Condensed Schedule for CM 2607 CW Part 01

Submission Deadline: 15th December 2024

This schedule provides a step-by-step plan to complete the coursework effectively in the remaining 6 days.

Day 1: Today (9th December)

Goals:

1. Set Up Python Environment
   - Install Python, Jupyter Notebook, and libraries (SymPy, NumPy, Matplotlib, SciPy).

     pip install sympy numpy matplotlib scipy
   - Test your installation by creating a simple Python notebook.
2. Basics of Differentiation
   - Learn how to compute partial derivatives manually and with Python using SymPy.
   - Solve Question 1 (a) using SymPy.
3. Gradient Vectors and 3D Visualization
   - Learn Matplotlib basics for 3D surface plotting.
   - Solve Question 1 (c) and create a 3D surface plot.

Outcome: Partial derivatives, gradient vector Python function, and basic 3D plot completed.

Day 2: 10th December

Goals:

1. Integration Basics

- Learn definite integrals and their interpretation.
- Use SymPy to compute integrals in Python.
- Solve Question 2 (a) and plot A(t) for Question 2 (b).

2. Signal Energy Interpretation

- Research and write an explanation for Question 2 (c).

Outcome: Integration tasks completed with plots and interpretation.

Day 3: 11th December

Goals:

1. Series Approximation

- Learn series expansions and their Python implementation.
- Plot approximations using loops and Matplotlib.
- Solve Questions 3 (a) and (b), and analyze convergence for Question 3 (c).

Outcome: Series approximation and convergence analysis completed.

Day 4: 12th December

Goals:

1. Fourier Transform Basics

- Understand the Fourier Transform and how to compute it with NumPy.
- Learn about low-pass filters.
- Solve Questions 4 (a) and 4 (b), and discuss filtering for Question 4 (c).

Outcome: Fourier Transform tasks completed with visualizations and explanations.

Day 5: 13th December

Goals:

1. Image Processing with Fourier and DCT
   - Learn 2D Fourier Transform and DCT.
   - Solve Question 5 tasks: edge detection, Gaussian blur, DCT scaling, and artifact reproduction.

Outcome: Image processing tasks completed with visualizations and analysis.

Day 6: 14th December

Goals:

1. Polish and Review
   - Double-check your code for correctness and readability.
   - Add detailed comments and explanations.
   - Ensure all plots are labeled and visually appealing.
2. Prepare for Viva
   - Practice explaining your Python code and results.
   - Focus on the significance of each concept.

Outcome: Coursework finalized and ready for submission.

Submission: 15th December

Goals:

- Submit the Python notebook by the deadline.

- Revise viva topics for clarity and confidence.

Key Tips:

- Focus on One Question per Day: Complete one question fully before moving to the next.

- Use Online Resources: Leverage tutorials for quick learning (e.g., SymPy, Matplotlib, NumPy).

- Ask for Help: Seek guidance immediately if stuck.