GRADUATE PROGRAM IN SOFTWARE
Database Management Systems
SEIS630-01 Syllabus
Summer 2020

Course Description and Goals

This course focuses on database management software as a system and explores different components of it. We will discuss the "Relational" database model in this class. Conceptual, logical, and physical database design issues are discussed first. We then focus on the Structure Query Language (SQL) as an implementation and a query language interface. We will also discuss normalization and query performance. In understanding query performance and optimization, we briefly talk about Relational Algebra. Lastly, we study the concepts of database transactions, concurrency control, database failures, and database recovery.

Specifically, students will learn to:

1) Gaining a basic understanding of the database management systems (e.g., factual knowledge, methods, principles, generalizations, theories) (**I**) – Question **1** in IDEA
2) Learn to apply database specific skills to real life situations (**M**) – Question **3** in IDEA
3) Develop specific skills in Entity-Relationship Modeling (ER), SQL, and Query optimization (**E**) – Question **4** in IDEA

Prerequisite

SEIS 610 Software Engineering is required.

Class Hours and Location:

Tuesdays and Thursdays (05/26 to 07/09), 5:45 to 9:00 PM via Zoom

Instructor:

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Voice: 651 962 5554
Mail stop   OSS301
Office hours: Check the sign next to my office door

Email is the best way to reach me. Please make sure to mark your email by **#SEIS630** for ease of locating and categorization. Otherwise, your email could be classified as junk by my inbox filter.

Attendance Policy:

Timely and regular attendance is an expectation of performance for all students. If you cannot make it to a class, **please notify the instructor via email prior to the class time.** If you cannot make it to an exam, **please notify the instructor via email ONE WEEK prior to the exam**. If you miss an exam without notifying the instructor in advance of an absence, no makeup exam will be given unless you have a proper reason. The instructor reserves the right to approve the leave of absence.

Textbooks
Required Text: *Database Processing: Fundamentals, Design, and Implementation*, 15th Edition, by Kroenke, et al. (13th or 14th editions also okay) ISBN: 978-0134802749

The following two books are optional. The first book has information on SQL and data modeling concepts we discuss. The second book has chapters on ER modeling, concurrency control, fault tolerance, query optimization, locking and deadlock handling that we cover in this class.
"Database Management Systems," Third Edition, by Ramakrishnan and Gehrke, McGraw-Hill Publishing, 2003, ISBN 0-07-246563-8.
"Distributed Database Management Systems: A Practical Approach", Rahimi and Haug, Wiley Publishing, 2010, ISBN 978-0470407455

Exams:
There will be three exams for this class. The exams are in class and open book and scheduled as indicated below. Each exam will cover the material not covered in the previous exam(s). You may need to use a computer to connect to Oracle to answer your SQL questions. You are responsible for installing the software necessary to run Oracle Express Edition (XE) on your laptop.

Grading:
Your final grade for the course will be based on the following:
- Attendance (10%)
  - Up to two excused lecture absences are acceptable
  - 50% attendance score reduction for each absence
  - Two or more absences will result in additional grade reduction
  - If you cannot make it to a class, **please notify the instructor via email prior to the class time.**
- Assignments (30%)
  - 5 graded assignments (6% each)
  - No credit for late submissions
- Exams (60%)
  - based on assignments
  - 20% each
  - If you cannot make it to the exam, **please notify the instructor via email ONE WEEK prior to the exam.** If you miss an exam without notifying the instructor in advance of an absence, no makeup exam will be given unless you have a proper reason.

Letter grade will be assigned as follows:
90 – 100   : A-, A
75 – 90   : B-, B, B+
60 – 75   : C-, C, C+
Below 60   : F

Course Outline

Session	Topics	Assignment*	Reading
#1 - 05/26	Introduction • Why a DBMS? Conceptual Modeling • Entity Relationship Model (ER)		Ch1, Ch5
#2 - 05/28	Relational Model • Database Constraints • Relational model (DDL) • ER to Relational model mapping • ER hands-on	#1 assigned	Ch3, Ch6
#3 - 06/02	Relational Model Languages • DDL statements		Ch2
#4 - 06/04	SQL Language • Connecting to Oracle Workshop • Basic SQL statements	#1 due; #2 assigned	Ch2
06/09	**Exam I** – (Session 01-03)		
#5 - 06/11	SQL Language • More Basic statements	#2 due; #3 assigned	Ch2
#6 - 06/16	SQL Language • Other SQL Statements • Loading your database		Ch7
#7 - 06/18	Design Topics • Normalization	#3 due; #4 assigned	Ch3
#8 - 06/23	Query Processing (1) • Optimizing the CPU cost • Indexing B$^+$Tree		
06/25	**Exam II** – (Session 04-06)		
#9 - 06/30	Query Processing (2) • Optimizing the IO cost • Individual operations and total query tree cost	#4 due; #5 assigned	
#10 - 07/02	Database Durability • Fault tolerance • Database recovery		Ch9
#11 - 07/07	Database Consistency Issues • Transaction Management • Concurrency Control • Locking and Deadlocks • Oracle's locking approach	#5 due	Ch9
07/09	**Exam III** – (Session 07-11)		

* Assignments are due at 5:45 pm on the day indicated.

Academic Integrity Policy for GPS

GPS's policy about academic integrity is to assure students understand the definition of academic integrity and are informed about the consequences if they choose to engage in academic dishonesty.

I. Definition – Students are informed about academic integrity and plagiarism
1. Definition of academic integrity is given to students as part of each class syllabus each semester and summer (see below).
2. Instructors discuss academic integrity the first day of class and outline the process and consequences if caught cheating or plagiarizing.

II. Severity - There are many degrees of severity of academic dishonesty. For GPS, plagiarism and cheating could be, but not limited to:
1. Copying someone else's assignment and turning it in as one's own
2. Talking during the test
3. Using a book or unauthorized material during a closed book test
4. Copying someone else's answers for a test
5. Copying someone else's entire program code and delivering it as one's own
6. Copying text (word for word) from texts, magazines, Internet, etc.

III. Actions – depending on the severity of the academic dishonesty, one of the following actions will be taken:
1. If minor, the student will be warned by the faculty member, director will be informed and the incident will be documented in student's file
2. If major, student will be warned, director will be informed, the incident will be documented in students file and student will lose a grade point (A to B, B to C, etc.) for the assignment, project, test or program in which dishonesty happened
3. If severe, (e.g., program code identical to another student's or repeated dishonesty) then student will be given an "F" as the grade for that course, director informed, and the incident will be documented in student's file.

IV. Process – The following explains the process that GPS follows after academic dishonesty has been detected
1. The faculty member who detects the student(s) violation of academic integrity discusses the situation with the GPS Director.
2. The Director and faculty member determine the severity of the dishonesty and the appropriate action.
3. The faculty member provides the GPS Director copies of the dishonest material and an explanation of why it is considered dishonest (possibly the source of the material)
4. Faculty member informs the student(s) of the dishonest act and consequences
5. Students have the right to appeal to the GPS Director the act and consequences.

6. If students still disagree with the consequences imposed, they may contact the Vice President of Academic Affairs.

Plagiarism
The following statement of plagiarism is reprinted here for the use of faculty and students.

The following is a reprint from writing: "A College Handbook, James A.W. Heffernan and John E. Lincoln." By permission W. W. Norton & Company, Inc., Copyright 1982 by W.W. Norton & Company, Inc.

Plagiarism is the dishonest act of presenting the words or thoughts of another writer as if they were your own.
You commit plagiarism whenever you use a source in any way without indicating that you have used it. If you quote anything at all, even a phrase, you must put quotation marks around it, or set it off from your text; if you summarize or paraphrase an author's words, you must clearly indicate where the summary or paraphrase begins and ends; if you use an author's idea, you must say that you are doing so. In every instance, you must also formally acknowledge the written source from which you took the material.

The only time you can use a source without formal acknowledgment is when you refer to a specific phrase, statement, or passage that you have used and acknowledged earlier in the same paper. If the writer has already formally acknowledged the specific source of the material, there is no need to acknowledge it again in the conclusion. Nor is there any need to enumerate the sources of a summary statement based on several different passages that have been used earlier in the paper and have already been acknowledged. But you are free to skip the acknowledgment only when you are referring a second time to exactly the same material. When you use new material from a source already cited, you must make a new acknowledgment.

Here are examples of various kinds of plagiarism. In each instance, the source is a passage from p. 102 of E.R. Dodd's *The Greek and the Irrational* (Berkeley, 1971; reprinted: Boston: Beacon, 1957). First here is the original note, copied accurately from the book.

Functions, Dodds 12, p. 102
"Dreams help us satisfy another important psychic need - our need to vary our social life. This need is regularly thwarted in our waking moments. If the waking world has certain advantages of solitary and continuity its social opportunities are terribly restricted. In it we need as a rule, only the neighbors whereas the dream world offers the chance of intercourse, however fugitive, with our distant friends, our dead and gods. For normal men it is the sole experience in which they escape the offensive and incomprehensible bondage of time and space." And here are five ways of plagiarizing this source:

1. Word-for-word continuous copying without quotation marks or mention of the author's name. Dreams help us satisfy another important psychic need - our need to vary our social life. This need is regularly thwarted in our waking moments. If the waking world has certain advantages of solidity and continuity, its social opportunities are terribly restricted. In it we need, as a rule, only the neighbors, whereas the dream world offers the change of intercourse, however fugitive, with our distant friends, our dead, and our gods. We awaken from such encounters feeling refreshed, the dream having liberated us from the here and now...

2. Copying many words and phrases without quotation marks or mention of the author's name. Dreams help us satisfy another important psychic need - our need to vary our social life. In the waking world our social opportunities, for example, are terribly restricted.....

Copying an occasional key word or phrase without quotation marks or mention of the author's name. Dreams help us satisfy another important psychic need - our need to vary our social life. During our waking hours our social opportunities are terribly restricted. We see only the people next door and our business associates. In contrast, whenever we dream, we can see our distant friends. Even though the encounter is brief, we awaken refreshed, having freed ourselves from the bondage of the here and now...

4. Paraphrasing without mention of the author's name. Dreams help us satisfy another important psychic need - our need to vary our social life. When awake, we are creatures of this time and this place. Those we meet are usually those we live near and work with. When dreaming, on the other hand, we can meet far-off friends. We awaken refreshed by our flight from the here and now.

5. Taking the author's idea without acknowledging the source. Dreams help us to satisfy another important psychic need - the need for a change. They liberate us from the here and now, taking us out of the world we normally live in....

Policy Statement

No late assignments are accepted. If you are going to be having problems turning your assignments or lab work on time, you need to let me know ASAP. I may decide to give you extra time to deliver your work if the reason for being late is acceptable to me.

All team members have to participate in doing the team project equally. I may have to give you a different grade from your team members if it is decided that you did not do your fair share of the work.

Only one paper per team per milestone is accepted for grading. Make sure that you are happy with the work that is being delivered before it is given to me.

Although your project is done in a team setting, your assignments and take home test(s) need to be done by individual students. You will lose the points on the assignment and any take home test(s) if it is determined that the work is a copy of some other student's.

Class attendance is crucial to the learning process because a considerable amount of the course content will be provided as a result of the experience of the instructor. A guideline for absences for courses meeting once a week is one or two excused absences for the semester. In all instances, students are expected to regularly attend class. The student is responsible for informing the instructor of absences ahead of time and is responsible for meeting assignment deadlines regardless of attendance.
No make up test will be given unless it has been approved and arranged before the date of the test.

Academic Integrity - Make sure you read the document about school's policy on cheating and plagiarism.

Disability Statement

Academic accommodations will be provided for qualified students with documented disabilities including but not limited to mental health diagnoses, learning disabilities, Attention Deficit Disorder, chronic medical conditions, visual, mobility, and hearing disabilities. Students are invited to contact the Disability Resources office about accommodations early in the semester. Appointments can be made by calling 651-962-6315 or in person in Murray Herrick, room 110. For further information, you can locate the Disability Resources office on the web at http://www.stthomas.edu/enhancementprog/