Course No. : CSE 2110
Course Title: Advanced Programming Sessional

2nd year 1st semester, Session 2023-2024

Course Credit: 1.5

Course Schedule

SL No.	Topic
Lab 1	Python Basics 1. Getting Started with Jupyter, Getting Started with VS code and Python 2. Data Types, Expressions and Variables, String Operations
Lab 2	Python Data Structures 1. Lists, Tuples, Dictionaries, Sets 2. **Lab Exercise 1** (required to submit report and code in ELP)
Lab 3	Python Programming Fundamentals I 1. Conditions and Branching 2. Loops 3. Functions 4. Exception Handling
Lab 4	Python Programming Fundamentals II 1. **Class Test (Lab 1− Lab 3)** 2. Objects and Classes 3. **Lab Exercise 2** (required to submit report and code in ELP)
Lab 5	Working with Data in Python I 1. Read and Write files with Open 2. Pandas: Loading Data, Working with and Saving Data 3. **Lab Exercise 3** (required to submit report and code in ELP)
Lab 6	Working with Data in Python II 1. One Dimensional Numpy 2. Two Dimensional Numpy **3. Project Proposal Submission**
Lab 7	**Mid Term Examination** (Quiz(5) and Coding (10))
Lab 8	Data Visualization in Python 1. MatplotLib 2. Seaborn 3. **Lab Exercise 4** (required to submit report and code in ELP)
Lab 9	APIs and Data Collection I 1. API, API Examples 2. Web Scraping
Lab 10	APIs and Data Collection II 1. An Example Project Demonstration 2. Discussion on Project Progress
Lab 11	APIs and Data Collection III 1. Working with Different File Formats 2. **Lab Exercise 5** (required to submit report and code in ELP)
Lab 12	**Quiz Test + Project Demonstration and Presentation**
Lab 13	**Project Demonstration and Presentation**

Grading Policy

- Attendance 10%
- Assignment (Class and Home) / Report 30%
- Mid Term 15%
- Final Exam 40% (Quiz 20% + Project 15% + Presentation 5%)
- Viva 5%

Project Ideas

(Ideas are generated using AI)

1. Weather Data Analysis and Visualization

- **Description**: Students can use an API (like OpenWeather) to collect real-time weather data for different cities. They will process the data using Pandas and visualize weather trends (temperature, humidity, etc.) over time using Matplotlib and Seaborn.
- **Skills Used**: API, Pandas, Matplotlib, Seaborn, Exception Handling, File I/O.

2. Personal Budget Tracker

- **Description**: Students can build a simple personal finance tracker using Python. They can store transactions in a dictionary or CSV file, then analyze spending habits by category (e.g., groceries, rent) and visualize their expenses over time.
- **Skills Used**: File Handling, Pandas, Dictionaries, Data Visualization.

3. Movie Recommendation System

- **Description**: Using a dataset like IMDb, students can build a simple recommendation system based on movie genres or ratings. They can use Python's data structures and basic machine learning techniques to suggest movies.
- **Skills Used**: Pandas, Numpy, File I/O, Object-Oriented Programming, APIs (optional).

4. Stock Price Web Scraper and Predictor

- **Description**: Students can scrape stock prices from a financial website and use historical data to visualize price trends. For extra credit, they could implement a simple prediction model using moving averages.
- **Skills Used**: Web Scraping, Pandas, Matplotlib, Numpy.

5. COVID-19 Data Dashboard

- **Description**: Students can create a dashboard that collects and visualizes COVID-19 data using an API. The project could include visualizations of cases, recoveries, and vaccinations over time in different countries.
- **Skills Used**: API, Pandas, Matplotlib/Seaborn, File Handling, Data Structures.

6. Library Management System

- **Description**: Create a simple library management system where users can add, search, and borrow books. Use classes to define books and users, and manage records using file handling.
- **Skills Used**: Classes, Objects, File I/O, Lists, Dictionaries.

7. Twitter Sentiment Analysis

- **Description**: Use the Twitter API to collect tweets on a specific topic and analyze the sentiment of those tweets (positive, negative, neutral). Use text processing libraries like NLTK or TextBlob.
- **Skills Used**: API, Text Processing, Pandas, Data Visualization.

8. E-commerce Data Analysis

- **Description**: Students can analyze a dataset of an e-commerce store (like Amazon or eBay) and create visualizations for best-selling products, customer trends, and sales analysis.
- **Skills Used**: Pandas, Numpy, Data Visualization, File Handling.

9. World Population Data Processor

- **Description**: Similar to the GDP project, students can extract and process world population data from an online source. They can calculate population growth rates, visualize population trends, and compare different countries.
- **Skills Used**: API, Pandas, Matplotlib, Seaborn, File I/O.

10. Music Genre Classification

- **Description**: Using a dataset of songs, students can build a model to classify songs by genre based on features like tempo, duration, and key. This could be a fun introduction to machine learning or basic classification algorithms.
- **Skills Used**: Pandas, Numpy, File Handling, Classification (Optional).