server 2012* textbook.

In this hands-on project, you will install a new SQL Server named instance, called SQLSERVERHOA, on your computer. You may complete the installation using either the installation wizard or the command prompt. Detailed instructions on how to install a SQL Server are available in this module's assigned textbook reading.

1. Your installation should include only the database engine and Integration Services components. Add your local user account to the SQL System Administrators group for the SQLSERVERHOA named instance so you can administer it after the installation is completed. Keep all other default settings during the installation process. Once you have successfully completed the installation, save a copy (screenshot) of the *summary.txt* located in C:\Program Files\Microsoft SQL Server\110\Setup Bootstrap\Log\.

2. Verify that the Windows services for the database engine and Integration Services have been successfully installed using the SQL Server Configuration Manager. Take a screen shot of this step.

3. Analyze the other system changes that resulted from this installation and list the steps you took to review these changes. This writing assignment should be 1-page minimum in length and follow the CSU-Global Guide to Writing and APA.

Deliverable

After you have completed these steps, submit one Microsoft® (MS) Word document that contains all three components. Take a screenshot of the *summary.txt* file and insert it into the MS Word document. Next, insert the screenshot you took of the SQL Server Configuration Manager. Finally, complete your writing assignment in the same document below the screenshots. Make sure each section is labeled clearly. Upload your document to the assignment dropbox. Note: Do not make any other changes to the SQLSERVERHOA instance, as you will use this for hands-on projects in upcoming modules.

Module 2

CRITICAL THINKING ASSIGNMENT (60 points)
For this Critical Thinking Assignment, you will complete the hands-on activity, **Project 3-1:** Client/Server Connectivity, based on p. 112 of the *MCSA guide to Microsoft® SQL server 2012* textbook.

For this hands-on project, you will use the SQL Server named instance SQLSERVERHOA you created for the Module 1 Critical Thinking Assignment. The objective of this assignment is to configure and test client/server connectivity using a variety of network protocols that are supported by SQL Server 2012. Document your work by taking a screen shot at the end of each step.

1. Begin by ensuring that the Shared Memory and TCP/IP protocols are enabled for your instance using the SQL Server Configuration Manager. Configure the TCP/IP server listener to use the static TCP port 4459.

2. Use SQLCMD to test connecting to the SQLSERVERHOA named instance using Shared Memory.

3. Use SQLCMD to test connecting to the SQLSERVERHOA TCP/IP listener on TCP port 4459. Use the 127.0.0.1 loopback address to simulate the network.

4. Troubleshoot any failures in Steps 2 and 3. For each failure, document the steps that were taken to diagnose and resolve each issue. Then reflect on this process and any difficulty that you experienced when carrying out these tasks in a report of at least 1-page, following the CSU-Global Guide to Writing and APA.

Deliverable
After you have completed these steps, submit one MS Word document that contains your screenshots and the written report. Your first screenshot should document your configuration of the TCP/IP server listener to use the static TCP port 4459. The second screenshot should document the connection test using shared memory. The third screenshot should document your use of the SQLCMD to test connecting to the SQLSERVERHOA TCP/IP listener on TCP port 4459, while using the 127.0.0.1 loopback address to simulate the network. The minimum number of screenshots that should be included is three; however, if you feel like you need to include more than that, you are welcome to do so. Insert all of the screenshots into one MS Word document, label each of them clearly, and include the 1-page minimum report below the screenshots. Then, upload this single MS Word document to the assignment dropbox.

Module 3

CRITICAL THINKING ASSIGNMENT (60 points)
For this Critical Thinking Assignment, you will complete the hands-on activity, **Project 4-1:** Creating Databases and Tables, based on p. 149 of the *MCSA guide to Microsoft® SQL server 2012* textbook.

For this Critical Thinking Assignment, you will use the SQL Server named instance SQLSERVERHOA you created in the Module 1 Critical Thinking Assignment. The objectives of this activity are to configure two new user databases and to create new tables and a foreign key relationship.

1. Use SQL Server Management Studio to connect to the SQLSERVERHOA instance. Create a new user database with the name HandsOnOne using the New Database dialog box from Object Explorer. Use the default database settings with the following exceptions:

a. Data file initial size: 40 MB
b. Log file initial size: 15 MB
c. Autogrowth enabled with 15 MB in file growth
d. Unlimited maximum file size

2. Use Object Explorer to generate a CREATE DATABASE script from the HandsOnOne database in a new Query Editor window. Change the name of the database in the SQL script to HandsOnTwo and modify the data file initial size to 35 MB. Execute the SQL script to create the database named HandsOnTwo. Document this step by saving a copy of the SQL Script, and after executing the command, take a screenshot of the Query Editor window, showing that the query completed successfully.

3. Using either Object Explorer or Query Editor, set the recovery mode for the HandsOnOne database to full. Set the recovery mode for the HandsOnTwo database to simple. Document this step by taking a screenshot of the options page in the database properties window for each database.

4. Using Object Explorer—or by running a SQL command in the Query Editor window—rename the HandsOnTwo database to HandsOnTwo_Delete.

5. Execute a SQL command to DROP the HandsOnTwo_Delete database. After executing the SQL command, document this step by taking a screen shot of the Query Editor window to show that it completed successfully.

6. Using Object Explorer, create a new table named Customer with the following column names, associated data types, and constraints:

Column name	Data type	Constraint
CustomerID	int	Primary key
CustomerName	nvarchar(40)	Not null
CustomerAddressID	int	Not null

Take a screenshot of the Table Designer window to document this step.

7. Using Query Editor, construct and execute a SQL command to create a new table named Address with the following column names, associated data types, and constraints:

Column name	Data type	Constraint
AddressID	int	Primary key
Street	nvarchar(50)	Not null
City	nvarchar(40)	Not null
State	char(2)	Not null
ZipCode	nvarchar(10)	Not null

After executing the SQL command, document this step by taking a screenshot of the Query Editor window to show that the query completed successfully.

8. Using Object Explorer, create a foreign key relationship between the Customer and Address tables. The AddressID of the Address table is the primary key, and the CustomerAddressID of the Customer table is the foreign key. After creating the key, view the dependencies of the Address table in Object Explorer and take a screenshot to document this step.

9. Reflect on what worked well and which steps you struggled with in a paper of 1-page minimum that follows the CSU-Global Guide to Writing and APA.

Deliverable

After completing these steps, combine the five appropriately labeled screenshots and the written reflective portion into a single MS Word document, and then upload it to the assignment dropbox.

Module 4

CRITICAL THINKING ASSIGNMENT (70 points)
For this Critical Thinking Assignment, you will complete the hands-on activity, **Project 5-1:** Creating Databases and Tables, based on p. 195 of the *MCSA guide to Microsoft® SQL server 2012* textbook.

This Critical Thinking Assignment requires you use the SQL Server instance named SQLSERVERHOA, and the HandsOnOne database and tables you created in Modules 1 and 3, respectively. The objective of this activity is to hone your skills at manipulating data using SQL DML statements. Use the Query Editor throughout this activity.

1. Construct and execute INSERT SQL statements to add the sample data in the following tables to the Customer and Address tables in the HandsOnOne database:

Additional Sample Data for Customer Table

CustomerID	CustomerName	CustomerAddressID
1	Western Supply Company	1
2	Nick Harper	3
3	Alice Harper	3
4	Abacus Consulting	4

Additional Sample Data for the Address Table

AddressID	Street	City	State	Zip Code
1	2400 Broadway Drive	Missoula	MT	59802
2	320 21st Street	Billings	MT	59101
3	439 Skyline Blvd	Denver	CO	80002
4	56 Park Avenue	New York	NY	10001

2. Construct and execute a SQL query to list all customers with their corresponding cities and states. The list should be sorted in ascending numerical order by ZIP code, followed by customer name alphabetically. Take a screenshot of the Query Editor after you have executed this SQL command to show that it was completed successfully.

3. Construct and execute a SQL Query to list the Street, City, State, and Zip Code of all addresses that do not have a customer associated with them. Take a screenshot of the Query Editor after you have executed this SQL command to show that it was completed successfully.

4. Construct and execute a SQL query to count the number of customers in each state. The list should be ordered by the number of customers in descending order, then by zip code in ascending order. Take a screenshot of the Query Editor after you have executed this SQL command to show that it was completed successfully.

5. Construct and execute a SQL query to change Alice Harper's address to 320 21st St, Billing, MT 59101. Take a screenshot of the Query Editor after you have executed this SQL command to show that it was completed successfully.

6. Construct and execute a SQL query to list the full names of all customers who have Harper in their name. Take a screenshot of the Query Editor after you have executed this SQL command to show that it was completed successfully.

7. Your final step in this assignment is to compose a report of 1-page minimum in length that outlines your experience completing this assignment. Which task was the most difficult for you? Which was the easiest? Your report should follow CSU-Global Guide to Writing and APA.

Deliverable
After you have completed these steps, submit a single MS Word document that contains the screenshots and the written report. Insert all of the screenshots into the document, label each of them clearly, and include the information for the report below the screenshots. Then upload this single MS Word document in the assignment dropbox.

Module 5

CRITICAL THINKING ASSIGNMENT (60 points)
For this Critical Thinking Assignment, you will complete the hands-on activity, **Project 6-2:** Encrypting and Decrypting Data, based on p. 236 of the *MCSA guide to Microsoft® SQL server 2012* textbook.

For this hands-on project, you will use the SQL Server named instance SQLSERVERHOA, and the HandsOnOne database and tables you created in previous chapters. The objective of this activity is to practice generating keys and encrypting/decrypting data. Document each step by taking a screen shot of the Query Editor window after successfully executing each SQL query.

1. In SQL Server Management Studio, open a new Query Editor window, which you will use for completing all steps in this activity.

2. Create a SQL query to generate a new database master key and certificate for the HandsOnOne database. Take a screenshot of the Query Editor after you have executed this SQL command to show that it was completed successfully.

3. Construct a SQL query to generate a new symmetric key for encrypting data. The symmetric key should use the AES algorithm with a 256-bit key size, and it should be protected by the certificate you created in Step 2. Take a screenshot of the Query Editor after you have executed this SQL command to show that it was completed successfully.

4. Construct a SQL query to alter the Customer table and add a new column named CustomerNameEncrypted with data type varbinary(128). This column will be used to store the encrypted values of the CustomerName column. Take a screenshot of the Query Editor after you have executed this SQL command to show that it was completed successfully.

5. Using the symmetric key you created in Step 2, write an SQL UPDATE query that encrypts the values in the CustomerName column and adds the encrypted values to the CustomerNameEncrypted column. Take a screenshot of the Query Editor after you have executed this SQL command to show that it was completed successfully.

6. Construct a SQL SELECT query to view the encrypted values of the CustomerNameEncrypted column in the Customer table. Take a screenshot of the Query Editor after you have executed this SQL command to show that it was completed successfully.

7. Construct a SELECT SQL query that uses the symmetric key to decrypt the values in the CustomerNameEncrypted column. Note that you will need to convert the hexidecimal values into a character string in order to read the decrypted values. Take a screenshot of the Query Editor after you have executed this SQL command to show that it was completed successfully.

Deliverable
After you have completed these steps, submit one MS Word document that contains the screenshots and include a report that summarizes the database security controls you implemented. Insert all of the screenshots into the document, label each of them clearly, and include the 1-page minimum report below the screenshots. Then, upload this single MS Word document to the assignment dropbox.

Module 6

CRITICAL THINKING ASSIGNMENT (60 points)
For this Critical Thinking Assignment, you will complete the hands-on activity, **Project 7-1:** Monitoring and Analyzing Performance, based on p. 272 of the *MCSA guide to Microsoft® SQL server 2012* textbook.

For this hands-on project, you will use the SQL Server named instance SQLSERVERHOA, and the HandsOnOne database and tables you created in previous assignments. The objective of this project is to practice using Windows utilities and SQL Server management tools to monitor performance and diagnose query performance.

1. Using the Windows Performance Monitor utility, add a set of counters to the real-time performance monitor display that you consider most relevant to the performance of your SQL Server instance. Document this step by taking a screen shot of the real-time display.

2. In SQL Server Management Studio, construct a SQL query that uses a SELECT statement and a JOIN clause to query data from both the Customer and Address tables. Analyze the estimated execution plan.
    a. Identify the costliest plan steps.
    b. Are any of the steps that you identified in Step 2(a) a cause for concern? If so, explain.
    c. Describe how the performance of the query could be improved, or explain why the query is already optimal.

3. Implement any changes identified in Step 2(c) and execute the query using the option Include Actual Execution Plan. Document this step by taking a screen shot of the actual execution plan.

4. Use SQL Server Profiler to capture a trace and execute the query again. Analyze the trace and determine how many milliseconds the query took to execute. Take a screen shot of the trace that shows the execution of your query to document this step.

5. Launch the Database Engine Tuning Advisor from Query Editor to analyze your query. Did the analysis generate any recommendations? Explain why or why not.

Deliverable
After you have completed these steps, submit one MS Word document that contains the screenshots and a written report that describes the performance and monitoring activities you have performed. Insert all of the screenshots into the document, label each of them clearly, and include the 1-page minimum report below the screenshots. Then, upload this single MS Word document to the assignment dropbox.

Module 8

Choose one of the following two assignments to complete as your Portfolio Project. Do not complete both assignments. Identify your assignment choice in the title of your submission.

PORTFOLIO PROJECT (350 points)

Option #1: SQL Server Implementation Proposal
Recently, Shiv Corp, a solar panel manufacturing business, put out a bid for database system due to their rapid growth. Congratulations! Your company was chosen from many to develop and implement a proposal for implementation of SQL Server.

Shiv Corp uses MySQL for their order placement system. There are various problems with the current implementation of MySQL including, but not limited to, availability, redundancy, security, and performance monitoring. Plus, the chief information officer (CIO) of Shiv Corp is concerned that there is no professional support because it based on open standards. The CIO is asking that you develop a proposal to move to a SQL Server from MySQL, keeping the cost minimal.

Your proposal should include the following criteria and the reasoning behind your choices:

- The version of SQL Server
- The architecture of the file system of the SQL Server
- Database and data security plan
- Database optimization plan
- Backup and recovery plan
- Proactive monitoring plan
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Deliverable

Your APA-formatted proposal should be at least 10-12 pages in length, not including the title and reference page(s). Follow the appropriate *CSU-Global Guide to Writing and APA* for this assignment.

Option #2: SQL Server Deployment

Congratulations! Recently, you responded to a Request for Proposal (RFP), and you were awarded the contract to deploy, configure, and manage the SQL Server for the CSU Global Student Management System.

You are required to perform the following steps:

1. Install SQL Server 2012/2014, using unattended method to standardize installs.
2. Configure the TCP to run on port TCP 4459.
3. Create a database named CSUGlobalEdu with following settings:
    a. Data file initial size: 100MB
    b. Log file initial size: 50MB
    c. Set to Autogrow
    d. No limit on maximum file size.
4. Create following tables using scripts:
    a. Class

Name	Data Type	Constraint
Course Number	Int	Primary Key
Course Name	Nvarchar (30)	Not null
Time of the Day	Time	Not null
Room	Char (10)	Not null
Room Capacity	Int	Not null
Course Description	Nvarchar (3000)	Not null
Credit Hours	Int	Not Null

    b. Instructor

Name	Data Type	Constraint
Address	Nvarchar (100)	Not Null
InstructorID	Int	Primary Key
Phone Number	Int	Not null
Office	Int	Not null
Office Hours	Nvarchar (30)	Not null
Department	Nvarchar (15)	Not null
Department ID	Int	Not null
First Name	Nvarchar (30)	Not null
Last Name	Nvarchar (30)	Not null

    c. Student

Name	Data Type	Constraint
Address	Nvarchar (100	Not Null
StudentID	Int	Primary Key
Phone Number	Int	Not null
Major	Char (10)	Not null
GPA	Decimal (2,2)	Not null
First Name	Nvarchar (30)	Not null
Last Name	Nvarchar (30)	Not null

5. Develop scripts to INSERT data into Class, Instructor, and Student tables. Load the tables with sample data with at least 10 rows.
6. Construct and execute queries that match the following criteria:
    a. List all classes sorted by course number followed by course number.
    b. List all instructors by last name followed by first name.
    c. List all instructors by last name, first name, InstructorID.
    d. List all students by last name followed by first name.
    e. List all students by last name, first name, GPA, Major.
7. Generate a certificate for the database.
8. Develop a SQL query to generate a new symmetric key for encrypting data.
9. Develop a SQL query to alter the Student table and a new column names StudentDataEncrypt with data type varbinary(128).
10. Create a backup plan with following criteria:
    a. The backups should occur on Sundays starting at 9:00 AM.
    b. CSU Global Campus cannot afford to risk data loss of more than one hour.

Deliverable

You need to document the installation of SQL Server 2012/2014, and the creation of a database, tables, queries, and the backup plan by providing screenshots. All of the screenshots should be clearly labeled. Also, provide a summary of at least 2-3 pages that describes your experiences of SQL Server, not including the title and reference page(s). Follow the appropriate *CSU-Global Guide to Writing and APA* for this assignment.

Course Policies

Course Grading

20% Discussion Participation
0% Opening Exercises
8% Mastery Exercises
37% Critical Thinking Assignments
35% Final Portfolio Paper

Grading Scale and Policies

A	95.0 – 100
A-	90.0 – 94.9
B+	86.7 – 89.9
B	83.3 – 86.6
B-	80.0 – 83.2
C+	75.0 – 79.9
C	70.0 – 74.9
D	60.0 – 69.9
F	59.9 or below

In-Classroom Policies

For information on late work and incomplete grade policies, please refer to our **In-Classroom Student Policies and Guidelines** or the Academic Catalog for comprehensive documentation of CSU-Global institutional policies.

Academic Integrity
Students must assume responsibility for maintaining honesty in all work submitted for credit and in any other work designated by the instructor of the course. Academic dishonesty includes cheating, fabrication, facilitating academic dishonesty, plagiarism, reusing /re-purposing your own work (see *CSU-Global Guide to Writing and APA* for percentage of repurposed work that can be used in an assignment), unauthorized possession of academic materials, and unauthorized collaboration. The CSU-Global Library provides information on how students can avoid plagiarism by understanding what it is and how to use the Library and Internet resources.

Citing Sources with APA Style
All students are expected to follow the *CSU-Global Guide to Writing and APA* when citing in APA (based on the APA Style Manual, 6th edition) for all assignments. For details on CSU-Global APA style, please review the APA resources within the CSU-Global Library under the "APA Guide & Resources" link. A link to this document should also be provided within most assignment descriptions in your course.

Disability Services Statement
CSU–Global is committed to providing reasonable accommodations for all persons with disabilities. Any student with a documented disability requesting academic accommodations should contact the Disability Resource Coordinator at 720-279-0650 and/or email ada@CSUGlobal.edu for additional information to coordinate reasonable accommodations for students with documented disabilities.

Netiquette
Respect the diversity of opinions among the instructor and classmates and engage with them in a courteous, respectful, and professional manner. All posts and classroom communication must be conducted in accordance with the student code of conduct. Think before you push the Send button. Did you say just what you meant? How will the person on the other end read the words?

Maintain an environment free of harassment, stalking, threats, abuse, insults or humiliation toward the instructor and classmates. This includes, but is not limited to, demeaning written or oral comments of an ethnic, religious, age, disability, sexist (or sexual orientation), or racist nature; and the unwanted sexual advances or intimidations by email, or on discussion boards and other postings within or connected to the online classroom.

If you have concerns about something that has been said, please let your instructor know.