Course: SENG 565 - Database Design and Implementation

Semester: Summer 2019

Course Format And Credit hours: Online (3 credit hours)

Prerequisites: 1. SENG 550 - Object Oriented Design, or instructor consent
2. You must be proficient in at least one programming language (preferably Java, PHP, or JavaScript) and able to learn more languages.

Instructor: Mr. Ron Reaser, MS
342 Advanced Engineering Research Building, Evansdale Campus
Email: ron.reaser@mail.wvu.edu - Slack: https://reaser.slack.com

Office Hours: By appointment (visit https://reaser.org/ to schedule)

Course Description: Database Design and Implementation is an introduction to designing and implementing databases for computer applications. Course projects are designed to develop problem solving, engineering skills, and development skills. Project work will be provided to demonstrate database concepts.

Course Objectives: The objectives of this course are to learn how to use the entity-relationship model (ER), the relational model (RM), Structured Query Language (SQL), and industry standard database management systems to design and implement relational and non-relational databases.

Expected Learning Outcomes: Upon successful completion of this course, students will be able to...
1. Design relational databases using entity-relationship (ER) diagrams.
2. Design relational databases using relational model (RM) schemas.
3. Translate ER diagrams to RM schemas.
5. Solve nontrivial problems using databases by writing data manipulation language (DML) queries in Structured Query Language (SQL).
6. Create applications using these industry-standard software stacks:
   a. Oracle Database (relational model) with Java code and JDBC driver.
   b. MySQL (relational model) with PHP code and MySQLi driver.
   c. MongoDB (“NoSQL” model) with Node.js code and official driver.

Grading:

- Design Assignments (4 @ 10% each) 40%
- Implementation Assignments (2 @ 15% each) 30%
- Exams (2 @ 10% each) 20%
- Attendance and participation 10%

Total: 100%

Grade Scale:

- 100-90 A
- 89-80 B
- 79-70 C
- 69-60 D
- 59-0 F

Grading Policy:

All assignments must be finished and turned in to complete the course. Unless the instructor is notified BEFORE the assignment is due and provides an opportunity for the student to submit his/her assignment late, points may be taken off for late assignments.

Attendance Policy:

Consistent with WVU guidelines, students absent from regularly scheduled examinations because of authorized University activities will have the opportunity to take them at an alternate time. Make-up exams for absences due to any other reason will be at the discretion of the instructor.

Preparation for class means reading the assigned readings and reviewing all information required for that week. Attendance in an online course means logging into eCampus on a regular basis and participating in the activities that are posted in the course.

Feedback Response

Time:

I will generally reply to email and discussion posts within 24 hours, except on weeks or during university recess. Often I will reply much more quickly, but you should not count on a same-day reply. Please plan accordingly so that you don’t miss deadlines. I generally return assignments within one week of when a discussion or assignment closes. If you would like to get help on an assignment ahead of the deadline, please contact me.

Academic Integrity:

The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the West Virginia University Academic Catalog at http://catalog.wvu.edu/undergraduate/coursecredittermclassification/#academicintegritytext. Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see me before the assignment is due to discuss the matter. Student Conduct Code http://campuslife.wvu.edu/r/download/180235.
Inclusivity Statement: The West Virginia University community is committed to creating and fostering a positive learning and working environment based on open communication, mutual respect, and inclusion. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with the Office of Accessibility Services (304) 293-6700. For more information on West Virginia University’s Diversity, Equity, and Inclusion initiatives, please see http://diversity.wvu.edu.

Technical Requirements: Students need to have access to a computer for word processing, e-mail and access to eCampus. Access to the Internet is necessary for completion of this course. Run the Browser Check. This tool will check that you are using a supported Internet browsers and have a valid Java version installed. The required technical skills to participate in this course are:

1. Navigate eCampus and Collaborate
2. Create and submit files in commonly used word processing, diagramming, and source code formats
3. Download and install software
4. Consult software tutorials and other online sources as a method of learning software features

Course Netiquette: The basic premise is that the etiquette expected of students in the online environment is the same as that expected in a classroom. Common courtesy is the guiding rule of Internet communications. Be prepared to communicate effectively when taking an online course. Following these simple netiquette rules in your online class or education environment will ensure your success:

- Never type in ALL CAPS, because it reads as if you ARE SHOUTING AT PEOPLE.
- Act as professionally, via your writing, as you would in a face to face classroom.
- Refrain from inappropriate language and derogatory or personal attacks.
- Do not dominate any discussion. Give other students the opportunity to join in the discussion.
- Disagree with ideas, but avoid challenges that may be interpreted as a personal attack.
- Check that you are replying to the specific person you intend, and not to the entire class.
- Never give your password to another person.
- Respect the virtual classroom. Never forward in-class communications or posts by others outside of this virtual space.
- Never spam your classmates.
- If you quote someone's previous post, only quote enough to make your point.

Be aware of the University’s Academic Integrity and Dishonesty Policy http://catalog.wvu.edu/undergraduate/coursecredittermsclassification/#academicintegritytext. You can review the rules, regulations, and procedures concerning student conduct and discipline for the main campus of West Virginia University, at http://campuslife.wvu.edu/r/download/180235.
Technical Support: For technical assistance, Information Technology Services offers support from 6:30 a.m. to midnight every day, and responds to voicemail and email left overnight at the beginning of each business day. Please contact Information Technology Services at [http://it.wvu.edu/](http://it.wvu.edu/).

Phone: (304) 293-4444  Toll Free: 1(877) 327-9260  Email: ITSHelp@mail.wvu.edu

Course Schedule:

<table>
<thead>
<tr>
<th>Weeks</th>
<th>Course Level Objectives</th>
<th>Unit Level Objectives</th>
<th>Assignment (due End of Week)</th>
<th>To Do List</th>
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</thead>
<tbody>
<tr>
<td>First Half</td>
<td>Design (1-5)</td>
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<tr>
<td>Week 1 5/13 – 5/17</td>
<td>1 ER diagrams</td>
<td>Entities (Regular, Weak), Attributes (Simple/Composite, Multivalued, Stored/Derived), Relationships, Cardinality (1:1, 1:N, N:M), Participation (Total, Partial), Inheritance, Union</td>
<td>Watch Unit 1</td>
<td></td>
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<tr>
<td>Week 2 5/20 – 5/24</td>
<td>2 RM schemas</td>
<td>Tables, Rows, Domains, Null, Primary Keys, Foreign Keys, Uniqueness</td>
<td>Design 1 (ER Diagram)</td>
<td>Watch Unit 2</td>
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<tr>
<td>Week 3 5/27 – 5/31 (Recess 5/27)</td>
<td>3 ER to RM</td>
<td>Regular Entities, Weak Entities, 1:1 Rel’ships, 1:N Rel’ships, M:N Rel’ships, Multivalued Attributes, N-Ary Rel’ships, Inheritance/Union</td>
<td>Watch Unit 3</td>
<td></td>
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<tr>
<td>Week 4 6/3 – 6/7</td>
<td>4 DDL Queries</td>
<td>CREATE DATABASE, GRANT, CREATE /ALTER TABLE</td>
<td>Design 2 (RM Schema)</td>
<td>Watch Unit 4</td>
</tr>
<tr>
<td>Week 5 6/10 – 6/14</td>
<td>5 DML Queries</td>
<td>SELECT FROM, AS aliasing, WHERE criteria, ORDER BY, GROUP BY aggregation, HAVING criteria, nesting</td>
<td>Design 3 (DDL Queries)</td>
<td>Watch Unit 5.1</td>
</tr>
<tr>
<td>Week 6 6/17 – 6/21</td>
<td>5 DML Queries</td>
<td>INSERT INTO, UPDATE SET, DELETE FROM</td>
<td>Exam 1 (Objectives 1-5)</td>
<td>Watch Unit 5.2</td>
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<tr>
<td>Second Half</td>
<td>Implementation (6a-6c)</td>
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<tr>
<td>Week 7 6/24 – 6/28</td>
<td>6a Oracle/Java</td>
<td>Oracle Database, Oracle SQL Developer</td>
<td>Design 4 (DML Queries)</td>
<td>Watch Unit 6a.1</td>
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<td>Week 8 7/1 – 7/5 (Recess 7/4)</td>
<td>6a Oracle/Java</td>
<td>Eclipse IDE, Java, JDBC</td>
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<td>Watch Unit 6a.2</td>
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<td>Week 9 7/8 – 7/12</td>
<td>6b MySQL/PHP</td>
<td>MySQL/MariaDB, phpMyAdmin</td>
<td>Implementation 1 (Oracle/Java)</td>
<td>Watch Unit 6b.1</td>
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<td>Week 10 7/15 – 7/19</td>
<td>6b MySQL/PHP</td>
<td>Atom editor, PHP, MySQLi</td>
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<td>Watch Unit 6b.2</td>
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<tr>
<td>Week 11 7/22 – 7/26</td>
<td>6c Mongo/Node</td>
<td>MongoDB, mLab, JSON</td>
<td>Implementation 2 (MySQL/PHP)</td>
<td>Watch Unit 6c.1</td>
</tr>
<tr>
<td>Week 12 7/29 – 8/2</td>
<td>6c Mongo/Node</td>
<td>Heroku, JavaScript, Node.js</td>
<td>Exam 2 (Objectives 6a-6c)</td>
<td>Watch Unit 6c.2</td>
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