SER 322: Principles of Database Management

Catalog Description:
Fundamental methods in modeling and managing data-oriented systems. Relational, object, and hierarchical data modeling techniques. Query languages including SQL. Semantics of transaction processing. Modern trends in data management including unstructured data, NoSQL and Graph databases.

General Information:

Instructor	Dr. Robert Heinrichs, robert.heinrichs@asu.edu
Office & office hours	Peralta Hall 230R, TTh 12-1pm or via appointment (contact via Slack or email)
Schedule line number	93195
Class website	Canvas: asu.instructure.com
Communication / discussion	Slack (link on Canvas)
Final exam date	Tuesday, December 6, 2:30 - 4:20 PM (in classroom)

Topics:

Class Overview, Introduction to Database systems
Semantic Modeling: Entity and Enhanced Entity Relationship Modeling (ER and EER modeling)
Relational Data Model
Relational Algebra – Selection and Projection
Relational Algebra – Joins and Division
Introduction to Structured Query Language; SQL Data definitions and constraints
SQL Queries, Aggregation, Joins
Translating ER and EER models to Relational schema
Java Database Programming
Hierarchical data model, Unstructured and Semi-structured databases
Normalization
Query Processing and Optimization
Transaction Processing
NOSQL, Graph Databases, Semantic Databases

Course Outcomes:
Students completing SER322 will be able to:
• Design a relational data model solution for problems of non-trivial complexity
• Construct queries to retrieve data from relational databases using SQL
• Analyze a problem from a data perspective and model a solution using Entity Relationship modeling
• Apply normalization theory to normalize a relational database
• Demonstrate an understanding of Query Optimization by explaining how queries are processed, optimized, and evaluated
• Demonstrate an understanding of Transaction Processing by explaining ACID properties of a transaction; logging and recovery techniques
• Demonstrate an understanding of the differences between Unstructured, Semi-structured, Hierarchical, NOSQL, and Graph databases
• Develop, populate, and query relational databases using SQL
• Demonstrate ability to present project results

Recommended Course Materials:
Textbook:
• "Fundamentals of Database Management Systems" by Elmasri & Navathe (latest edition)

Reference Books:
• "A first course in Database Systems" by Jeffrey Ullman & Jennifer Widom
• "An Introduction to Database Systems" by C J Date

Pre- or co-requisite(s):
Prerequisite: SER 222 with C or better.

Other:
• Late submissions will lead to a 10% deduction. Submissions that are submitted 24 hours after the due date will not be accepted.
• All assignments, unless otherwise announced, MUST be submitted to the designated area of Canvas. Do not submit an assignment via email.
• ASU email is an official means of communication among students, faculty, and staff. Students are expected to read and act upon email in a timely fashion. Students bear the responsibility of missed messages and should check their ASU-assigned email regularly.
• Cell phones and pagers must be turned off or set to airplane mode during class to avoid causing distractions.
• The use of recording devices is not permitted during class.

Grading:

Assessment Type	Weight
Quizzes	10%
Final exam	30%
Assignments	30%
Final Project	30%

Grading Scale:

Grade	Percentage range
A+	97% to 100%
A	93% and less than 97%
A-	90% and less than 93%
B+	87% and less than 90%
B	83% and less than 87%
B-	80% and less than 83%
C+	77% and less than 80%
C	70% and less than 77%
D	60% and less than 70%
E	0% and less than 60%

Grade Appeals:
Students may appeal a scored assessment within one week of the grade's posting online. Appeals are in written form only (email only!) and must point to specific evidence of why the grade should be revised. Arbitrary "please regrade because I want a higher score" queries will be discarded without a response. The instructor reserves the right to assign a lower score on appeal.

Absence & Make-Up Policies:
Notify the instructor BEFORE an assignment is due if an urgent situation arises and the assignment will not be submitted on time.

Published assignment due dates (Arizona Mountain Standard time) are firm. Please follow the appropriate University policies to request an accommodation for religious practices (http://www.asu.edu/aad/manuals/acd/acd304-04.html) or to accommodate a missed assignment due to University-sanctioned activities (http://www.asu.edu/aad/manuals/acd/acd304-02.html). Accommodations will be made for religious observances provided that students notify the instructor at the beginning of the semester concerning those dates. Students who expect to miss class due to officially university-sanctioned activities should inform the instructor early in the semester. Alternative arrangements will generally be made for any examinations and other graded in-class work affected by such absences.

Classroom Behavior:
Any violent or threatening conduct by an ASU student in this class will be reported to the ASU Police Department and the Office of the Dean of Students.

Students are expected to participate in the educational process and not be a disruptive element with regard to the learning of others. Safety, self-discipline and respect for others are necessary elements in the educational processes employed in this course. All students should be familiar with the Student Code of Conduct, which can be found at http://www.asu.edu/studentlife/judicial/.

Academic Integrity:
All students in this class are subject to ASU's Academic Integrity Policy (available at http://provost.asu.edu/academicintegrity) and should acquaint themselves with its content and requirements, including a strict prohibition against plagiarism. All violations will be reported to the

Dean's office, who maintain records of all offenses. Students are expected to abide by the FSE Honor Code (http://engineering.asu.edu/integrity/).

The Student Academic Integrity Policy of Arizona State University requires each student to act with honesty and integrity and to respect the rights of others in carrying out all academic assignments. There are a number of actions that constitute a violation of the policy. These actions in this course include, but are not limited to:

1. practicing any form of academic deceit;
2. referring to materials or sources or employing devices (e.g., audio recorders, crib sheets, calculators, solution manuals, or commercial research services) not specifically authorized by the instructor for use during tests, quizzes, homework, and class activities;
3. acting as a substitute for another person in any academic evaluation or using a substitute in any academic evaluation;
4. possessing, buying, selling, or otherwise obtaining or using, without appropriate authorization, a copy of any materials intended to be used for academic evaluation in advance of its administration;
5. on the aid of others to the extent that the work is not representative of the student's abilities, knowing or having good reason to believe that this aid is not authorized by the instructor;
6. providing inappropriate aid to another person, knowing or having good reason to believe the aid is not authorized by the instructor;
7. submitting the ideas or work of another person or persons without customary and proper acknowledgment of sources (i.e., engaging in plagiarism);
8. permitting one's own ideas or work to be submitted by another person without the instructor's authorization; or attempting to influence or change any academic evaluation or record for reasons having no relevance to class achievement.
9. turning in work/code done by someone else or another pair/group
10. copying work/code done by someone else or another pair/group
11. writing code together with someone else or with another pair/group (unless expressly allowed by the instructor)

A common question in programming courses is the use of code that is "googled" or found on popular sites such as StackOverflow. Items 5 and 7 pertain to this situation. Most programmers use reference examples, found in print or online. This is fine as a practice but is not acceptable in situations where you are using code to proxy your understanding of the coding concepts applied in that assessment (i.e. lab or in-class activity). First, if you are uncertain if it is allowable or not, verify directly with the instructor before submitting the assignment. Second, if it is allowable, you are still required to a) adhere to all originating author's constraints on the use and licensing of the code, and b) provide proper attribution (full URL to the code snippet or bibliographic reference to a print item). Failure to do so constitutes a violation of this Academic Integrity Policy.

Students may be allowed to work in small teams on lab and in-class assessments. You are to work with your partners and only your partners as directed by the instructor; receiving assistance from anyone else other than your partners, the graders, teaching assistants, approved tutors or the instructor is considered a violation of this Academic Integrity Policy. Further, on any paired/group assessments you remain individually responsible for the entire solution – you must understand it fully, and there will grades awarded between the individuals in the pair/group. From an ethics standpoint, you have a professional responsibility to your partner to give your best effort on each programming assignment. Failure to do so will be considered an ethics violation.

The penalty for an Academic Integrity Violation (cheating) on any assessment will be a reduction of a course letter grade for the first offense, and failure of the course for a second offense. The penalty for an Academic Integrity Violation (cheating) on an exam is immediate failure of the course. The penalty for an ethics violation will be a zero for the in-class assessment or lab. All violations will be referred to the Dean's Office of the Ira A. Fulton Schools of Engineering.

Disability Accommodations:
Suitable accommodations will be made for students having disabilities and students should notify the instructor as early as possible if they will require same. Such students must be registered with the Disability Resource Center and provide documentation to that effect.

Sexual Discrimination:
Title IX is a federal law that provides that no person be excluded on the basis of sex from participation in, be denied benefits of, or be subjected to discrimination under any education program or activity. Both Title IX and university policy make clear that sexual violence and harassment based on sex is prohibited. An individual who believes they have been subjected to sexual violence or harassed on the basis of sex can seek support, including counseling and academic support, from the university. If you or someone you know has been harassed on the basis of sex or sexually assaulted, you can find information and resources at https://sexualviolenceprevention.asu.edu/faqs.

As a mandated reporter, I am obligated to report any information I become aware of regarding alleged acts of sexual discrimination, including sexual violence and dating violence. ASU Counseling Services, https://eoss.asu.edu/counseling, is available if you wish discuss any concerns confidentially and privately.

Copyright:
All of the contents of these lectures, including written materials distributed to the class, are under copyright protection. Any content of this course is protected and may not be shared, uploaded, sold or distributed. Notes based on these materials may not be shared, uploaded, sold, distributed or commercialized without the express permission of the instructor [see ACD 304-06]. Some materials might be taken from sources apply the Creative Commons license and are reused in accordance with that policy.

Change Notice:
Any information in this syllabus (other than grading and absence policies) may be subject to change with reasonable advance notice.