Institutional Syllabus

New Course

X Substantive Change in Existing Course

Date of Last Review: Fall 2009

Date of Most Recent Approval: 

I. **Course Title:** Database Systems

II. **Course Prefix Number:** CSCI 360

III. **Credit Hours:** 2.0

IV. **Prerequisite(s):** CSCI 208 minimum grade of C-

V. **Catalog Description:** Introduction to database design, implementation, security, transaction management, administration, and programming. Includes a study of embedded, relational, object-oriented, and distributed database architectures.

VI. **Curricular Relationships:** This course is required for a B.S. Mathematics degree with an emphasis in Computer Science. It is a recommended course for anyone interested in database design, implementation, or backend programming.

VII. **Student Learning Outcomes**

- Students will have knowledge of database administration issues such as security, monitoring, backup, and recovery.
- Students will have knowledge of and experience with data modeling.
- Students will understand and be able to use relational algebra to describe queries.
- Students will have knowledge of and experience with SQL programming including both DDL and DML.
- Students will understand and utilize the process of normalization to produce a relational design that adheres to 1NF through 4NF standards.
- Students will have knowledge of and experience working with database specific issues such as transaction processing, concurrency, integrity, efficiency, and atomicity.
- Students will understand relational, object-oriented, embedded, and distributed models of database modeling and architecture.
- Students will design, implement, and program at least one database based on a set of user requirements.

VIII. **Content Outline**

- Database systems: History and motivation for database systems; components of database systems; DBMS functions; database architecture and data independence.
- Data modeling: Data modeling; conceptual models; object-oriented model; relational data model; distributed model.
• Relational databases: Mapping conceptual schema to a relational schema; entity and referential integrity; relational algebra, functional dependencies, and normalization.
• SQL, including DDL and DML
• Transaction processing: Transactions, failure and recovery, concurrency control, consistency, schedules, serializability, locking, and timestamping.
• Database Administration: Database backups, recovery, maintenance, monitoring, security
• Database Programming: Various styles and strategies for backend programming from low-level embedded SQL to high-level object based programming.

IX. **Course Procedures/Policies/Grading Scale:**

• Regular homework assignments are a component in determining the course grade.
• At least two examinations are given each semester.
• A comprehensive final examination is given during finals week.
• A significant database project (group or individual) is a component in determining the course grade. The project will involve design, implementation, and backend programming based on a detailed set of user requirements.

X. **Required/Recommended Readings:**

A standard text book will be required. Example books include:


XI. **Issues Unique to Course:** None.

XII. **Additional Departmental Issues:**

This course addresses the topics listed in the CS body of knowledge core as described in the ACM/IEEE document *Computer Science Curriculum 2008: An Interim Revision of CS 2001, Report from the Interim Review Task Force.*

The course includes topics from the following core areas: AL (Algorithms and Complexity), HC (Human-Computer Interaction), SE (Software Engineering), IM (Information Management), and GV (Graphics and Visual Computing).

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<th>IM</th>
<th>Information Models</th>
<th>3 core hours</th>
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<td>IM</td>
<td>Database systems</td>
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<td>IM</td>
<td>Data modeling</td>
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<td>IM</td>
<td>Query languages</td>
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<td>IM</td>
<td>Relational Database Design</td>
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<td>IM</td>
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<td>IM</td>
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<tr>
<td>IM</td>
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