HOSTOS COMMUNITY COLLEGE
DEPARTMENT OF MATHEMATICS
AND COMPUTER SCIENCE

CST 150: FUNDAMENTALS OF DATABASE SYSTEMS

Credit Hours: 3.0

Lab Hours: 2.0

Class Hours: 2.0

Prerequisite: CSC 140

Course Description:
This course introduces students to the role and place of databases in Information Systems (IS). The course explains the advantages of databases compared to file systems, describes the basic functionality of the Database Management Systems (DBMS)--the special software needed for running a database, and shows how a database functions with other parts of the IS. The course concentrates on relational databases (RDB), explains the organization of data within tables in the RDB, and the role of the integrity constraints: the primary and foreign keys. The major portion of the course is concerned with Structured Query Language (SQL}-the language of creating and supporting RDBs, and manipulating the relational data. The students learn how to create tables, specify constraints, populate tables with data, and manipulate the data: create, update, delete, and retrieve the data. Demonstrations of database concepts and practical work are performed in one of the relational DBMSs. This will include the creation of tables, manipulation of data in the tables, queries using one or more tables, and importing/exporting data to other applications.

Required Text:
Mark Shellman, Hassan Afyouni, Philip J. Pratt, Mary Z. Last
A Guide to SQL, 10th edition. 2020 Boston: Cengage Learning
ISBN-10 : 0357361687
ISBN-13 : 978-0357361689

Grades: **A, A⁻, B⁺, B, B⁻, C⁺, C, D, F**

Course Objectives:
  Upon successful completion of the course, the student should be able to:
       1. Understand the role of a database in an IS, and the relationships databases have with other

parts of the IS.
2. Understand the organization of the data in the RDB, the concepts of the table structure, the primary and the foreign keys.
3. Create tables according to a given design, including choosing data types for columns and declaring the column and the table constraints (primary key, foreign key, NOT NULL, CHECK).
4. Populate tables with data and manipulate the data (create, update, delete and retrieve).
5. Program data retrieval queries, including:
    a. Select data from one table for various retrieval conditions.
    b. Select data from several tables with the help of joins or subqueries, and for variousretrieval conditions.
    c. Perform aggregate calculations on data from one or several tables.
    d. Populate tables with data from other applications and export data to otherapplications (including spreadsheets).

Student Learning outcomes:

1. Students will demonstrate fluency in describing the entity relationship model for data modeling concepts, and implement it in database design.
2. Students will recognize the services provided by a Database Management System and the application of the Relational Database Model.
3. Students will demonstrate efficiently solving database problems using the oracle DBMS, and write SQL commands to create, insert, update, and retrieve data from a simple database.
4. Students will demonstrate fluency in writing multiple tables queries to retrieve data and perform calculations on them.
5. Students will develop an understanding of transaction processing and multi-user database support.
6. Students will demonstrate fluency in creating views for database modifications and ensuring database security.
7. Students will demonstrate fluency in defining SQL functions and stored procedures used in database applications.

Grading:
Passing grades are given only if all assignments are completed. The professor reserves the right to ask you to defend any of your assignments or tests. Your final grade is based on the following:
- 10% - Participation
- 30% - Three Exams
- 20% - Final Exam
- 40% - Homework assignments

Course Outline:

Week	Topic	Chapter
1-2	Introduction to database concepts Relational databases • Entities Attributes and Relationships • Functional Dependence • Primary keys • Database Design	2
	• Design method • Database design requirements • Database design process example • Normalization (first, second and third normal form) • Diagrams for database design	
3-4	Creating Tables • Introduction to Oracle • Creating a table • Dropping a table • Using Data types • Using nulls • Adding rows to a table via the Insert command • Viewing table Data • Correcting Errors in a table • Saving SQL Commands • TEST ONE	3
5	SQL. Single Table Queries Simple Queries • Retrieving certain columns and all rows • Retrieving all columns and all rows • Using the WHERE Clause • Using compound conditions • Using the BETWEEN Operator • Using computer columns • Using the LIKE operator • Using the IN OperatorSorting • Using the ORDER BY clause • Additional Sorting Options	4
6-7	Simple Queries (Continued)Using Functions • Using the COUNT function • Using the SUM function • Using the AVG, MAX and MIN functions • Using the DISTINCT OperatorGrouping • Using the GROUP BY clause • Using a HAVING Clause • Having vs. WHERE • Nulls • SubQueries - brief introduction	4

8-9	Multiple Table Queries Querying Multiple Tables • Joining Two tables Comparing joins, IN and EXISTS • Using the IN operator • Using the EXISTS Operator • Using a Subquery within a subquery • Using alias • Joining a table to itself	5

	• Using a self-join on a primary key column • Joining several tales • ALL and ANY • Special Operations (Inner and outer join and product) • TEST TWO	
10-11	Updating Data • Creating a new table from an existing table • Changing existing data ina table • Adding a new row to an existing table • Commit and rollback • Transactions • Changing ad deleting existing rows • Changing a value in a column to null • Changing a table's structure • Dropping a table	6
12	Database Administration • Creating and using views • Using a view to update data • Dropping a view • Security • Indexes • System catalog • Integrity constraints in SQL	7
13-14	SQL Functions and Procedures • Using SQL in a programming environment • Using functions • Concatenating columns • Stored procedures • Error handling • Using update procedures • Selecting multiple rows witha procedure	8
15	Review and FINAL	