Miami Dade College

GENERAL INFORMATION	
Course Prefix/Number: CAP2302	Course Title: Advanced Analytics
Number of Credits: 4	

Degree Type	☐ B.A.　☐ B.S.　☐ B.A.S　☒ A.A.　☒ A.S.　☐ A.A.S. ☐ C.C.C.　☐ A.T.C.　☐ V.C.C
Date Submitted: 9-17-2008	Effective Year/Term: 2008-2

☒ New Course Competency　　☐ Revised Course Competency

Course to be designated as a General Education course (part of the 36 hours of A.A. Gen. Ed. coursework) ☒ Yes　　☐ No

The above course links to the following Learning Outcomes:

☒ Communication　　　　　　☐ Social Responsibility
☒ Numbers / Data　　　　　　☐ Ethical Issues
☒ Critical thinking　　　　　　☒ Computer / Technology Usage
☒ Information Literacy　　　　☐ Aesthetic / Creative Activities
☐ Cultural / Global Perspective　☐ Environmental Responsibility

Course Description (limit to 50 words or less):
This is an advanced course in analytics. Students will learn to review and expand the use and fundamentals of databases and database programming for implementing analytics. Students will also learn to design data models and subsequently implement and use analytics and data mining techniques to derive information from domain-specific databases. The MySQL database engine and its SQL implementation will be used.

Prerequisite(s): CAP1301 and CIS1321	Corequisite(s):

Competency 1: The students will demonstrate both a theoretical and practical understanding of databases by:

1. Defining data.
2. Defining information.
3. Describing the process by which inherent information is derived from data.
4. Describing how a database is implemented.
5. Detailing variant database models, how they differ, and the advantages to each model.
6. Describing the methods by which databases are used.
7. Describing different database types and their use in industry and science.
8. Defining a database transaction.

Competency 2: The student will create a database design by:

1. Describing all data types.
2. Discussing the basic tenets of proper database design by describing the impact of:
   a. Data duplication
   b. Data redundancy
   c. Data integrity
   d. Implicit information storage
   e. Referential integrity
3. Describing the components and the symbols that make up an entity relationship diagram.
4. Developing and creating an entity relationship diagram for modeling a database.
5. Describing and executing the general methods of design as applied to databases.

6. Describing normalization.
7. Describing the three primary normal forms.
8. Optimizing the entity-relationship diagram to ensure that the database is normalized.

Competency 3: The student will demonstrate proficiency in SQL by:

1. Describing the basic characteristics of the Standard Query Language.
2. Describing the syntax of SQL.
3. Defining a query.
4. Discussing the basic processes by which a well-constructed query is executed against a database.
5. Writing and implementing basic queries.
6. Writing and implementing basic queries formatted for specific output.
7. Writing and implementing basic queries that use all data types.
8. Writing and implementing basic queries that alter the structure of tables.

Competency 4: The student will demonstrate an understanding of the techniques to optimize information retrieval by:

1. Relating tables in the design.
2. Identifying the data elements by which to relate tables.
3. Relating tables in the database.
4. Describing and exploring the advantages of using an index.
5. Detailing how a database implements and uses indexing.
6. Identifying the optimum data elements for indexing through:
   a. Cardinality,
   b. Uniqueness,
   c. Propensity for transformation.

Competency 5: The student will demonstrate an understanding of basic techniques to derive information by:

1. Describing referential integrity.
2. Describing foreign keys.
3. Writing queries to create/alter tables that incorporate Foreign Keys.
4. Implementing queries that use related tables.
5. Describing joins and join queries.
6. Writing and executing outer join queries.
7. Writing and executing inner join queries.
8. Contrasting the results of the two types of join queries.

Competency 6: The student will demonstrate advanced techniques to derive information by:

1. Writing and executing multi-table joined queries.
2. Writing and executing summarizing queries.
3. Writing and executing nested embedded queries.
4. Writing and executing queries for high-performance retrieval.
5. Writing and executing queries for high-throughput transactional applications.
6. Writing and executing queries that return well-formed XML.

Competency 7: The student will create a database using domain-specific data by:

1. Evaluating metadata.
2. Evaluating the application requirements.
3. Modeling the database design using an entity-relationship diagram.
4. Writing and executing queries which create the database.
5. Importing exiting domain-specific data.
6. Designing, creating and implementing views.

Competency 8: The student will demonstrate the use and interpretation of intermediate analytics on the domain-specific information by:

1. Developing custom-written queries in SQL for creating summarized data from disparate tables.
2. Developing custom-written queries in SQL for drilling-down on the summarized data.
3. Interpreting the results of the drilling-down queries.
4. Developing custom-written queries in SQL to perform data mining.
5. Interpreting the results of the data mining queries.

Competency 9: The student will derive new information that is not inherently modeled in the database by:

1. Performing and reporting on a capstone project that:
   a. Populates a database with publicly available disparate data,
   b. Requires custom-written SQL queries for creating inferential association of data across disparate tables,
   c. Requires custom-written SQL queries for creating symbolic n-dimensional representations of the data model,
   d. Utilizes the skills denoted in competencies 1-8 in order to accomplish Information Discovery.
2. Discussing in written and oral form the relevance and degree of usefulness of the new information derived in the capstone project.