College of Allied Health Sciences

Database Design and Modeling

IS 7031

Instructor
Dr. Dong-Gil Ko

Facilitators
Bharath Adagarla
Mrinmay Pundalik
Sumathy Subramanian

Term - Fall Term B

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Faculty & Staff

Dr. Dong-Gil Ko – Primary Instructor

Dr. Dong-Gil Ko is an associate professor and a Lindner Research Fellow in the Carl H. Lindner College of Business at the University of Cincinnati. He holds a BS degree in Electrical Engineering from the University of Maryland, a MBA in International Business/Finance from the George Washington University, and a doctorate in Management of Information Systems from the Katz Graduate School of Business, University of Pittsburgh. He is an active researcher having published in several journals including Management Science, MIS Quarterly, Organization Science, and Information Systems Research. He served on the editorial board of Information Systems Research as an Associate Editor. Dr. Ko has been consistently recognized for teaching excellence having taught a variety of courses at the undergraduate, graduate, and doctoral levels. With over eight years of industry consulting experience, he offers unique experiences to his students. He has supervised more than 30 digital technology client-based projects or start-ups, having secured external funding for nearly all for-profit projects. On international front, Dr. Ko regularly leads study-abroad programs serving as a faculty liaison to Audencia School of Management (Nantes, France).
Syllabus

Program Name: Masters of Science in Health Informatics

Course Title: Database Modeling and Design
Course Number: IS 7031
Semester: Fall 2016
Prerequisites: HI 7001 and HI 7010
Course Credits: 3

Course Description:
This course teaches students principles of data modeling and database design. Students gain hands-on experience data modeling, designing and developing a database for a health scenario. Students gain experience with a querying language such as structured query language (SQL).

Textbooks:

ISBN: 0133048071, 9780133048070, 0672336073, 9780672336072
UC Library offers this as an eBook to students free of charge
(http://uc.summon.serialssolutions.com/document/show?id=FETCHMERGED-uc_catalog_b578500823&s.q=sams+sql+10+minutes&x=0&y=0)

Other Materials:
Software (all available free of charge):
Microsoft SQL Server 2014
Drawing tool of your choice (e.g., MS Visio)
Text Editor of your choice (e.g., NotePad++, TextWrangler)

Reading and Assignments:
Readings and assignments will be specified in each module. Students are expected to acquire required books prior to the first day of classes. You will need a headset with a microphone, a webcam or working internal microphone for this course. Please complete ALL required readings. Assignments must be completed by the due date and all assignments are due by specified time. Please pay attention to time zone; all time stated in this course is based on EST. Please review the late assignment policy below carefully.

Toolbox:
All materials contained in the course toolbox are supplementary to requirements; they are designed to aid the student, but not mandatory.
Course Objectives: 
Students who successfully complete this course will be able to:
1. Gain a foundation on relational database
2. Design a database for a specific health or healthcare problem applying normalization theory
3. Develop a data model
4. Map a conceptual model to a logical model
5. Map a logical model to a physical model
6. Develop a relational database for a specific health or healthcare problem
7. Develop database queries

Learning Activities
A variety of learning activities are designed to support the course objectives, facilitate different learning styles, and build a community of learners. You are expected to devote approximately 18 preparatory hours per week to this course. Learning activities for the modules include:
1. Read and complete textbook assignments
2. Complete other assignments as assigned
3. Complete quizzes and other assignments
4. View (and listen) to lectures (with audio recordings)
5. Participate in discussions by responding to assigned topics/questions and replying to comments posted by faculty or other students
6. Complete project assignments

Course Resources
Resources below could be beneficial. Additional resources will be provided in Blackboard.
Library Resources
- Off-campus access to library resources: http://guides.libraries.uc.edu/content.php?pid=250633&sid=2982851
- Lynda video resources on a variety of topics: http://www.uc.edu/ucit/learningtechnologies/lynda.html
- Library Guide for Informatics
- Library resources for distance learners: http://guides.libraries.uc.edu/distancelearners

Grading Policy
Method for Calculation of Course Grade (point system)

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Module One</th>
<th>Module Two</th>
<th>Module Three</th>
<th>Module Four</th>
<th>Module Five</th>
<th>Module Six</th>
<th>Module Seven</th>
<th>Total Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Homework (27.9%)</td>
<td>125</td>
<td>100</td>
<td>100</td>
<td>50</td>
<td>50</td>
<td>425</td>
<td></td>
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<tr>
<td>Quiz (32.8%)</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>500</td>
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<td>Project (39.3%)</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>200</td>
<td>100</td>
<td>600</td>
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<tr>
<td>Total Points</td>
<td>225</td>
<td>200</td>
<td>300</td>
<td>250</td>
<td>250</td>
<td>200</td>
<td>100</td>
<td>1525</td>
</tr>
</tbody>
</table>
**Grading Scale**

*Policy:*

All grades will be maintained in Blackboard’s online Grade Center. Students are responsible to track their progress by referring to the online grade book. Email me with any questions.

*Grade Scale:*

<table>
<thead>
<tr>
<th>Grade</th>
<th>Minimum Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>X ≥ 93%</td>
</tr>
<tr>
<td>A-</td>
<td>90% ≤ X &lt; 93%</td>
</tr>
<tr>
<td>B+</td>
<td>87% ≤ X &lt; 90%</td>
</tr>
<tr>
<td>B</td>
<td>83% ≤ X &lt; 87%</td>
</tr>
<tr>
<td>B-</td>
<td>80% ≤ X &lt; 83%</td>
</tr>
<tr>
<td>C+</td>
<td>77% ≤ X &lt; 80%</td>
</tr>
<tr>
<td>C</td>
<td>73% ≤ X &lt; 77%</td>
</tr>
<tr>
<td>C-</td>
<td>70% ≤ X &lt; 73%</td>
</tr>
<tr>
<td>F</td>
<td>X &lt; 70%</td>
</tr>
</tbody>
</table>

*Grade Center:* All grades will be maintained in Blackboard’s online Grade Center. Students are responsible to track their progress by referring to the online grade book. It is students’ responsibility to ensure correct grades are reflected in Blackboard. Students have SEVEN full calendar days after grades are posted or assignment due date, whichever is later, to resolve any discrepancies by emailing the instructor.

**Course Policies**

*Late Assignment Policy:* Late assignments will not be accepted under any circumstances because solutions are made available at the same time they are due. In addition to disabling assignment/quiz links at specified due dates and time (preventing students’ ability to submit), late assignments and quizzes will automatically reflect a grade of zero. For this reason, one assignment and one quiz (for a total of two grades) will be dropped at the end of the course – i.e., one lowest assignment grade (percentage-wise) will be dropped + one lowest quiz grade will be dropped. As a note, the only exception to this late assignment policy is if there is a campus-wide, regional, and/or national network connectivity outage. When in doubt, email your instructor making sure to include your assignment.

*Participation Policies:* Students are expected to actively participate in class and in the Blackboard learning environment and to complete all assignments in a timely manner. Infrequent and inconsistent participation and work completion will negatively influence the benefits that may be obtained from the course as well as lead to a lower grade.

*Make-Up Policy:* Pay attention to assignment due date and time. All work will generally be graded and returned within five calendar days. If you have a SERIOUS problem that can be documented/verified and that keeps you from participating on time, please contact me immediately. If you are not passing the class at any point due to missing work, I encourage you to contact me.

You are responsible for timely assignment submission. Should your personal computer system or network go down, you must still turn in your work in a timely manner. Don’t wait until the last minute. Plan ahead by seeking alternative means for submitting your work. Plan to submit your assignments one day ahead of its due date. Local libraries or wifi establishments can serve as alternative resources. Not having access to the required software on your home or work computer is NOT a legitimate excuse for failing to submit your assignments.
**Academic Integrity Policy:** The University Rules, including the Student Code of Conduct, and other policies of the department, college, and university related to academic integrity will be enforced. Any violation of these regulations, including acts of plagiarism, cheating, or falsifying field work will be dealt with according to the severity of the misconduct. Dishonesty in any form may result in a failing grade in a course and/or suspension or dismissal from a program (e.g., graduate or undergraduate).

**Electronic Communication / Email Policy:** Students are required to use a University of Cincinnati email address for all program activity. The primary reasons for the new policy relate to issues of confidentiality, security and the receipt of information from the University of Cincinnati and the Educational Leadership Program.

The University of Cincinnati is now sending many official notices, announcements and important information to students via email. For example, student bills are now sent by email and are no longer mailed through the U.S. Postal Service. To ensure this type of confidential information is sent to the correct individual, items are only sent to student UC email accounts. A UC email address is clearly identified with the student’s name and only a student can register for her/his own email account. Therefore, there is a high level of confidence by the University the student will receive the email. The MSHI program highly recommends that you use Blackboard to send e-mails to ensure that they are delivered and for your records. Please do not use personal e-mails such as yahoo, gmail etc. to communicate with me.

I can be reached via email and will try to respond to all emails within 48 hours. That said, this is a database class. There is a great deal of reliance on IT to learn and complete your activities. Procrastinating and completing your tasks last minute is a potential recipe for disaster especially if SQL or your solution is not behaving as expected. Slow-n-steady will get you far in this class.

**NETIQUETTE**

1. **Be Friendly, Positive and Self---Reflective**
   When people cannot see you, and also do not know you, feelings can be hurt if you are not careful in how you express yourself. The old saying, think before you speak is important here. Think before you write. One word of advice is, do not respond when you feel angry. Wait. Write it down somewhere and come back to it. When you do, you may find that you no longer feel the same way as you did when you wrote it, because you have had time to reflect about the situation. Last, if you still feel the need to be heard, then edit before you post, and write it in terms that are easily embraced. This is also true when you feel a critique is necessary; say it in a positive tone. Reread what you have written to be sure it is positive.

2. **Use Proper Language and Titles**
   Do not use slang or even profane words in an online education environment, even if they are words you consider, "not so bad," as they will sound offensive to the reader. Do not refer to your professor as "Doc" or by his or her first name, unless it is acceptable with him or her to do so. Also, do not use caps lock when typing. It will insinuate yelling. That would hurt someone's feelings and possibly give him (or her) the wrong impression of you.
3- Use Effective Communication
Say what you mean to say. This takes practice and thoughtful writing. Try to speak and write clearly at all times. Again, reread before you respond. Define and restate your words when necessary. Correct a misunderstanding right away. Chances are, if one person felt a certain way about what you said, another may have as well. Likewise, be mindful of chosen words and joking. Let's say for example, I write, "get out!" This slang term can be interpreted in several ways, either positively or negatively.

4- Professionalism
Leave the characters like smiley faces, and instant message abbreviations out. Your friends may like it, but chances are your professor will not. Save it for personal conversations or definitely ask for permission before using them. They may be interpreted as childish or too casual for the online education environment. Last, always say please and thank you.

5- Ask for Clarification
If you are unsure of what was said, or the instructor's directive, or are trying to interpret a person's expressions, then ask again. Do not sit in silence either misunderstanding or feeling offended. Do not interrupt though; wait until there is a break in the conversation, or until the open interaction occurs. Your instructor will appreciate your responsiveness and maturity. A simple way to do this is to say (or write), "I did not understand...", which will always keep the onus for the misunderstanding on yourself.

The Golden Rule of Netiquette
With these top five netiquette rules, you are on your way to a great grade in your online course. Most importantly, when speaking in an online course or in any online environment for that matter, the same rules apply for etiquette as in real-time. The golden rule of netiquette in an online class or environment is, do not do or say online what you would not do or say offline.
# Course Schedule

**October 10th – December 4th, 2016**

Unless otherwise specified, all assignments/projects are due by 11:59 PM (EST) of specified date.

<table>
<thead>
<tr>
<th>Modules/ Dates</th>
<th>Readings</th>
<th>Media</th>
<th>Assignments</th>
<th>Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module 1 Databases: Introduction &amp; Environment&lt;br&gt;10/10 – 10/16</td>
<td>Chapters 1-2</td>
<td>Lecture slides: L1-1&lt;br&gt;L1-2&lt;br&gt;L1-3</td>
<td>Quiz</td>
<td>Successful SQL Server access screen shot</td>
</tr>
<tr>
<td>Module 2 SQL&lt;br&gt;10/17 – 10/23</td>
<td>Chapter 3</td>
<td>Lecture slides: L2-1&lt;br&gt;“how-to” videos will be provided as needed</td>
<td>Quiz</td>
<td>Read and become familiar with project case study</td>
</tr>
<tr>
<td>Module 3 Views &amp; Integrity&lt;br&gt;10/24 – 10/30</td>
<td>Chapter 4</td>
<td>Lecture slides: L3-1&lt;br&gt;“how-to” videos will be provided as needed</td>
<td>Quiz</td>
<td>Complete Step 1 (directions in Bb)</td>
</tr>
<tr>
<td>Module 4 Normalization&lt;br&gt;10/31 – 11/06</td>
<td>Chapter 5</td>
<td>Lecture slides: L4-1&lt;br&gt;“how-to” videos will be provided as needed</td>
<td>Quiz</td>
<td>Complete Step 2 (directions in Bb)</td>
</tr>
<tr>
<td>Module 5 Database Design&lt;br&gt;11/07 – 11/13</td>
<td>Chapter 6</td>
<td>Lecture slides: L5-1&lt;br&gt;“how-to” videos will be provided as needed</td>
<td>Quiz</td>
<td>Complete Step 3 (directions in Bb)</td>
</tr>
<tr>
<td>Module 6 Database Implementation&lt;br&gt;11/14 – 11/27</td>
<td>Project</td>
<td>“how-to” videos will be provided</td>
<td>n/a</td>
<td>Complete Step 4 (directions in Bb)</td>
</tr>
<tr>
<td>Module 7 Database Implementation&lt;br&gt;11/28 – 12/04</td>
<td>Project</td>
<td>“how-to” videos will be provided</td>
<td>n/a</td>
<td>Troubleshoot and/or Finalize</td>
</tr>
</tbody>
</table>

* Bonus points
Module 1: Databases: Introduction & Relational Model
10/10/2016 – 10/16/2016

Topic Overview
In this module, you will be introduced to databases and database management systems. You will also gain an understanding about relational model.

Learning Outcomes
By the end of this module, students will be able to:
1. Understand basic database terminology and describe database management systems (DBMSs)
2. Explain the advantages and disadvantages of database processing
3. Understand Premiere Products, the company that is used as the basis for many of the examples throughout the text
4. Describe the relational model and understand relational algebra

Module Checklist
Your tasks for this module are:
1. Read Chapter 1 (p. 1-22) and Chapter 2 (p. 31-34; 58-65)
2. Review (relevant) “Summary” at the end of each chapter.
3. Go through lecture slides.
4. Complete “Review Questions”. Check your answers against the solution key.
5. Complete “Premiere Products Exercises” questions. Check your answers against the solution key.
7. Complete “Quiz Review”. Check your answers against the solution key.
8. Complete “Quiz” (100 pts).
9. Setup SQL Server database account/access and become familiar with the application.
10. Submit screens shot via Blackboard showing successful creation of Premiere Products and Henry Books Case databases using two *.sql script files (25 pts).

Readings
2. Chapter 2: p. 31-34; 58-65

Media
Introduction to Database in Health
Chapter 1 – Module 1.1 Slides
Chapter 2 – Module 1.2 Slides

Assessment
1. Chapter 1:
   a. Review Questions: 1-5; 7-9; 15
   b. Premiere Products Exercises: 1-7; 9-10
   c. Henry Books Case: 1-8; 11-12
2. Chapter 2:
   a. Review Questions: 1-4; 7; 20; 22
   b. Premiere Products Exercises: Relational Algebra: 1-5
   c. Henry Books Case: Solution in Relational Algebra: 1; 3; 7-9; 11; 12 (bonus 10 pts)
Module 2: SQL

Topic Overview
In this module, you will explore structured query language (SQL).

Learning Outcomes
By the end of this module, students will be able to:
1. Understand SQL
2. Become familiar with SQL commands

Module Checklist
Your tasks for this module are:
1. Read Chapter 3 (p. 71-113).
2. Review (relevant) “Summary” at the end of the chapter.
3. Review “Key Terms” at the end of the chapter.
4. Go through lecture slides.
5. Complete “Review Questions”. Check your answers against the solution key.
6. Complete “Premiere Products Exercises” questions. Check your answers against the solution key.
7. Complete “Henry Books Case” questions. Submit your assignment via Blackboard (100 pts).
8. Complete “Quiz Review”. Check your answers against the solution key.
9. Complete “Quiz” (100 pts).
10. Setup database environment and upload data into database.
11. Read Project Case Study.

Readings
1. Chapter 3

Media
Chapter 3 – Module 2 Slides

Assessment
1. Chapter 3:
   a. Review Questions: 2-6; 8-10; 12
   b. Premiere Products Exercises: 1-16
   c. Henry Books Case: 3; 5; 7; 12; 17; 18 (bonus 10 pts)
      [Be sure to include SQL and screen shots from SQL Server database!]
2. SQL Server:
   a. Use optional textbook information to “play” around with SQL.
3. Project:
   a. Read and become familiar with Victoria Hospital case study.
Module 3: Views & Integrity
10/24/2016 – 10/30/2016

Topic Overview
In this module, you will primarily focus on views and integrity constraints.

Learning Outcomes
By the end of this module, students will be able to:
1. Define, describe, and use views.
2. Discuss entity, referential, and legal-values integrity.
3. Define system catalog and discuss stored procedures and triggers.

Module Checklist
Your tasks for this module are:
1. Read Chapter 4 (p. 119-147).
2. Review (relevant) “Summary” at the end of the chapter.
3. Review “Key Terms” at the end of the chapter.
4. Go through lecture slides.
5. Complete “Review Questions”. Check your answers against the solution key.
6. Complete “Premiere Products Exercises” questions. Check your answers against the solution key.
7. Complete “Henry Books Case” questions. Submit your assignment via Blackboard (100 pts).
8. Complete “Quiz Review”. Check your answers against the solution key.
9. Complete “Quiz” (100 pts).
10. Complete project case study Step 1.

Readings
1. Chapter 4

Media
1. Chapter 4 – Module 3 Slides

Assessment
1. Chapter 4:
   a. Review Questions: 1-2; 4; 11-16
   b. Premiere Products Exercises: 2; 4-6; 11
   c. Henry Books Case: 2; 4; 5; 8; 9; 12 (bonus 10 pts)
      [Be sure to include SQL and screen shots from SQL Server database!]

2. Project:
   a. Complete project case study Step 1
Module 4: Normalization
10/31/2016 – 11/06/2016

Topic Overview
In this module, you will explore database system development lifecycle, entity-relationship modeling, enhanced entity-relationship modeling, and normalization.

Learning Outcomes
By the end of this module, students will be able to:
1. Discuss functional dependence and primary keys
2. Define first normal up to fourth normal forms
3. Understand how normalization is used in the database design process
4. Identify functional dependencies
5. Identity and convert normal forms

Module Checklist
Your tasks for this module are:
1. Read Chapter 5 (p. 155-178).
2. Review (relevant) “Summary” at the end of the chapter.
3. Review “Key Terms” at the end of the chapter.
4. Go through lecture slides.
5. Complete “Review Questions”. Check your answers against the solution key.
6. Complete “Premiere Products Exercises” questions. Check your answers against the solution key.
8. Complete “Quiz Review”. Check your answers against the solution key.
9. Complete “Quiz” (100 pts).
10. Complete project case study Step 2.

Readings
1. Chapter 5

Media
Chapter 5 – Module 4 Slides

Assessment
1. Chapter 5:
   a. Review Questions: 1; 3-7; 11-12
   b. Premiere Products Exercises: 1; 3
   c. Henry Books Case: 2
2. Project:
   a. Complete project case study Step 2
Module 5: Database Design

Topic Overview
In this module, you will explore database design.

Learning Outcomes
By the end of this module, students will be able to:
1. Understand design methodology.
2. Use entity-relationship modeling to build a conceptual data model.
3. Validate conceptual model.
4. Examine ER model for designing databases.

Module Checklist
Your tasks for this module are:
1. Read Chapter 6 (p. 183-222).
2. Review (relevant) “Summary” at the end of the chapter.
3. Review “Key Terms” at the end of the chapter.
4. Go through lecture slides.
5. Complete “Review Questions”. Check your answers against the solution key.
6. Complete “Premiere Products Exercises” questions. Check your answers against the solution key.
8. Complete “Quiz Review”. Check your answers against the solution key.
9. Complete “Quiz” (100 pts).
10. Complete project case study Step 3.

Readings
1. Chapter 6

Media
Chapter 6 – Module 5 Slides

Assessment
1. Chapter 6:
   a. Review Questions: 1-2; 4; 14
   b. Premiere Products Exercises: 1; 3; 5
   c. Henry Books Case: 1
2. Project:
   a. Complete project case study Step 3
Module 6: Database Implementation

Topic Overview
In this module, you will implement your database.

Learning Outcomes
By the end of this module, students will be able to:
1. Apply concepts and SQL learned during course.
2. Create and implement a database.

Module Checklist
Your tasks for this module are:
1. Complete project case study Step 4
   a. Create SQL scripts for creating your project database.
   b. Populate database with data.
   c. Incorporate relationships and data integrity.
   d. Submit your SQL script and screen shots via Blackboard.

Assessment
1. Project:
   a. Complete project case study Step 4
Module 7: Database Implementation Completion

Topic Overview

In this module, you will make corrections and add a feature to your database.

Learning Outcomes

By the end of this module, students will be able to:
1. Troubleshoot problems/errors with database design and SQL.
2. Implement an added feature.

Module Checklist

Your tasks for this module are:
1. Test to ensure requirements are met.
2. Identify errors/problems and troubleshoot.
3. Make needed corrections/changes.
4. Revise SQL script.
5. Submit your statement of changes, revised SQL script, and screen shots via Blackboard.

Assessment

1. Project:
   a. Complete final project
   b. For those receiving a perfect score on Project Case Study Step 4, you will automatically receive a grade of 100% for this assignment given that you have no revision to make.
IS7031
Suggested Timeline

**HENRY BOOKS CASE**
**QUIZ**
**PROJECTS**

<table>
<thead>
<tr>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review requirements for upcoming week’s topic</td>
<td>Read Chapters</td>
<td>Complete “Review Questions” and “Premiere Products Exercises”</td>
<td>Submit “Henry Books Case”</td>
<td>Submit Quiz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review lecture slides</td>
<td>Review “Summary” and “Key Terms”</td>
<td>Complete “Quiz Review”</td>
<td>Work on SQL Server activities</td>
<td>Submit Project work</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>