BIRZEIT UNIVERSITY

Department of Computer Science

COMP2421 – Data Structures and Algorithms (Fall 2025/2026)

Project No. 2

Due Date: Tuesday (29 December 2025) ***before 8:00PM***

You will build a system to manage students' course registrations at a university. The course registration system stores essential information in the form of enrollment records to keep track of which students are registered in which courses.

Your program should read the information from a file called "reg.txt", which should follow the format:

Student Name#Student ID#Major#Course Code#Course Title#Credit Hours#Semester

Example of data input:

```
Sara Mahmoud#1223121#Computer Science#COMP242#Operating Systems#3#Fall 2024

Tareq Hasan#1233333#Business Administration#BUSA120#Marketing Principles#3#Spring 2025
```

1. You are required to implement a program to help creating the system by including the following operations of an AVL tree:
    - Read the file reg.txt and load the data (i.e., AVL Tree).
    - Insert a new registration from user with all its associated data. The tree will use the student ID as the data value. Note that the student may have different registrations (i.e., different courses to be registered, and your data structure should be able to handle this).
    - Find a student (using name) and give the user the option to update the information of the student if found.
    - List all students registered in the same course.

- Delete a student's registration from the system.
- Save all words in file "`students_hash.data`"

Then create a Hash Table using the students' data of the previous step (use names as keys). The project should use open addressing methods for collision resolution and implement the following functions on the hash table:

- Print hashed table (i.e., print the entire table to the screen including empty and deleted spots).
- Print out table size.
- Print out the used hash function.
- Insert a new record into the hash table.
- Search for a specific student.
- Delete a specific record.
- Save hash table back to the file "reg.txt".

Notes and submission instructions:

1. **This is individual work**. It should represent your own efforts. It is fine to discuss your work and to ask your colleagues, but you are not allowed to copy/paste the work of others or give your work to anyone else. You are not allowed to post/copy from other websites and/or social media and this will be considered as cheating.
2. **Late submissions** to midnight will be scaled down to 30%; up to 24 hours will be scaled down to 50%; up to 48 hours will be scaled down to 50%; any submission beyond 48 hours will be worth 0%.
3. **Document format**. Please submit only the code file (**c** file) containing the code of your project. Please rename it as follows: "**P2_YourStudentID_FirstNameLastName_SectionNo.c**".
4. **Input/output file name**. Make sure that the input/output file names are the same as in the specifications.
5. Include your full name, student ID, and section number in the beginning of your file.
6. Please do not compress the file, only the C-file is needed.
7. Files not following the convention in point 2 will not be marked.

Good luck!