RDBMS and SQL, Aug-Nov 2025

Assignment 1, 14 September 2025, due 22 September 2025

Here are some relations from the university database discussed in class. The column headings are, in general, self-explanatory.

- `instructor(ID,name,dept_name,salary)`

  Information about faculty.

- `department(dept_name,building,budget)`

  Information about departments.

- `course(course_id,title,dept_name,credits)`

  Information about courses offered.

- `student(ID,name,dept_name,total_credits)`

  Information about students.

- `prerequisites(course_id,prereq_id)`

  Information about course prerequisites. Both columns refer to `course_id` from the `courses` relation.

- `section(course_id,sec_id,semester,year,building,room_number,time_slot_id)`

  Timetable information — classroom allocation and time slot for courses. `course_id` refers to the `course` relation.

- `teaches(ID,course_id,sec_id,semester,year)`

  Information about course allocation to faculty. `ID` refers to the `instructor` relation and `course_id` refers to the `course` relation.

- `takes(ID,course_id,sec_id,semester,year,grade)`

  Information about course enrollment by students. `ID` refers to the `student` relation and `course_id` refers to the `course` relation.

Write relational algebra queries for the following.

1. Find all departments that share a building with another department.
2. Find all faculty members who teach exactly one course.
3. Find all courses that are pre-requisites for more than one course.
4. Find all students who did not register for any course in 2024.
5. Find all students who have repeated a course.
6. For each building, identify the department(s) in that building with the highest budget.

How to submit

- For each question, in addition to the relational algebra expression, write a short informal explanation explaining your solution.
- Submit your solutions on Moodle.
- Your submission should be a pdf file. It can either be generated using some document writing software, or a scan of a handwritten document.
