Rensselaer

Course Syllabus

Course Information

Database Systems	CSCI 4380	Section 01
RPI Fall 2020	4 cr	
Lecture	MR 2:30PM-4:20 PM	ONLINE

Course Website: https://www.cs.rpi.edu/~sibel/csci4380/fall2020
Homeworks, Exercises and Discussions: https://submitty.cs.rpi.edu/courses/f20/csci4380
Online meetings and logistics: Webex Teams (CSCI 4380 Fall 2020)

Prerequisites or Other Requirements: This is a fourth year computer science course. As a result, it assumes a level of academic maturity appropriate for a student in their junior or senior year. It also requires good working knowledge of data structures and algorithms, and proficiency in C++ programming or Python (equivalent of CSCI-2300).

Instructor

Professor Sibel Adali   sibel@cs.rpi.edu
Office Location: ONLINE   (518) 276-8047
Office Hours: TBA

Teaching Assistant(s)

Name	Office	Office Hours	Email Address
Clare Arrington	Online	TBA	arrinj@rpi.edu
Ridhi Gulati	Online	TBA	gulatr@rpi.edu

Course Description

This course provides an introduction to database systems, with a special emphasis on data modeling and programming. We will learn the fundamentals of database management systems and discuss how these fundamentals affect the best application design principles for databases. This course assumes no previous background in database systems. You will be expected to learn the use of computing systems on your own.

Course Text(s)

Database Systems: The Complete Book (2nd Edition), by Hector Garcia-Molina, Jeffrey D. Ullman, and Jennifer Widom. ISBN: 0131873253, Prentice Hall.

Online Resources

Due to its fully online nature, this course will use a variety of online resources to share and collect course content. These include:

- Course Website for course notes and basic course information, including this syllabus. It can be accessed here: https://www.cs.rpi.edu/~sibel/csci4380/fall2020/

- MediaSite and Vimeo for all of the mini lectures will be pre-recorded (48 hours before class) and posted on MediaSite and Vimeo. All links to these recordings are available here: https://www.cs.rpi.edu/~sibel/csci4380/fall2020/recordings.html

  As discussed below, you are expected to watch 1-3 of these videos before each lecture.

- Mediasite for archival lecture recordings. The link to the channel link is here: https://mediasite.mms.rpi.edu/Mediasite5/Channel/dbsf20

- Webex Teams: we will hold lectures and office hours on Webex Teams and also use it to host during-class synchronous chats.

- Submitty: All the homeworks and lecture exercises will be posted, submitted and graded here. This is also the preferred discussion forum for asynchronous chat and threads about specific homework or exam questions. I expect to use Submitty for exams as well. You are already added to Submitty: https://submitty.cs.rpi.edu/courses/f20/csci4380

- We may add other tools along the way. One of them is going to be a shared database server that I will configure and make available to the class.

- I will try to post any course relevant information to multiple places, but if I forget, please check three main locations: Course Website (links and course notes), Webex Teams (announcements) or Submitty (assignment info and questions), in this order.

The instructor and TAs will add you to these various sites using your RCS email before the start of class, and you should download the various apps for your phone and other devices. If you can't get access to any of these online resources, please send me an email as soon as possible. Please do not hesitate to contact me if events occur that disrupt your access to the internet such as power outages.

Course Goals / Objectives

Student Learning Outcomes
1. apply principles of normalization to design a data model that leads to the development of high performance data intensive applications
2. write correct and efficient code that implements application logic for high throughput data operations
3. apply understanding of the internals of database management systems to proper tuning of the data model, code and storage methods

Course Assessment Measures

Assessment	Due Date	Learning Outcomes
Homework	Every ten days	1, 2, 3
Exam	2 exams in a semester, final exam during finals week	1, 2, 3
Class Exercises	Roughly every lecture	1, 2, 3

Grading Criteria

Class Exercises (20%), Homeworks (40%), Midterms (12% each), Final Exam (16%).

To pass this course, you must get an average of 60 in your midterm and final exams regardless of your homework and exercise grades. This is a firm rule and will be determined by the weighted test average rounded to the nearest integer. Exceptions will not be made.

There will be regular exercises, mostly automatically graded. The expected frequency is once or twice a week. Three of the lowest exercise grades will be dropped. The exercises will count for 20% of your final grade. There will be homeworks roughly every ten days. The homeworks will count for 40% of your total grade. Some homeworks will be programming projects.

I will use the following chart to convert your year-end average to a letter grade (I reserve the right to lower these cutoff points, but I will never raise them):

	B+: 87-89	C+: 77-79	D+: 67-69
A: 93-100	B: 83-86	C: 73-76	D: 60-66
A-: 90-92	B-: 80-82	C-: 70-72	F: 0-59

Attendance Policy

The class is divided into pre-recorded lectures (about 1 hour or less) that you are expected to watch before the lecture. The lecture will start about one hour late, at 3:20PM EST regularly on Webex Teams to give you time to watch them. We will use Webex Teams to solve questions and review material, but not to lecture. Please come to these sessions prepared. Webex Teams sessions will also be recorded and made available online for those of you who cannot regularly make them due to time zone differences.

After each lecture, there will be some lecture exercises on Submitty. Some of these will be automatically graded. Each lecture exercise must be completed alone, but you are welcome to work on them with others in the class. I will form groups and put them on Webex Teams for the class for easy communication with each other.

Missed lecture exercises cannot be made up even with a valid excuse. If you have an extended absence, talk to the professor. Each lecture exercise will be available for about two days, starting with the end of class.

Digital Tools Policy

The online tools in the Online Resources section above provide services designed to assist schools, teachers and other educational partners to improve student learning outcomes. In some circumstances, these online tools may receive personally identifiable information about students ("Student Data") from the instructor in the course providing this service. For example, an instructor will provide a class roster, email addresses of all students in the class, as well as coursework data that may be linked to a particular student. All listed online resource companies used by the instructor consider Student Data to be strictly confidential and have physical, administrative and technical security protections in place to protect such data. They do not use personally identifiable Student Data for any purpose other than to provide the services to the instructor, and they do not share personally identifiable Student Data with any third party except

as authorized or required by the instructor. The online tools above may collect, analyze, and share anonymized or aggregated data or data derived from Student Data for certain purposes, but only if the disclosure of such data could not reasonably identify a specific individual or specific School. Collection and use of Student Data provided by the instructor is governed by Terms of Service for each platform and by the provisions of the Family Educational Rights and Privacy Act (FERPA). Student Data is provided and controlled by the instructor. If you have questions about reviewing, modifying, or deleting your personal information, please contact the instructor.

Students will be asked to sign this statement to agree to the use of these online tools and to acknowledge understanding of their use to facilitate online content for the course.

All live sessions will be recorded, including your questions and comments and possibly your video if your camera is on. If you don't want to be part of the recordings, please be sure to turn off your camera and microphone.

Inclusivity and Accessibility

Rensselaer Polytechnic Institute strives to make all learning experiences as accessible as possible. In this course, we will strive to provide an environment that is equitable and conducive for learning for all students. Please contact me as soon as possible if you:

1) live in a distant time zone and may need accommodations for exams. All course material will be available online as described above. Extra office hours (i.e., in the morning rather than the afternoon) will be provided. Please be proactive about attending open hours and office hours.

2) have internet accessibility issues where you live at any time during the semester. Contact me directly if events cause disconnection for any important portion of the course. If you know this will be a consistent problem, please contact me early in the semester.

3) anticipate or experience academic barriers based on a disability. Please let me know of such issues immediately so that we can discuss your options. To establish reasonable accommodations, please register with The Office of Disability Services for Students. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion. To receive any academic accommodation, you must be appropriately registered with DSS (dss@rpi.edu; 518-276-8197, 4226 Academy Hall).

4) experience any other difficulties that are not mentioned above as well any challenges related to your health and safety, please do not hesitate to get in touch to discuss ways we can put you in the best possible position to succeed.

Other Course Policies

You are responsible for all the information posted in this syllabus including the course policies as well as any announcements made in class or posted on Webex Teams or Submitty. You must use these online platforms for any course related questions.

You are expected to communicate to the instructor any issue regarding your performance in the class ahead of time. This includes absence from exams, late homeworks, inability to perform an assigned task, problems with your group members, the need for extra time on exams, etc. You

should be prepared to provide sufficient proof of any circumstances on which you are making a special request as outlined in the Rensselaer Handbook of Student Rights and Responsibilities.

As part of the course material, you are expected to learn how to use a number of software products and frameworks. You will be given sufficient advance notice of such expectations and links to the appropriate study material. You are responsible for learning the software needed for the class.

Homework Policy: Homeworks in this class are optional. If you skip a homework, your next exam's point value will be incremented by the point value of the homework. Point value of each homework will be given at each assignment. If you submit a homework, you accept that the homework grade will count towards your final grade. You may not ask a homework grade to be excluded from your grade computation once you submit it.

Late Homework Policy: Late assignments create an extra burden on your TA and delay the discussion of the solutions in class. Late homeworks will not be accepted. Homework assignments must be submitted electronically by the given deadline.

Grade Appeal Policy: If you disagree with the grading on a homework, you should appeal to the TA first to maintain consistency in grading. If you are not satisfied with the outcome, you should then appeal to the instructor. For exam grading, appeal directly to the instructor. Appeals must be made within one week after the specific grade is returned.

This is a unique time that requires flexibility, patience, and communication. Communication is vital. As we experience tools together, we might make changes to how we use them. Remember that your input and participation are crucial to the success of the course and your own success. Please be involved in the class and reach out when things are not working for you as soon as possible. I am here to listen and do any adjustments that are reasonable and can help others in the class. Any changes to the course and policies will be presented to the entire class through designated channels (email, WebEx Teams, in lecture). One thing that will not change is the grading structure (relative weight of homeworks and exams).

Academic Integrity

Intellectual integrity and credibility are the foundation of all academic work. A violation of Academic Integrity policy is, by definition, considered a flagrant offense to the educational process and a violation of the trust between a student and a teacher. It is taken seriously by students, faculty, and Rensselaer and will be addressed in an effective manner. If found responsible for committing academic dishonesty, a student may be subject to one or both types of penalties: an academic (grade) penalty administered by the professor and/or disciplinary action through the Rensselaer judicial process described in the student handbook. Three relevant academic integrity violations to emphasize include:

Collaboration: Collaboration is defined as deliberately facilitating an act of academic dishonesty in any way or form; for example, allowing another student to observe an exam paper or allowing another student to "recycle" one's old term paper or using one another's work in a paper or lab report without citing it as another's work.

Copying: Copying is defined as obtaining information pertaining to a graded exercise by deliberately observing the paper of another student; for example, noting which alternative a neighboring student has circled on a multiple-choice exam.

Plagiarism: Plagiarism is defined as representing the work or words of another as one's own through the omission of acknowledgment or reference. Examples include using sentences verbatim from a published source in a term paper without appropriate referencing, or presenting as one's own the detailed argument of a published source, or presenting as one's own electronically or digitally enhanced graphic representations from any form of media.

The Rensselaer Handbook of Student Rights and Responsibilities defines the full list of forms of Academic Dishonesty and you should make yourself familiar with these. In this class, all assignments that are turned in for a grade must represent the student's own work. In cases where help was received, or teamwork was allowed, a notation on the assignment should indicate your collaboration. If you have any questions concerning this policy before submitting an assignment, please ask for clarification.

Specific examples: Some assignments, like exams, have a clearly marked place on the front page that requires a signature confirming academic integrity. If you forget to sign the document before submitting it, a TA or instructor will contact you directly to ask you to sign before grading your assignment. We require that you take exams without speaking to other students via another communication channel. We expect you to use any permitted material just like you would in class. You cannot interact with Chegg.com or any other online/internet assignment sharing system for any graded assignment. Interaction with it results in an automatic failure for the entire course. A result of the violation using online resources to assist in graded assignments will result in a formal report. As a warning, there are ways that we can easily detect your use of these online resources that compromise academic integrity.

Submission of any assignment that is in violation of the policies described above will result in a penalty of an F in the class, and may be subject to further disciplinary action.

If you have any question concerning this policy before submitting an assignment, please ask for clarification.

Course Calendar

Session	Date	Topic	Readings
Week 1	8/31/2020	Introduction to Database Systems and Relational Data Model (2 classes)	Chapters 1, 2.1, 2.2
Week 2-3	9/8/2020	Data Modeling - Normalization (3 classes)	Chapter 2, 3
Week 3-4	9/17/2020	Entity Relationship Models (2 classes)	Chapter 3, 4
Week 4-5	9/24/2020	Catch up (2 classes)	
Week 5	**10/1/2020**	**Exam #1**	
Week 6	10/5/2020	SQL Language (3 classes)	Chapter 6
Week 8	10/19/2020	Constraints and Triggers (1 class)	Chapter 7
Week 8	10/22/2020	Views and Indexes (1 class)	Chapter 8
Week 9	10/27/2020	SQL in a server environment (2 lectures)	Course notes, Chapter 9
Week 10	11/2/2020	Catch up (1 class)	
Week 10	**11/5/2020**	**Exam #2**	
Week 11	11/9/2020	Secondary Storage Management (1 class)	Chapter 13

Session	Date	Topic	Readings
Week 11-12	11/12/2020	Index Structures (2 classes)	Chapter 14
Week 13	11/19/2020	Query Execution (1 class)	Chapter 15
Week 13	11/23/2020	Query Optimization (1 class)	Chapter 16
Week 14-15	11/30/2020	Transaction Management (3 classes)	Chapters 17, 18, 19
Week 15	12/10/2020	Catch up (1 class)	
Finals Week		**Final Exam**	