



Western Technical College

10154145 Database Server Administration

Course Outcome Summary

Course Information

Description	This course provides students with a technical and administrative overview of installing, securing, backing up, restoring, importing/exporting, logging, monitoring and troubleshooting relational database systems. In addition to administrative functions, students will understand core database concepts which include querying, relationships, transactions, schema definitions, referential integrity, constraints and data normalization.
Career Cluster	Information Technology
Instructional Level	Associate Degree Courses
Total Credits	3
Total Hours	72

Pre/Corequisites

Prerequisite 10150194 Windows Server Administration 2

Textbooks

Microsoft SQL Server 2019: A Beginner's Guide. 7th Edition. Copyright 2020. Petkovic, Dusan. Publisher: McGraw-Hill Publishing Company. **ISBN-13:** 978-1-260-45887-9. Required.

Learner Supplies

High-speed external storage for Virtual Machine on lab machines or your own system. **Vendor:** To be discussed in class. Recommended.

Program Outcomes

1. Identify security strategies
2. Implement secure infrastructures
3. Conduct security testing
4. Analyze security data
5. Mitigate risk
6. Develop security documentation

Course Competencies

1. Examine relational database fundamentals.

Assessment Strategies

- 1.1. Demonstration
- 1.2. Written Product

Criteria

You will know you are successful when

- 1.1. you describe the need for databases and discuss the problems they solve.
- 1.2. you add new data to an existing database.
- 1.3. you correctly define a table, column, row, and primary key using your own words.
- 1.4. you discern the attributes of a good primary key from a bad primary key.
- 1.5. you identify the relationship and cardinality between two tables.
- 1.6. you demonstrate the constraints referential integrity imposes on data.

Learning Objectives

- 1.a. Examine motivations for database work.
- 1.b. Examine why databases are needed and identify the problems they solve.
- 1.c. Examine the fundamental objects in a database – tables, columns, rows, and keys.
- 1.d. Examine relationships, foreign keys, cardinality, and referential integrity.

2. Install and configure a database management system.

Assessment Strategies

- 2.1. Demonstration

Criteria

You will know you are successful when

- 2.1. you install an enterprise class database management system (DBMS) on an operating system.
- 2.2. you install a provided sample databases in your DBMS.
- 2.3. you install a GUI tool to work with the DBMS.
- 2.4. you perform basic functions, like connect to the DBMS, start and stop an instance, and work with databases, using the GUI tool.

Learning Objectives

- 2.a. Demonstrate prep and installation of an enterprise class database instance.
- 2.b. Examine feature selection and database engine configuration.
- 2.c. Demonstrate installing and working with the database's GUI.
- 2.d. Demonstrate creating, managing, and modifying databases via the database's GUI.
- 2.e. Explore working with the database's query editor.

3. Explore fundamental database design.

Assessment Strategies

- 3.1. Demonstration
- 3.2. Written Product

Criteria

You will know you are successful when

- 3.1. you translate a narrative of requirements into a database design (ERD) of the third normal form.
- 3.2. you build your database using the database's GUI tools.
- 3.3. you generate an ERD from the database's GUI tool, complete with tables, fields, keys, and relationships.
- 3.4. you populate at least one row of data in all of your database tables using the GUI tool.

Learning Objectives

- 3.a. Identify the need for normalization and normalize to the third normal form – 3NF.
- 3.b. Review general database design recommendations.
- 3.c. Examine character, numeric, date/time, and other database data types.

4. Retrieve, manipulate, and modify data using SQL's data manipulation language (DML).

Assessment Strategies

- 4.1. Written Product
- 4.2. Demonstration

Criteria

You will know you are successful when

- 4.1. you translate English queries to SQL queries to retrieve data from a database.
- 4.2. you translate English queries to SQL queries to filter data from a database.
- 4.3. you translate English queries to SQL queries which aggregate data from a database.
- 4.4. you translate English queries to SQL queries for data requests which span several tables.
- 4.5. you translate English requests to SQL statements which insert, update, and delete data in a database.

Learning Objectives

- 4.a. Utilize SELECT, FROM, and WHERE clauses.
- 4.b. Utilize the CASE statement and functions.
- 4.c. Utilize aggregate functions and the GROUP BY clause to summarize data.
- 4.d. Examine INNER JOINS.
- 4.e. Examine INSERT, UPDATE, and delete clauses.

5. Backup and recover database.

Assessment Strategies

- 5.1. Demonstration
- 5.2. Written Product

Criteria

You will know you are successful when

- 5.1. you perform a full backup on a database.
- 5.2. you move the files from your database and remount them.
- 5.3. you perform a restore using one of your backups.
- 5.4. you create a maintenance task to remove old backups.

Learning Objectives

- 5.a. Examine potential recovery scenarios.
- 5.b. Perform a simple recovery.
- 5.c. Configure automating the backup and backup cleanup process.

6. Create tables and other database objects (DDL) using SQL and GUI tools.

Assessment Strategies

- 6.1. Demonstration
- 6.2. Written Product

Criteria

You will know you are successful when

- 6.1. you create tables with fields, primary and foreign keys, and constraints using SQL.
- 6.2. you perform basic table alterations using SQL.
- 6.3. you delete a table using SQL.
- 6.4. you create database views using SQL.
- 6.5. you use SQL and/or the database GUI interchangeably to create and manage database objects.

Learning Objectives

- 6.a. Examine CREATE TABLE statement.
- 6.b. Examine ALTER TABLE statement.
- 6.c. Examine DROP TABLE statement.
- 6.d. Examine primary, foreign, unique, and check constraints.
- 6.e. Implement VIEWS.
- 6.f. Utilize the GUI to manage database objects.

7. Explore database security.

Assessment Strategies

- 7.1. Demonstration
- 7.2. Written Product

Criteria

You will know you are successful when

- 7.1. you encrypt any column in a database using symmetric encryption.
- 7.2. you encrypt any column in a database using asymmetric encryption.
- 7.3. you create users who can authenticate into a database.
- 7.4. you assign privileges to users and roles in a database.

Learning Objectives

- 7.a. Explore symmetric and asymmetric encryption.
- 7.b. Explore certificates.
- 7.c. Implement encryption within the database.
- 7.d. Implement authentication and authorization within the database.

8. Write stored procedures.

Assessment Strategies

- 8.1. Demonstration
- 8.2. Written Product

Criteria

You will know you are successful when

- 8.1. you create a stored procedure which accepts parameters and performs a basic action within the database.
- 8.2. you create a stored procedure which utilizes a loop and conditional statement.
- 8.3. you create a function which accepts a parameter and returns a result.
- 8.4. you create a function or stored procedure which appropriately handles an error condition.

Learning Objectives

- 8.a. Review coding fundamentals.
- 8.b. Create block scripts, stored procedures, and functions.

9. Explore database tuning.

Assessment Strategies

- 9.1. Demonstration
- 9.2. Written Product

Criteria

You will know you are successful when

- 9.1. you create a clustered index.
- 9.2. you create a nonclustered index.
- 9.3. you analyze a poorly performing query and create an index to improve its performance.
- 9.4. you create or generate the DDL for your indexes.
- 9.5. you discuss the tradeoffs indices pose.

Learning Objectives

- 9.a. Explore the problems indices solve and the structure of indices.
- 9.b. Implement clustered and nonclustered indices.

10. Write SQL transaction statements and manage concurrency.

Assessment Strategies

- 10.1. Demonstration
- 10.2. Written Product

Criteria

You will know you are successful when

- 10.1. you create a script which processes several SQL statements as a transaction.
- 10.2. you describe the general idea behind the pessimistic and optimistic concurrency models.
- 10.3. you describe the concept of locks and discuss the consequences of a deadlock.
- 10.4. you describe the database isolation levels and related concurrency issue tradeoffs.

Learning Objectives

- 10.a. Examine transactions and their properties.
- 10.b. Examine the pessimistic and optimistic concurrency models.
- 10.c. Examine locking.
- 10.d. Examine problems associated with concurrency.
- 10.e. Review database isolation levels.