CECS 535
Introduction to Databases
Spring 2020

- **Instructor:** Antonio Badia. Email: `abadia@louisville.edu`. Office: Duthie Center 207. Phone number: `852-0478`. Office hours: Tuesdays and Thursdays, 12:30 to 1:30, and by appointment. To make an appointment, please send an email with the subject "535 appointment" and a list of possible meeting times.

- **Lectures:** The on-campus version of this class meets on Mondays, Wednesdays and Fridays from 1 pm to 1:50 pm.

- **Absences:** Attendance is not controlled, but making up material from missed classes is the student's responsibility.

- **Prerequisites:** This course is an introduction to database systems for Computer Science and Computer Engineering majors. It assumes basic knowledge of computer organization, data structures, and high-level programming languages (at a minimum, knowledge of programming, memory management, trees, and hash tables is assumed). It can be taken both by undergraduate and graduate students (given the proper background). **If you are not in one of these groups, please contact the instructor ASAP!**

- **Textbook:** This course uses a custom, abridged (and much cheaper) version of *Fundamentals of Database Systems, 7th Edition*, Elmasri and Navathe, Addison-Wesley. The custom, loose-leaf edition should be available at the Bookstore; the ISBN is 978-1-323-34622-8. The custom eBook ISBN is 1323346651. The eBook can be purchased from this link: `http://pearsonecontent.com/?1323346651` Buying the textbook is not mandatory. However, it is highly recommended, since I do use the textbook in the lectures and I cannot post the slides; this is prevented by copyright considerations. **IMPORTANT:** additional material will be posted to the course web page on Blackboard. *It is your responsibility to look up that page often;* information will be posted there periodically. Updates will be ongoing throughout the semester. **You are responsible for reading all the material and any supplementary material that is posted to Blackboard. Any such material may be covered on the exam**. You are encouraged to ask any questions you may have to the instructor.

- **Course Description:** The following is a summary of the topics that we will cover in this semester.

  1. Introduction and Overview of Database Management Systems
  2. The Relational Data Model: relations, schemas and extension. Keys, foreign keys, integrity constraints.
  3. SQL: Data Definition Statements (CREATE TABLE).
  4. Query Languages: Relational Algebra.
  5. SQL: data manipulation statements (SELECT). Basic operations, aggregation and grouping, subqueries, and views. Triggers and embedded SQL.
  6. Database Design I: conceptual modeling (E-R diagrams), from E-R diagrams to database schemas.
  7. Database Design II: functional dependencies and normalization, integrity constraints and design issues.
  8. Query Processing and Optimization: data storage, query trees, implementation of relational operators, and relational query optimization.
  9. Transactions: basic concepts on concurrency control and crash recovery. ACID Transactions. Write-ahead logs, locking.

- **Course Objectives:** At the end of the semester a successful student will be able to:

  1. Understand the basic concepts behind relational databases, including how data is represented and stored, and how it is manipulated.
  2. Acquire a solid understanding of the SQL standard.
  3. Become familiar with database design principles and their use.
  4. Understand the main factors that impact database performance, including transactions and query processing.
  5. Be able to understand the database administrators manual for most commercial relational database systems.

- **Exams:** There will be two exams, the first one an in-class midterm exam halfway through the semester, covering points (1) to (5). The midterm will take place during the 8th week of classes; the exact date be announced in class and on Blackboard.

  A Note on Late Withdrawal Every semester I aim to have the midterm exam done and graded before the late withdrawal date so that students can make an informed decision about whether to continue with the class. If for whatever reason this does not work out, students can use the grades for Homework 1 and Homework 2 (which will always take place before the midterm, and usually are good indicators of performance in the midterm) as guidance for any enrollment decision. Please note that the instructor cannot give advice as to what to do; this is a decision that each student must take based on his/her personal circumstances.

  The second and last exam is a two and a half hour final, emphasizing the material covered since the first exam ((6) to (10)). The final exam takes place during exam's week; the date is Thursday, April 23.

  To both exams you can bring one sheet of paper, written on both sides, with any material you wish.

- **Homeworks and Project**: There will be 4 homeworks handed out throughout the semester, 2 before the midterm and 2 more before the final exam. Homeworks will be distributed through Blackboard. Students will have at least 4 working days to complete each homework. Late homeworks will carry a 20% penalty per day. Homeworks are returned to students, graded, before the exams. The main purpose of the homeworks is to help you prepare for the exams and therefore they are *very important*, even though they carry little grade weight. In the past, *failure to complete homeworks has shown a strong correlation with low grades*!

- **Project:** There will also be a project, handed out in the second half of the semester and due the last day of classes. It is your responsibility to complete the project in a timely manner. In particular, it is strongly recommended that you do not wait until the last few days before the deadline to work in the project. No extensions will be given for the project.

  The project will be carried out using MySQL. Pointers to documentation will be provided. Even so, if you dont have any previous experience with this system, or with installing software, some issues may arise. In most cases, those issues can be solved by searching for help on your own (i.e. using Google or checking sites like Stackoverflow (www.stackoverflow.com)).

- **Grades:** Your grade in this course is based *solely* on your performance (i.e. scores) on the exams, project and homeworks. There is no extra credit opportunities. Grades are computed as follows: midterm exam, 40%; final exam, 40%; project, 10%; homeworks (all together), 10%. Cut points are 90 for As, 80 for Bs, 70 for Cs, and 60 for Ds. *There is no grade curving in this class.* Pluses and minuses are given on 3-point intervals. The instructor reserves the right to adjust the nal (letter) grade in cases where the numerical grade falls between two letter grades; if made, adjustments are always made to the benefit of the student.

We may have graduate and undergraduate students together in this class. If so, both groups will be graded together on the same scale; however, graduate students' exams will have extra questions on them.

- **Calendar:** The semester calendar for the course is available at the University of Louisville's web site. Lectures start on Monday, January 6, and end on Monday, April 20. There are no lectures on Monday, January 20 (Martin Luther King Day), and the week of Monday, March 9 to Sunday, March 15 (Spring Break).

- **Exam make-ups:** No make-ups will be given except for documented, exceptional circumstances. This is especially true of the final exam; the date is posted on the University's Web site from the beginning of the semester, so please take note and plan accordingly. The decision of offering a make-up to a student or not is entirely to the discretion of the instructor, who will decide on a case-by-case basis. The instructor will base the decision on whether the disrupting event was (a) unforeseen, and it was not reasonable to expect the student to foresee it; (b) out of the control of the student; and (c) disruptive to the students ability to take the exam.

- **Grading questions:** If you have a question about a grade, you should see the instructor as soon as possible. You can ask for a review any time, but it is recommended that if you have any concerns you let your instructor know right away.

- **Incompletes:** If, because of unexpected circumstances, a student is unable to complete the course work within the semester deadlines, the student should contact the instructor as soon as possible to explain the nature and impact of such circumstances. If the instructors determines that such circumstances are (a) unexpected, and it was not reasonable to expect the student to foresee them; (b) out of the control of the student; and (c) negatively aecting the students ability to work in a normal manner, the instructor may grant an Incomplete grade. This determination is made solely by the judgment of the instructor. Please be aware that incomplete grades are granted very rarely and only under extenuating circumstances. Incompletes can only be requested before the last day of lectures.

- **Academic dishonesty:** Students are expected to do their own work. Students are allowed to discuss class assignments and material with classmates; however, what is turned in (including all homeworks, projects and exams) should be exclusively the authorship of the student. Academic dishonesty is a serious offense at Speed School of Engineering because it undermines the bonds of trust and honesty between members of the community and defrauds those who may eventually depend upon our knowledge and integrity. Students are expected to recognize and to uphold standards of intellectual integrity. The J. B. Speed School of Engineering assumes that all work submitted represents the student's own efforts. Academic dishonesty is defined in the University of Louisville's Code of Student Rights and Responsibilities. It is the student's responsibility to become familiar with the Code.

- **Students with Special Needs:** Students with special needs will be accommodated and all necessary arrangements will be made to facilitate learning the material, doing the assignments, and taking the exams. However, students should let the instructor know *during the first week of classes* that they require special accommodations. Failure to let the instructor know in advance of his or her situation does not entitle the student to repeat past work. The special need may have to be documented properly.

- **Cancellations Policy:** If a class has to be canceled due to some unexpected event, I will make every effort to post a note on Blackboard as soon as possible. When there is cancellation of classes due to weather, the university procedures will be followed.

- **Title IX/Clery Act Notification**

  Sexual misconduct (including sexual harassment, sexual assault, and any other nonconsensual behavior of a sexual nature) and sex discrimination violate University policies. Students experiencing such behavior may obtain confidential support from the PEACC Program (852-2663), Counseling Center

(852-6585), and Campus Health Services (852-6479). To report sexual misconduct or sex discrimination, contact the Dean of Students (852-5787) or University of Louisville Police (852-6111).

Disclosure to University faculty or instructors of sexual misconduct, domestic violence, dating violence, or sex discrimination occurring on campus, in a University-sponsored program, or involving a campus visitor or University student or employee (whether current or former) is not confidential under Title IX. Faculty and instructors must forward such reports, including names and circumstances, to the Universitys Title IX officer.

For more information, see `http://louisville.edu/hr/employeerelations/sexual-misconduct-brochure`.