**For Final:**

You are expected to develop a system that classifies students' academic performance. The dataset is available on Piazza under the Resources link. The dataset's inputs (x1–x7) and output (remarks) are explained below:

*x1 (Attendance): Represents the student's attendance, measured on a scale of 0 to 10.*
*x2 (Practical Skills): Captures the student's practical skills, also measured on a scale of 0 to 10.*
*x3 (Demeanor): Reflects the student's demeanor, measured on a scale of 0 to 10.*
*x4 (Presentation Quality): Assesses the quality of the student's presentations, with scores ranging from 0 to 10.*
*x5 (Class Participation): Measures the level of participation in class, scored between 0 and 10.*
*x6 (Continuous Assessment): Represents the continuous assessment scores, ranging from 0 to 10.*
*x7 (Examination): Reflects the student's performance in examinations, with a range of 0 to 40 marks.*
*Remarks: This column contains categorical values, which classify the overall performance*

The total size of the dataset is 200K records, and there are sufficient samples from each class. Two different modeling approaches are required for this dataset:

A. Fuzzy Inference System (FIS): You are expected to work with Mamdani-type rules and derive the rules yourself. Since there are 7 input variables, this may result in the creation of many rules and a long runtime. Therefore, you are expected to randomly select 20 inputs from each class, for a total of 100 records to work with. You will repeat this process twice, meaning you will perform two separate performance observations and reports based on two completely different 100-record datasets.

B. ANFIS: Since this algorithm includes both training and testing phases, you will randomly select 10,000 records from each class, for a total of 50,000 records. You will separate 1/4 of the data as the test set and perform two iterations of modeling.

Both studies should be documented with their results in the same report. The expected report structure is as follows:

1. Data
    a. Data selection approach
    b. Data distribution of the employed set
        i. correlation coefficients of the inputs and the output
        ii. correlation coefficients of each input and the resting inputs

iii. visualization of the data distributions

2. Method FIS
   a. Definition of FIS
   b. Implementation details, libraries, ready-to-use methods, and self-coded parts
   c. Rule number and fuzzy set specs, etc
3. Method ANFIS
   a. Definition of ANFIS
   b. Implementation details, libraries, ready-to-use methods, and self-coded parts
   c. Obtained Rule number and fuzzy set specs, etc, after training
4. Results and Discussion
   a. Definition of performance evaluators, obtained result tables (2 tables for FIS, 2 tables for ANFIS)
   b. Subjective interpretation on FP and FN values and cases
   c. Suggestions for further studies

Reports and codes must be submitted as messages and attachments sent to the relevant folder on Piazza. If the message does not include the student ID number, and if name similarity cannot be resolved, the submission will not be evaluated.

**Submission date:** The date of the final exam will be announced by the department.