Department of Environmental and Public Health Sciences/ Department of Biomedical Informatics

I. Course Information:

Title: Introduction to Database Systems and Applications
Course #: BE/PH8093, BMINxxxx   ***Credit Hours:*** 3
Course #: MEDS2060   ***Credit Hours:*** 2
Term: Fall 2021
Prerequisites: Undergraduate students should have taken at least one course in computer programming (any language) or statistics (any tool). For graduate students, there is no prerequisites. However, graduate students are expected to be familiar with R programing language and have basic statistics skills. The class has a capacity of 20 including both graduate and undergraduate students.

II. Instructor Information:

Name: Dr. Danny T.Y. Wu
Title: Assistant Professor
Office Information: Medical Sciences Building, Room 6465
Office: (513)558-6464
Email: wutz@ucmail.uc.edu
Office Hours: By Appointment

Name: Dr. Li Zhang
Title: Associate Professor
Office Information: Kettering Complex, Room 106
Office: (513)558-3199
Email: zhang3l3@ucmail.uc.edu
Office Hours: By Appointment

(instructors are ordered alphabetically by their last name)

Communication Policy: Students are encouraged to contact the instructors anytime via email. A response will be given within 48 hours except on weekends.

III. Course Materials

Required
- N/A

Optional
- Learning SQL: Master SQL Fundamentals 2nd Edition (ISBN: 978-0596520830)
- Next Generation Databases: NoSQL and Big Data 1st Edition (ISBN: 978-1484213308)
- R in Action: Data Analysis and Graphics with R 2nd Edition 2nd Edition (ISBN: 978-1617291388)
- SQLite https://www.sqlite.org/index.html
- DB Browser for SQLite https://sqlitebrowser.org/

- RStudio https://rstudio.com/
- R-Shiny https://shiny.rstudio.com/

IV. Course Description:

This course is designed to provide students with basic knowledge and hands-on experience in database systems and applications. The course material covers both relational databases and non-relational databases. Students will have the opportunity to perform basic tasks in database management and data analysis in the classroom in a highly interactive manner. The examples and assignments used in the course are derived from real problems to help students to obtain practical data management skills.

V. Student Learning Outcomes:

The following table lists the four learning objectives of the course and how they are assessed through assignments and the final project. The graduate students will have 4 assignments and a final project. The third assignment (Homework 3b) will ask the graduate students to write a proposal of the final project so that the instructor(s) can help them refine the project scope in the early stage. The undergraduate students, on the other hand, will have 4 assignments but no final project. Three of the undergraduate assignments (1st, 2nd, and 4th) are the same as the graduate students. However, undergraduate students may work as a group of two on all assignments. In this case, the students who work together will have to submit an individual survey to indicate the contribution of the partner. For the 3rd assignment, instead of writing the proposal, undergraduate students will have a regular assignment to assess their learning outcomes of database applications (Homework 3a).

Upon successful completion of this course, the learner will be able to:	How is this outcome assessed?	
	Undergrad	Graduate
1. LO #1 Structured Query Language	Homework #1	Homework #1, Final Project
2. LO #2 Relational Database Design	Homework #2	Homework #2, Final Project
3. LO #3 Database Applications	Homework #3a	Homework #3b, Final Project
4. LO #4 NoSQL databases	Homework #4	Homework #4

VI. Instructional Methods (Including Description about Bb):

The following course has the Canvas Learning Management System to provide student-centered online learning that will enhance the teaching and learning process. If you are not familiar with these tools, please visit https://www.uc.edu/cetl/canvas/canvas-first-steps-and-tips.html.

VII. Course Communication:

University policy requires that the email set up in Canvas is the primary means of communication. It is advisable that you use your UC email for this purpose and that you check it often. If you choose to change your email in Canvas to a non-UC email it is your responsibility to ensure you check it frequently.

VIII. Course and Grading Policies:

1. **Course Contract:** Upon officially registering for the course, the student assumes responsibility for understanding and complying with the entire contents of the course syllabus. It is the student's responsibility to raise questions or concerns directly with the instructor. The course instructor reserves the right to change, modify, add or delete any class assignment, reading, or activity at any time. Such changes will be made at the earliest possible time.

2. **Academic Code of Conduct:** Academic misconduct or dishonesty is defined in the University of Cincinnati Student Code of Conduct. Academic misconduct includes, but is not limited to: acts of cheating, plagiarism, falsification, and misappropriation of credit. The Student Code of Conduct defines behavior expected of all University of Cincinnati students. It is each student's responsibility to know and comply with the University's Student Code of Conduct. Disciplinary procedures are explained in a step-by-step manner, and the procedures for appeal of decisions are stated. (see: UC's Student Code of Conduct)

   Plagiarism is defined as:
   - Submitting another's published or unpublished work in whole, in part, or in paraphrase, as one's own without fully and properly crediting the author with footnotes, quotation marks, citations, or bibliographic reference.
   - Submitting as one's own original work, material obtained from an individual, agency, or the internet without reference to the person, agency or webpage as the course of the material.
   - Submitting as one's own original work material that has been produced through unacknowledged collaboration with others without release in writing from collaborators.
   - Submitting one's own previously written or oral work without modification and instructor permission.

   Plagiarism will not be tolerated and according to the Student Code of Conduct (https://www.uc.edu/conduct/Code_of_Conduct.html), may result in the following consequences:
   - Formal report of academic misconduct.
   - Reduced or failing grade on the exercise.
   - Reduced or failing grade for the course.
   - Recommendation to the College Hearing Panel/Dean/Provost for probation, suspension, or dismissal.

   Plagiarism will be detected using multiple methods in this course to ensure the compliance of this important academic conduct. The instructors have the obligation to and will report any misconduct on this matter to the program director(s).

3. *Disability:* Students with disabilities who need academic accommodations or other specialized services while attending the University of Cincinnati will receive reasonable accommodations to meet their individual needs as well as advocacy assistance on disability-related issues. Students requiring special accommodation must register with the Disability Services Office. UC's Disability Services Office.

4. **Counseling Services, Clifton Campus:** Students have access to counseling and mental health care through the University Health Services (UHS), which can provide both psychotherapy and psychiatric services. In addition, Counseling and Psychological Services (CAPS) can provide professional

counseling upon request; students may receive five free counseling sessions through CAPS without insurance. Students are encouraged to seek assistance for anxiety, depression, trauma/assault, adjustment to college life, interpersonal/relational difficulty, sexuality, family conflict, grief and loss, disordered eating and body image, alcohol and substance abuse, anger management, identity development and issues related to diversity, concerns associated with sexual orientation and spirituality concerns, as well as any other issue of concerns. After hours, students may call UHS at 513-556-2564 or CAPS Cares at 513-556-0648. For urgent physician consultation after-hours students may call 513-584-7777.

5. **Title IX:** Title IX is a federal civil rights law that prohibits discrimination on the basis of your actual or perceived sex, gender, gender identity, gender expression, or sexual orientation. Title IX also covers sexual violence, dating or domestic violence, and stalking. If a Title IX issue is disclosed by a student, the instructors are required forward that information to the Title IX Office, who will follow up with the student about how the University can take steps to address the impact on the student and the community and make the student aware of his/her rights and resources. The title IX office's priority is to make sure students are safe and successful here at the University of Cincinnati. Students are not required to talk with the Title IX Office. If you would like to make a report of sex or gender-based discrimination, harassment, or violence, or would like to know more about your rights and resources on campus, please consult UC's webpage for Title IX or contact the office at (513) 556-3349.

6. **Missed and/or late examinations, quizzes, and graded exercises:**
Students should not expect to get credits from the instructors for late submissions and missed final exam. Students should notify the instructors as soon as possible for medical conditions and other emergencies that prevent them from submitting assignments on time and/or taking the final exam.

7. **CoM Weather Related Protocol**: When inclement weather threatens the safety of the University of Cincinnati community, the Senior Vice President for Administration and Finance may invoke University Rule 3361: 10-55-01 and declare an emergency closing. College of Medicine Students: Graduate Students – follow all University snow policies and procedures. All classes and exams are canceled when the university has closed. On days when the University delays opening, classes and exams will resume at the hour that the University reopens if this is at or before 3 pm.

8. **Criteria for letter grades**: The course grade will be based on the performance. Undergraduate students will not have a final project and their total points available is 100. Graduate students will have a final project and their total points available is 200. Dr. Danny Wu will be grading all assignments and the attendance of undergraduate students. Dr. Li Zhang will be grading the final project and the attendance of graduate students. For undergraduate students, the attendance will come from two equal parts. First, undergraduate students will receive 1 point for each week they join. Since there are 10 weeks in total (see the second table in IX. Course Schule), undergraduate students can earn 10 points for attendance. Second, undergraduate students will fill out a survey to indicate the contribution of the partner if they choose to work in a group on a homework. Each survey is 2.5 points. Since there are 4 homework assignments, undergraduate students can earn the other 10 points for homework participation. In the case where undergraduate students choose to work individually for a homework, they do not need to fill out the survey and will receive the full credit (2.5 points) for this homework participation.

Point Allocation (Graduate):

Assignments (4)	*20 points each*
Final Project (1)	*100 points each*
Attendance & Participation	*20 points*
Total Points Available	***200 points***

Point Allocation (Undergraduate):

Assignments (4)	*20 points each*
Attendance & Participation	*20 points*
Total Points Available	***100 points***

Grading Scale (for all)

Overall Percentage / Points	Letter Grade
93% and above	A
90%	A-
87%	B+
83%	B
80%	B-
77%	C+
73%	C
70%	C-
Below 70%	F

IX. Course Schedule:

Weeks/Dates	Topic(s):	Instructor	Homework	Due Dates
Week 01 (08/26)	Course Overview & Jump Start	Li Zhang		
Week 02 (09/02)	Database Overview	Li Zhang		
Week 03 (09/09)	Structured Query Language I	Danny Wu		
Week 04 (09/16)	Structured Query Language II	Danny Wu	HW1 released	
Week 05 (09/23)	Relational Database Design I	Danny Wu		HW1 due
Week 06 (09/30)	Relational Database Design II	Danny Wu	HW2 released	HW1 review
Week 07 (10/07)	Database Applications I	Danny Wu		HW2 due
Week 08 (10/14)	Database Applications II	Danny Wu	HW3a released	HW2 review
Week 09 (10/21)	Final Project Introduction	Li Zhang	HW3b released	HW3a due
Week 10 (10/28)	NoSQL Database I	Danny Wu		HW3a review
Week 11 (11/04)	NoSQL Database II	Danny Wu	HW4 released	HW3b due
Week 12 (11/11)	Advanced Data Analytics	Li Zhang		HW4 due
Week 13 (11/18)	Final Project Preparation	Li Zhang		
Week 14 (11/25)	Thanksgiving Week (no class)			
Week 15 (12/02)	Final Project Presentation	Li Zhang		
Week 16 (12/07)	Final Report Submission (no class), due by the end of day (11:59pm)			

Weeks/Dates	Topic(s):	Instructor	Undergrad	Graduate
Week 01 (08/27)	Course Overview & Jump Start	Li Zhang	X	X
Week 02 (09/03)	Database Overview	Li Zhang	X	X
Week 03 (09/10)	Structured Query Language I	Danny Wu	X	X
Week 04 (09/17)	Structured Query Language II	Danny Wu	X	X
Week 05 (09/24)	Relational Database Design I	Danny Wu	X	X
Week 06 (10/01)	Relational Database Design II	Danny Wu	X	X
Week 07 (10/08)	Database Applications I	Danny Wu	X	X
Week 08 (10/15)	Database Applications II	Danny Wu	X	X
Week 09 (10/22)	Final Project Introduction	Li Zhang		X
Week 10 (10/29)	NoSQL Database I	Danny Wu	X	X
Week 11 (11/05)	NoSQL Database II	Danny Wu	X	X
Week 12 (11/12)	Advanced Data Analytics	Li Zhang		X
Week 13 (11/19)	Final Project Preparation	Li Zhang		X
Week 14 (11/26)	Thanksgiving Week (no class)			
Week 15 (12/03)	Final Project Presentation	Li Zhang		X
Week 16 (12/10)	Final Report Submission (no class), due by the end of day (11:59pm)			