BROWARD COLLEGE
COURSE OUTLINE

LAST REVIEW: 2010-2011 **NEXT REVIEW:** 2015-2016 **STATUS:** A

COURSE TITLE: Database Design and Programming Using SQL

COMMON COURSE NUMBER: COP 2700C
CREDIT HOURS: 3

CONTACT HOUR BREAKDOWN
(per 16 week term)

CLOCK HOURS:
Lecture: 48 Lab: 16
Clinic: Other:

PREREQUISITE(S): CIS 1000C and COP 1334C (each with a grade of C or higher)

COREQUISITE(S): None

PRE/COREQUISITE(S): None

COURSE DESCRIPTION:
This course provides the student with a solid foundation in Relational Database Management Systems and RDBMS technology. It emphasizes an end-to-end solution, beginning with requirements and progressing through conceptual design, logical database design, physical database design, and implementation, using a RDBMS and the SQL language. It involves extensive database manipulation and querying using SQL. It also stresses transaction management concepts, data integrity constraints, and performance issues.

General Education Requirements – Associate of Arts Degree (AA), meets Area(s): Area
General Education Requirements – Associate in Science Degree (AS), meets Area(s): Area
General Education Requirements – Associate in Applied Science Degree (AAS), meets Area(s): Area

UNIT TITLES

1. **The Database Environment**
2. **The Database Development Process**
3. **Modeling Data in the Organization**
4. **The Enhanced E-R Model and Business Rules**
5. **Logical Database Design and the Relational Model**
6. **Physical Database Design and Performance**
7. **Introduction to SQL**
8. **Advanced SQL**

EVALUATION:

Evaluation instruments will include written and/or skills-based examinations and individual projects and labs. Evaluation methods may also include group in-class labs and/or take-home assignments.

****Required Competencies**

1) **Read with critical comprehension.**

The student will be introduced to the basic texts, concepts, vocabulary, and methods necessary for developing an understanding of the discipline and meeting the required benchmarks as stated in the course outline.

2) **Write clearly and coherently.**

The student will demonstrate an understanding and mastery of subject matter in a variety of ways, including writing. Writing activities may include both graded and ungraded essays, short answer quizzes, summaries, reactions, journals, and various other reports.

3) **Demonstrate and apply literacy across all the disciplines (indicate which ones apply)**.

a) **Information literacy** means understanding how to locate needed information, using the appropriate technology for the task, managing and evaluating the extracted information and using it effectively and ethically.

b) **Technology literacy** is the ability to responsibly and effectively use appropriate technology to access, manage, integrate, or create information, and/or use technology to accomplish a given task.

c) **Workplace literacy** is having the appropriate knowledge and skills to communicate and work with others effectively and perform job duties, whether it is through the use of computers and/or other technology.

d) **Cultural literacy** is recognizing, understanding, and appreciating the similarities and differences between one's own culture and the cultures of others through a study of the arts, customs, beliefs, values, and history that define a culture.

e) **Quantitative literacy** is having the ability to formulate, solve and interpret mathematical/statistical operations and graphical/tabular representations to make informed decisions.

f) **Scientific literacy** means understanding the methodology and application of the scientific process, the physical and biological worlds, and recognizing that scientific knowledge is continuously updated or revised as new information is discovered.

4. **Apply problem-solving skills or methods to make informed decisions in a variety of contexts**.

The student will use acquired skills or methods to recognize, analyze, adapt, and apply critical thinking to solve problems and make informed decisions.

EVALUATION:

In the box to the right of the Methods of Assessment, enter all specific learning outcome numbers (i.e. 1.1, 2.7, 4.0, 4.2 and 5.12) that apply.

1. Portfolio	
2. Short essays	
3. Research Papers	
4. Group projects	
5. Discussions (In class and online)	
6. Multiple Choice tests	
7. Presentations	
8. Service Learning Projects	
9. Pop quizzes	
10. Take-home tests	
11. Summaries and critiques	
12. Reaction papers	
13. Surveys	
14. Performance	
15. Short answer tests	
16. Classroom debates and colloquia	
17. Blogs, wikis, web pages	
18. Other (Please explain)	

Common Course Number: COP 2700C

UNITS

Unit 1

General Outcome:

1.0 The students should be able to understand the database environment and compare database technology and conventional file-processing systems.

Specific Measurable Learning Outcomes:
Upon successful completion of this unit, the student shall be able to:

1.1 Explain why databases will continue to grow in number and importance.

1.2 Name several limitations of conventional file-processing systems.

1.3 Identify five categories of database systems.

1.4 Explain the advantages of using a database approach over using a traditional file-processing approach.

1.5 Identify several cost and risks of the database approach.

1.6 Describe the components of a typical database environment.

1.7 Describe the evolution of database systems.

Common Course Number: COP 2700C

Unit 2

General Outcome:

2.0 The students should be able to explain the process of database development for both structured life cycle and prototyping methodologies.

Specific Measurable Learning Outcomes:
Upon successful completion of this unit, the student shall be able to:

2.1 Describe the life cycle of a systems development project.

2.2 Explain the prototyping approach to database and application development.

2.3 Explain the roles of individuals who design, implement, use, and administer databases.

2.4 Explain the differences between external, conceptual, and internal schemas and the reasons for a three-schema architecture for databases.

2.5 Explain the role of packaged data models in database development.

2.6 Explain the three-tiered location architecture for databases and database processing.

2.7 Explain the scope of a database design and development class project.

2.8 Draw simple data models that show the scope of a database.

Common Course Number: COP 2700C

Unit 3

General Outcome:
3.0 The students should be able to understand conceptual data modeling with the entity-relationship (E-R) model.

Specific Measurable Learning Outcomes:
Upon successful completion of this unit, the student shall be able to:

3.1 State the reasons why data modeling is an important part of the system development approach.

3.2 Write good names and definitions for entities, relationships, and attributes.

3.3 Distinguish unary, binary, and ternary relationships and give an example of each.

1.4 Model each of the following constructs in an E-R diagram: composite attribute, multivalued attribute, derived attribute, associative entity, identifying relationships, and minimum and maximum cardinality constraints.

1.5 Draw an E-R diagram to represent common business situations.

1.6 Convert a many-to-many relationship to an associative entity type.

1.7 Model simple time-dependent data using time stamps and relationships in an E-R diagram.

Common Course Number: COP 2700C

Unit 4

General Outcome:

4.0 The students should be able understand advanced E-R data model constructs.

Specific Measurable Learning Outcomes:
Upon successful completion of this unit, the student shall be able to:

4.1 Understand when to use subtype/supertype relationships in data modeling.

4.2 Use both specialization and generalization techniques for defining supertype/subtype relationships.

4.3 Specify both completeness constraints and disjointness constraints in modeling subtype/supertype relationships.

4.4 Develop a supertype/subtype hierarchy for a realistic business situation.

4.5 Develop an entity cluster to simplify presentation of an E-R diagram.

4.6 Explain the major features and data modeling structures of a universal data model.

4.7 Name the various categories of business rules.

4.8 Define a simple operational constraint using a graphical model or structured English treatment.

Common Course Number: COP 2700C

Unit 5

General Outcome:

5.0 The students should be able to convert a conceptual data model to a relational model.

Specific Measurable Learning Outcomes:
Upon successful completion of this unit, the student shall be able to:

5.1 List properties of relations.

5.2 State properties that is essential for a candidate key.

5.3 Give a concise definition of each of the following: the first normal, the second normal form, and the third normal form.

5.4 Briefly describe some problems that may arise when merging relations.

5.5 Transform an E-R diagram to a logically equivalent set of relations.

5.6 Create relational tables that incorporate entity integrity and referential integrity constraints.

5.7 Use normalization to decompose a relation with anomalies into well-structured relations.

Common Course Number: COP 2700C

Unit 6

General Outcome:
6.0 The students should be able to optimize database performance.

Specific Measurable Learning Outcomes:
Upon successful completion of this unit, the student shall be able to:

6.1 Describe the physical database design process, its objectives, and deliverables.

6.2 Choose storage formats for attributes from a logical data model.

6.3 Select an appropriate file organization by balancing various important design factors.

6.4 Describe three important types of file organization.

6.5 Describe the purpose of indexes and the considerations in selecting attributes to be indexed.

6.6 Translate a relational data model into efficient database structures, including knowing when and how to denormalize the logical data model.

Common Course Number: COP 2700C

Unit 7

General Outcome:

7.0 The students should be able to use some basic SQL commands.

Specific Measurable Learning Outcomes:
Upon successful completion of this unit, the student shall be able to:

7.1 Interpret the history and role of SQL in database development.

7.2 Define a database using the SQL data definition language.

7.3 Write single table queries using SQL commands.

7.4 Establish referential integrity using SQL.

Common Course Number: COP 2700C

Unit 8

General Outcome:

8.0 The students should be able to use advanced SQL commands.

Specific Measurable Learning Outcomes:

Upon successful completion of this unit, the student shall be able to:

8.1 Write single and multiple table queries using SQL commands.

8.2 Define three types of join commands and use SQL to write these commands.

8.3 Write noncorrelated and correlated subqueries and know when to write each.

8.4 Understand common uses of database triggers and stored procedures.

Common Course Number: COP 2700C

Unit 9

General Outcome:

9.0 The students should be able to use templates in program design and development.

Specific Measurable Learning Outcomes:
Upon successful completion of this unit, the student shall be able to:

9.1 Discuss and use function templates

9.2 Overload function templates

9.3 Discuss and use class templates

9.4 Explain class templates and non-type parameters

9.5 Discuss the relationship between templates and inheritance

9.6 Discuss the use of friends with templates

9.7 Explain and use static data members with templates

Common Course Number: COP 2700C

Unit 10

General Outcome:

10.0 The students should be able to incorporate C++'s exception handling features into their programs.

Specific Measurable Learning Outcomes:
Upon successful completion of this unit, the student shall be able to:

10.1 Discuss the concept of exception handling

10.2 Explain when exception handling should be used

10.3 Describe and use try and catch blocks

10.4 Throw an exception

10.5 Catch an exception

10.6 Rethrow an exception

10.7 Throw a conditional expression

10.8 Discuss constructors, destructors and exception handling

10.9 Explain the relationship between exceptions and inheritance.