Python Programming

Assignment #1

This assignment is designed to strengthen your understanding of Python programming using concepts such as functions, file processing, exception handling, list data structure, and argument handling.

Description

You are required to build a Python application that:

- Reads student records from a file
- Validates the input data
- Calculates grades
- Generates report
- Writes processed output into file
- Handles user input dynamically

Input File Format

Each line must contain: *"StudentID,Name,Marks"*. Example (students.txt) is shown below.

```
101,John,78
102,Alice,88
103,Bob,67
104,Emma,91
105,Tom,abc
```

Note: invalid data (e.g., last line) should be handled gracefully using exception handling.

Task 1 – File Reader

Create the first function called "*read_students(file_path*)" which performs the following functionality.

- Accept file path as argument
- Check file existence
- Handle i) `FileNotFoundError` and ii) empty file condition. Otherwise,
- Populate each student's result within a **list** and return that list called "lines".

Task 2 – Data Processing with List/Tuples

Create the second function named "*process_students(lines)*" with the below requirements.

- Split and clean data (e.g., convert marks to integer)
- Use **tuples** to store refined students' results
- Skip invalid records and log rejected entries

Task 3 – Grade Calculator

Create the third function "*calculate_grade(marks)*" that shall assign grade A for marks ≥90, B for ≥80, C for ≥60, else D.

Task 4 – Write Output File

Create the fourth function "*write_results(file_path, students)*" that saves processed data in the format "name, marks, grade" into the output file.

Task 5 – Report Generator

Create the fifth function that "*generate_report(students)*" that displays following information as output:

- Total number of students
- Calculate average marks
- Count number of students for each grade; sample output shown below.

```
Enter input file path: C:\ProgramData\data2410\python-project\students.txt
Enter output file path: C:\ProgramData\data2410\python-project\students-grades.txt

*** Students grades report ***
Total Students: 4
Average Marks: 81
Number of A Grades: 1
Number of B Grades: 2
Number of C Grades: 3
Number of D Grades: 4

The output file is written sucessfully!
```

Task 6 — Main Program

Integrate the above functions within **main** program in a correct sequence.

Task 7 – Argument Handling

Modify main program to:

- Accept **input file path** and **output file path** from user
- Validate inputs and pass arguments to relevant functions
- Run the main program again to generate the same grades report

Submission

- Complete source code file(s)
- Input sample file and Output file
- 2-3 pages report containing project overview, features implemented, screenshots of execution, and challenges faced.
- Save the above files in a folder with name: "StudentID_PythonProject" e.g., 1023_PythonProject
- Submit the compressed folder with .zip extension.

(The End)