MASTER SYLLABUS

CYBR 216 - Database Fundamentals

Created by: Mehdi Ghayoumi
Updated by: Kambiz Ghazinour
A. **TITLE:** Database Fundamentals

B. **COURSE NUMBER:** CYBR 216

C. **CREDIT HOURS:** 3

D. **WRITING INTENSIVE COURSE:** n/a

E. **GER CATEGORY:** n/a

F. **SEMESTER(S) OFFERED:** Fall and Spring

G. **COURSE DESCRIPTION:** The course "CYBR 216 - Database Fundamentals" at SUNY Canton covers database management systems with a focus on SQL-based products. Topics include logical vs. physical organization, various database models (relational, network, hierarchical), normalization, and creating web-based interfaces for database manipulation. It includes a term project and emphasizes installation and administration of a database server. The course is designed to provide practical and theoretical knowledge in database systems, suitable for students interested in database management and data science.

H. **PRE-REQUISITES/CO-REQUISITES:**

   a. Pre-requisite(s): None.

I. **STUDENT LEARNING OUTCOMES:**

<table>
<thead>
<tr>
<th>Course Student Learning Outcome [SLO]</th>
<th>PSLO (2698)</th>
<th>GER</th>
<th>ISLO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand basic of Databases</td>
<td>Understanding of basic database concepts</td>
<td>5. Industry, Professional, Discipline-Specific Knowledge and Skills</td>
<td></td>
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<tr>
<td>Explain Fundamentals of SQL</td>
<td>Skill in SQL and basic database operations</td>
<td>5. Industry, Professional, Discipline-Specific Knowledge and Skills</td>
<td></td>
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<tr>
<td>List Database Design Principles</td>
<td>Ability to design effective databases</td>
<td>5. Industry, Professional, Discipline-Specific Knowledge and Skills</td>
<td></td>
</tr>
<tr>
<td>Describe Normalization and Data Integrity</td>
<td>Knowledge of data integrity</td>
<td>5. Industry, Professional, Discipline-Specific Knowledge and Skills</td>
<td></td>
</tr>
<tr>
<td>Describe Basic Database Security</td>
<td>Understanding of database security principles</td>
<td>5. Industry, Professional, Discipline-Specific Knowledge and Skills</td>
<td></td>
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<tr>
<td>Explain Database Management and Administration</td>
<td>Competence in database administration</td>
<td>5. Industry, Professional, Discipline-Specific Knowledge and Skills</td>
<td></td>
</tr>
<tr>
<td>Explain Transaction Processing</td>
<td>Understanding of transactions in databases</td>
<td>5. Industry, Professional, Discipline-Specific Knowledge and Skills</td>
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<tr>
<td>Explain Data Warehousing and Reporting</td>
<td>Basics of data warehousing and reporting</td>
<td>5. Industry, Professional, Discipline-Specific Knowledge and Skills</td>
<td></td>
</tr>
</tbody>
</table>
### Describe NoSQL Databases
Knowledge of NoSQL database systems

### Apply learnings in a Capstone Project
Application of learned skills in a project

<table>
<thead>
<tr>
<th>KEY</th>
<th>Institutional Student Learning Outcomes [ISLO 1 – 5]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISLO #</td>
<td>ISLO &amp; Subsets</td>
</tr>
<tr>
<td>1</td>
<td>Communication Skills</td>
</tr>
<tr>
<td>2</td>
<td>Critical Thinking</td>
</tr>
<tr>
<td>3</td>
<td>Foundational Skills</td>
</tr>
<tr>
<td>4</td>
<td>Social Responsibility</td>
</tr>
<tr>
<td>5</td>
<td>Industry, Professional, Discipline Specific Knowledge and Skills</td>
</tr>
</tbody>
</table>

### J. APPLIED LEARNING COMPONENT: Yes______ No_X______
If Yes, select one or more of the following categories:
- Classroom/Lab___
- Internship___
- Clinical Practicum___
- Practicum___
- Service Learning___
- Community Service___
- Civic Engagement___
- Creative Works/Senior Project___
- Research___
- Entrepreneurship___

### K. Suggested TEXTS:
1. "Database System Concepts" by Abraham Silberschatz, Henry F. Korth, and S. Sudarshan. This textbook provides comprehensive coverage of fundamental database concepts, SQL, database design, transaction management, and more. It's suitable for beginners and aligns well with the course's learning outcomes.

### L. REFERENCES: n/a

### M. EQUIPMENT: n/a

### N. GRADING METHOD: A-F

### O. SUGGESTED MEASUREMENT CRITERIA/METHODS:
- Participation Assignments
- Challenge Assignments
- Quizzes
- Exams
P. DETAILED COURSE OUTLINE:

Week 1: Introduction to Databases
- Overview of database systems
- Importance in modern computing

Week 2-3: Fundamentals of SQL
- Basic SQL queries
- Data manipulation

Week 4-5: Database Design Principles
- Entity-relationship models
- Database schemas

Week 6-7: Normalization and Data Integrity
- Normal forms
- Data integrity techniques

Week 8: Midterm Project Overview

Week 9: Basic Database Security
- Security fundamentals
- Protecting against common threats

Week 10-11: Database Management and Administration
- Basic administration tasks
- Database backup and recovery

Week 12: Introduction to Transaction Processing
- Transaction concepts
- ACID properties

Week 13: Data Warehousing and Reporting
- Basics of data warehousing
- Creating reports

Week 14: Introduction to NoSQL Databases
- NoSQL vs. SQL
- Use cases for NoSQL

Week 15: Capstone Project Presentations
- Final project presentations
- Course review and wrap-up

Q. LABORATORY OUTLINE:

n/a