CS 133 Course Syllabus

Pomona College, Spring 2018

Time/location: T/Th 13:15-14:30, Lincoln 1135
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T/Th 8-10pm

Table of Contents

CS133 OVERVIEW 2
COURSE DESCRIPTION 2
PREREQUISITES 2
AIM AND OBJECTIVES 2
COURSE OUTLINE 2
COURSE MATERIALS 2
GRADING SCHEME 2
SCHEDULE 3
COURSE POLICIES 4
ACADEMIC INVOLVEMENT 4
ACADEMIC HONESTY 5
EXAMS 5
ASSIGNMENTS AND PROJECT 5
General guideline 5
Editing guideline 5
Submission guideline 6
ACADEMIC ENVIRONMENTS 6
INCOMPLETE GRADE 6
SPECIAL NEED & RELIGIOUS OBSERVANCE 6
1 COLLABORATION POLICIES 7
2 USE OF COURSE MATERIALS 8
3 RESPONSIBILITY OF MENTORS AND GRADERS 9
4 PENALTIES 9
Appendix: Computer Science Academic Honesty Policy

CS133 Overview

Course description

Fundamental and cutting-edge concepts in database design: entity-relationship model, relational and semi-structured models. Query languages: relational algebra, relational calculus, SQL and XPath. Mechanism and design of database management systems: storage model, indexing, query evaluation and optimization, and concurrency control. Key ideas will be practiced via course projects that involve the design and implementation of real-life database applications.

Prerequisites

CSCI052 PO and CSCI062 PO (or CMC) or CSCI60 HM and CSCI070 HM. CSCI081 PO highly recommended.

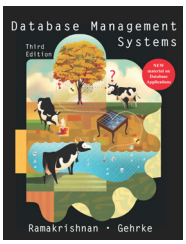
Aim and Objectives

- Sparks creative thinking in data management.
- Obtains in-depth comprehension of important database concepts.
- Develops the skills for designing and implementing database applications.
- Develops the ability to understand important issues related to database systems, such as performance, security, etc.
- Promotes hand-on experience for database design, and using database technique in other fields.
- Promotes the appreciation of cutting-edge database research.

Course outline

- Topic 1: DB & DB Applications, designing relational database, querying relational database
- Topic 2: Database Management System: storage management, indexing, concurrency control, query processing and optimization
- Topic 3: Advanced topics: semi-structured and graph data, data warehouse and data mining, distributed database, etc.

Course materials



Textbook: Database Management Systems
By Ramakrishnan and Guhrke.
3rd Edition.
McGraw-Hill.

Other materials, including syllabus, handouts, assignment (and solutions), will be available via Sakai.

Grading Scheme

- Assignments:
  - HW assignments
  - 20% of total grade
- Course project:
  - Semester-long group project

  - 35% of total grade
- Exams:
  - 2 exams. 20% each
  - 40% of total grade
  - each student can bring a one-page information sheet
- Participation:
  - 5% of total grade
  - Students are expected to actively participate in lectures and discussion.
  - The participation grade is assigned based on the value your participation adds to the lecture as well as your attendance.
- Article:
  - 1 final article
  - 5% bonus grade

Schedule

- Please notice that the schedule may change slightly during the semester based on students' feedback. An up-to-date course schedule will be shared via Sakai.

Week	Day	Date	Topic	Details	Readings	Deadlines
1	T	1/16		introduction, DB application	ch1, ch7.1, 7.5	
1	Th	1/18	1	Relational model, DDL	ch3.1-3.3	HW0 due Jan 18, 10pm
2	T	1/23	1	ER modeling design	ch2.1-2.5	
2	Th	1/25	1	Logical design	ch3.5-3.6	
3	T	1/30	1	Functional dependency	ch19.1-19.3	HW1 due Jan 29, 10pm
3	Th	2/1	1	FD, normal form	ch19.4-19.6	
4	T	2/6	1	Normal Form	ch19.4-19.6	HW2 due Feb 5, 10pm
4	Th	2/8	1	Relational algebra (RA)	ch4.1-4.2	Project Milestone 1 due Feb 7, 10pm
5	T	2/13	1	Relational calculus (RC)	ch4.3	HW3 due Feb 12, 10pm
5	Th	2/15	1	more RA/RC; review	ch4.3	
6	T	2/20	1	student project presentation		HW4 due Feb 19, 10pm, project milestone2 due 2/20,11am
6	Th	2/22	1	SQL	ch5.1-5.3	
7	T	2/27	1	SQL	ch5.4-5.7	
7	Th	3/1	1	more SQL		
8	T	3/6		exam 1		HW5 due Mar 5, 10pm
8	Th	3/8	2	storage management, Indexing	ch8.1-8.5, 10.1-10.6	
9	T	3/13		spring break		
9	Th	3/15		spring break		

10	T	3/20	2	More Indexing, Query evaluation	ch11.1, 12.1-12.5, 14.1	
10	Th	3/22	2	Query Eval, Sorting	ch13.1-13.3	Project Milestone 3 due Mar 22, 10pm
11	T	3/27		Sorting, Join Algorithms	ch14.4	HW6 due Mar 26, 10pm
11	Th	3/29	2	More Join, Query optimization	ch12.5, 12.6	
12	T	4/3	2	Query Optimization	ch15.2,15.4	
12	Th	4/5	2	Concurrency control	ch17.1-17.4	
13	T	4/10	5	Concurrency control, review	ch17.5-17.6	HW7 due Apr 9, 10pm
13	Th	4/12	3	Graph DB and noSQL		
14	T	4/17	3	Data warehouse and Data mining	ch 25.1-25.3, 25.6, 26.1-26.3	HW8 due Apr 16, 10pm
14	Th	4/19	3	History of DB		
15	T	4/24	3	exam 2		
15	Th	4/26	3	Project work		
16	T	5/1	3	Final Project Presentation		project final due Apr 29, 10pm

- Other important dates
  - Jan 29. Last day to add a course
  - Mar 8. Last day to drop a course
  - Apr 5. Last day to choose pass/no credit grading option.

Course Policies

The information contained herein is not optional. The students are responsible for conducting themselves in accordance with the rules below. Ignorance of a rule stated or referred to here is not grounds for excusal. If you have questions regarding a policy, seek advice from the instructor or student mentors ***BEFORE*** you act.

Academic involvement

- Sakai is used as the resource-sharing platform for this course. Students are expected to check the board daily for announcements, reading and assignments. You may want to double check your Sakai setup such that you will receive email notification whenever new accouchements are posted.
- Detailed topic syllabus will be made available via Sakai before we enter each topic. Students are responsible for assigned readings ***PRIOR*** to lectures.

- Course slides will be made available via Sakai before each lecture. Slides are designed to help students take lecture nodes. Students are responsible for downloading and printing the slides for note-taking during lecture.

Academic Honesty

Students should make themselves familiar with the Pomona College Student Code and Academic Honesty Policy of Computer Science Department. Please notice that conducting academic misconduct and facilitating academic misconduct both violate the student code and the academic honesty policy.

Exams

- Missed exams can ***NOT*** be made up. A student who is late for exam is expected to submit the exam paper at the arrange ending time of the exam.
- Group work is *NOT* permitted on the exams. The exams must be entirely your own work.

Assignments and project

General guideline

Homework assignment must be **individual work** of a student or a team (usually student pair).

- The team is required to work all problems together. Each team member is required to write part of the solutions of the solutions.
- Between teams, discussion is encouraged, but please avoid taking any written notes from discussion; do not show or send your edited work or written document to other team; and do not copy from books and other resources.
- Please clearly list all collaboration and references in your submission.

Editing guideline

Homework assignments and project documents should be electronically well-edited and be submitted in .pdf format.

- Please use the homework template, which will be posted via Sakai, when composing your homework submissions. If your document has more than one page, please clearly list the page # at the bottom of the page.
- Some instructions where given to you (in blue) in the template. You need to remove all these instructions from your own submission.
- For HW assignments, please name your file hw*-xxx.pdf, where * is the assignment # and xxx is your last name. For example, I would name my answer to HW 1 as hw1-Wu.pdf. For HW assignment that are to be done in pairs, the file name should be hw*-xxxyyy.pdf, with both students' last name in alphabetical order. For example, if I team up with Chris Brown for HW2, the file name should be hw2-BrownWu.pdf.
- To facilitate team grading, you will be asked to arrange every single question on a separate page. For certain questions, answers may spread out on more than one page. In such case, it will be indicated in the assignment how many pages you should reserve this the questions. If you use less pages than indicated, please leave empty pages.

- For project and article assignment, please see the corresponding handout for details.

Submission guideline

All HW should be submitted via the course gradescope site. All deadlines are strictly enforced.

- The timestamp of Gradescope is used as the indicator of the time of submission.
- Each student will have three "late days" during the course of the semester. A one-day delay in submission costs one "late-day". In the case of pair HW, it will cost each partner 1 "late day". The "late days" are intended to be used for illness and unexpected emergencies, rather than to make up for a late start on your HW. Once the late days are consumed, late submission will not be accepted any more except for extenuating circumstances. Extenuating circumstances will normally include only serious medical or family emergencies documented with a doctor's note or notes from dean's office.

Academic environments

- Students are responsible for making backups of all of their work, including code and other materials produced.
- Students are responsible for the safe and ethical use of class accounts on shared servers, according to university policy and copyright law, and for the sole purpose of carrying out class assignments. Accounts will be monitored and abuses will be reported and reflected in the grades.

Incomplete grade

- An incomplete ("I") final grade will be given only by prior arrangement in exceptional circumstances conforming to college policy.

Special need & Religious observance

- We will follow the policies of Pomona College to accommodate students' special needs and religious practice. Students with such needs should contact the Dean of Students and bring their instructions to the instructor for accommodation.

Academic Honesty Policy

Computer Science Department, Pomona College

Adopted July 1, 2014

The Computer Science Department seeks to create a friendly and supportive learning environment. We encourage students to work in groups to review material from the lectures and readings, to work practice problems from the text, to study for exams, and to discuss the general ideas and approaches to assignments. However, work submitted for a course must be done independently, unless collaboration on a particular assignment is explicitly permitted. Effective learning is compromised when this principle is violated. As explained in the Pomona College Student Handbook, this means that the work you turn in must represent only your own work. It must not be based on help from others or information obtained from sources other than those approved by the instructors.

The following discussion reflects our general understanding of academic honesty in the Computer Science Department. Any exceptions or differences will appear in the course syllabus or the instructions for an assignment. Ask your instructor if you are ever unsure about what constitutes acceptable behavior.

1 Collaboration policies

The types of work and the level of expected collaboration vary from course to course and assignment to assignment. In this section, we describe some typical expectations. Instructors will often indicate that an assignment falls into a particular category, occasionally with additional remarks about the use of specific materials or sources. Students may freely use any resource that is provided by the instructor for an assignment.

1.1 Individual Work

Most work in our courses is to be completed individually. In general, the work that that is submitted for an assignment must be the student's own. Students may not submit work under their own name that is done by, or in collaboration with, someone else. Copying solutions from any source, including the web or students in previous offerings of the course, is not allowed.

Students should not read or possess copies in any form—physical or electronic—of another student's work. There is no legitimate reason for a student to possess a copy of another student's assignment, to send a copy of student work from one computer account to another, or to be logged-on to another student's account. Providing one's own work to another student is also a violation of these policies.

We routinely use software and other tools to detect similarities between submissions. Identical, or nearly identical, submissions will be considered conclusive evidence of plagiarism.

- For programming assignments, students may normally discuss general approaches to assignments, and they may give or receive "consulting" help for specific problems with software or computer programs. A student may look at another student's work only when help is requested. In that situation the student takes on the role of mentor, and the interaction must be limited to the immediate problem. Two students sitting side-by-side and working through a program step-by-step will certainly produce work that will be considered evidence of illegal collaboration.
- On problem sets, group discussion of the general ideas and approaches is permitted, provided the group members are noted on the submitted solutions. However, each student must write the solutions apart from the group, without consulting notes or other artifacts from the discussion.
- Although papers are less common in computer science classes, when they are assigned they must adhere to the usual levels of academic integrity. The prose must be the student's own, and all external sources must be properly cited.

1.2 Group Projects

Sometimes assignments are to be done by small teams of students. In these situations, the team takes on the role of an individual in the preceding discussion. The members of a team may communicate with one another, but collaboration with members of a different team is not permitted.

1.3 Exams and Test Programs

As stated in the Pomona College Student Handbook, "Students neither give nor receive assistance with examinations." Each examination will have a clear statement of what resources are permitted. Any use of material beyond those limits is not allowed. Take-home examinations will have time limits and similarly explicit rules; they are subject to the same policies.

During examinations students may ask the instructor questions of clarification. The instructor will decide how complete an answer can be given.

Some courses have "test programs" which are programming assignments that are to be treated in the same way as take-home examinations.

1.4 Practice Exercises

Some assignments are intended to give students comfort with a programming language feature or software environment. On these, any kind of assistance is permitted. The point is to get the work done.

2 Use of Course Materials

Course materials that are distributed in class, on Sakai, on the web, or by other means are provided solely for students in the class. Students are encouraged to use them to the fullest extent, but they are not to publish or distribute them to other people or organizations.

3 Responsibility of Mentors and Graders

Course assistants are routinely provided with solution sets to assignments. The solutions are intended to be an aid to effective mentoring and grading. Course assistants are not to distribute the solutions, in whole or in part, at any time.

Graders who encounter suspicious similarities between submissions must report those instances to the instructor in the course.

4 Penalties

Failure to abide by our rules will be considered a violation of the college's academic honesty policy and will result in severe penalties. Instances of plagiarism are easy to identify and will be handled promptly. The first offense typically results in failure in the course and is always reported to the Dean of Students Office. A second offense is automatically referred to the College's Board of Academic Discipline. See the Academic Honesty Policy in the Pomona College Student Handbook for further information. Students from other Claremont Colleges will be treated according to the procedures of their home campus. Please do not put us, yourself, or anyone else in an unpleasant situation.