Bergen Community College
Computer Science Department
Course Syllabus

Instructor: _____ **Phone:** _____

Email: _____ **Office hours**_____

Course Title: CIS-278 Database Systems

Prerequisites: CIS-265 (Advanced Programming Concepts) or CIS-266 (Visual Basic)

Credits/Hours: 3 Credits 3 Lecture / 1 Lab

Gen'l Ed. Course: No

Course Description:

Database systems is an introduction to the design and implementation of a database system. Topics considered include database architecture; the Entity-Relationship model; the relational model of data; normalization theory; data definition languages and query facilities; physical database design; data integrity and security; programming language interfaces; database administration and control; and current trends in database systems. Students use a DBMS to develop an actual database.

Student Learning Outcomes: Upon completion of the course, the student will:

1. Be able to describe the components of a database system and the relationships between them.
2. Understand the major models of data and the role that each plays in the development process.
3. Know how to do the conceptual design of a database using the Entity-Relationship model of data.
4. Be able to use normalization theory to determine the quality of the design of a relational database.
5. Know how to use structured query language to create, modify, and query a relational database.
6. Understand the various schemes for the physical organization of a database.
7. Know the functions and goals of database administration.

Student Learning Outcomes Assessment Measurement:

Each of the above listed student learning outcomes will be assessed by: (1) written assignments and/or quizzes; (2) written examinations and a comprehensive final exam.

Course Grade: see the grading policy for the course.

Textbook: Modern Database Management, 11/E, Jeffrey A. Hoffer, Ramesh Venkataraman, Heikki Topi, ISBN-10: 0132662256 ISBN-13: 9780132662253
Publisher: Prentice Hall 2013

Course Content:

1. Introduction to Database Systems
   Data, information, and metadata
   Limitations of traditional file processing systems
   Components of the database environment
   Accessing a database
   Data dictionary and repository
   Pros and cons of the database approach
   Personal, workgroup, departmental, and enterprise databases

2. Database Architecture
   ANSI/SPARC three schema architecture
   Logical and physical data independence

3. The Database Development Process
   Overview of the database development life cycle
   Rapid application development methods – prototyping
   Survey of data models
   Fact-gathering techniques
   Management of the development project

4. Conceptual Database Design: The Entity-Relationship Model
   Entity types, attributes, and relationship types
   Modeling the business rules of the organization
   Entity-Relationship diagram and model notation
   Conceptual design using the E/R model

5. The Enhanced Entity-Relationship Model
   Representing supertypes and subtypes
   Representing specialization and generalization
   Specifying constraints in supertype/subtype relationships
   Defining supertype/subtype hierarchies
   Entity clustering

   Project Part I: Conceptual Database Design

6. Logical Database Design: The Relational Data Model
   Fundamental terminology and concepts
   Modeling with relations
   Transforming a conceptual data model into the relational data model
   Relational integrity constraints

7. Relational Database Design: Normalization Theory
   Modification anomalies
   Functional dependencies
   Normal forms and the normalization process
   Boyce-Codd normal form
   Fourth normal form – multi-valued dependencies

   Project Part II: Transforming the E/R Model into the Relational Model

8. Relational Database: Introduction to SQL
   The SQL environment - data definition, manipulation, and control languages
   Relational operations
   Schema and table definition
   Inserting, updating, and deleting data
   Single table queries
   Base tables and user views

9. Advanced SQL: Queries Involving Multiple Tables
   Sub-queries
   join operations
   Data manipulation using relational algebra
   Embedded SQL

   Project Part III: Implementing and Processing a Relational Database

10. Physical Database Design: Organization and Access
    Fundamental terminology and concepts
    File organization and access strategies
    Indexing techniques and B+ trees
    Denormalization

11. Database Administration and Control
    Database administration functions and goals
    Database integrity, security, backup and recovery
    Controlling concurrent access

12. Additional Topics and Current Trends in Database Systems
    Data warehousing
    Distributed database
    Object-Oriented data modeling and databases

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