Course Code/Course Title:

FSW105 Database Foundations

Course Description: The Database Foundations course is an introduction to working with and designing databases. Students will develop a foundational knowledge of database concepts, theory, and an overview of the various implementations and architectures. Students will work with both relational (aka SQL) and non-relational (aka document) databases.

Course Length: 40 hours	**Prerequisites:** FSW102	**Proficiency Exam** ☐Yes ☒ No	
Course Start Date: **Course End Date:**	**Meeting Days/Times**		

Required Resources:

Minimum: PC (Windows) or MacBook laptop. 4GB ram, 256GB HD, Core i5
Recommended: PC (Windows) or MacBook laptop. 8GB ram, 256GB SSD, Core i5

This will become your programming rig. Every student will need their own laptop. We will be downloading programming resources to your laptop, and it will also house your coding projects.

Additional Resources:

Students are expected to supply notebooks, pens, pencils, highlighters, folders, ring binders, calculators, USB storage devices and other general supplies as needed to aid in the collection and storage of information in their courses

B. For Classes Delivered in an Online Format (for approved courses and campuses). Online courses are delivered via **https://wozu.exeterlms.com** in an asynchronous format. Students enrolled in online courses/programs are expected to spend an equivalent amount of time on task, as campus-based students, in meeting course objectives. For Online Courses the total expected hours required for completion of course objectives are identified on the syllabus as **Total Contact Hours** and reflect the sum of theory, laboratory, and outside hours.

Educational Objectives:

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

1. Learn how databases are used to store and retrieve data
2. Learn the basic Create Read Update and Delete operations
3. Learn how to use SQL to query a relational database
4. Learn the differences between relational and document databases
5. Learn how to effectively query a document database

Course Outline

SQL

Lessons:

1. **Getting Started:** Includes setup, What's in a Database, SELECT, LIMIT, WHERE, AND, OR, and NOT syntax, string functions, upper, lower, LIKE and IN syntax, and ORDER BY
2. **Joins:** Includes Join, Inner Join, Outer Joins, USING, Aliases, and Multiple Joins
3. **CRUD in SQL:** Includes CRUD in SQL, Insert Into, NULL, IS NOT NULL, UPDATE, and DELETE
4. **Creating Tables:** Includes Tables, Structure, Create a table, Constraints, NOT NULL, UNIQUE, Primary Key, Autoincrement, Foreign Key, CHECK, default, triggers, INSERT, DROP TABLE, Views, CREATE VIEWS, Create view with Join, and Drop View
5. **Indexes and Project:** Includes indexes, Create index, common SQL functions, min and max, sum, avg, count, GROUP BY

Outline:

- **L1 Practice Hands On:** Using SQL run queries for certain names, album id's, customers in Brazil, etc, and take a screen shot of each SQLecton query when complete. Based on the scenario given run the appropriate queries needed.
- **L2 Hands On:** Using the SQL queries given include at least one join to each and take a screen shot of each SQLecton query when complete. Be sure to think about which columns you can use to Join the necessary tables. Based on the scenario given run the appropriate queries needed.
- **L3 Practice Hands On:** Using SQL, run queries based on the information given. Take a screen shot of each SQLecton query when complete. Based on the scenario given run the appropriate queries needed.
- **L4 Hands On:** Using SQL, run queries based on the information given. Create a table that has 5 columns and includes all requirements that when queried will show a single product in the table.
- **L5 Hands On:** Final Project

Final Project:

For this project, you will be working with a new database. This database will be holding information on customers, orders, and products that a bike store might encounter. Currently, this database has only one table but during this project, you will be adding more tables and data to it.

NoSQL

Lessons:

1. **Getting Started with NoSQL:** Includes setup, MongoDB, MLAB, What is NoSQL, creating a database, setting the Path variable, connecting to Mongo, MongoDB collections, Data types, JSON, relationships, inserting documents
2. **Querying Documents:** Includes finding documents, syntax, query operators, logical operators, element operators, array operators, projection document
3. **Updating Documents:** Includes updating documents, using update(), update options, update operators, update queries

4. **Deleting and Indexing Documents:** Includes deleting documents, indexes, single and compound indexing, indexing on embedded fields and documents, viewing your indexes, dropping indexes
5. **Sharding, More Methods and Project:** Includes sharding, scaling, aggregate(), count(), totalSize()

Outline:

- **L1 Practice Hands On:** Using NoSQL, create more users which include fields of user information. In Mlab create a new collection from the database and insert five cars using a query that includes the cars information. Once completed view all your added information and take a screen print.
- **L2 Hands On:** Using NoSQL, view the movies database to locate different movies, runtimes, actors, and keywords. Based on the scenario given run the appropriate queries needed.
- **L3 Practice Hands On:** Using NoSQL, using the inventory collection run queries to locate specific items and change their values. Based on the scenario given run the appropriate queries needed.
- **L4 Hands On:** Delete the cars collection and recreate the cars collection while adding more cars than before, prices, and filtering out old cars and specific models. Based on the scenario given run the appropriate queries needed.
- **L5 Hands On:** Final Project

Final Project:

Using SQL, modify an existing database of employees to introduce the notion of an order so that you can associate employees to their positions and locations. Using MongoDB, create and edit a database of songs and their related metadata.