EE950 – Data Analytics & Data Structures (DADS)

Department of Electrical Engineering, IIT Kanpur

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1. **Course No.**: EE950

2. **Course title**: Data Analytics & Data Structures (DADS)

3. **Pre-requisites**: Basic knowledge of any programming language or have used any programming language in academic or professional life at least once. The course will introduce Python programming language and Linux shell scripting from basics. So there is no strict pre-requisite about it.

4. **Course duration**: Full semester

5. **Instructor**: Dr. Tushar Sandhan, Email: sandhan@iitk.ac.in

   Instructor Homepage: https://home.iitk.ac.in/~sandhan/

   Proposing Department: Electrical Engineering

   Other Departments where the course content will be overlapping: Computer

   Science and Engineering

   Course type: PG

6. **Course description:**

   a) **Objectives:** This course is a hands-on introduction to basic concepts in data analytics, data structures, and visualization. The course provides the students with a comprehensive introduction to programming using Python and shell scripting, enabling them to work in a Linux environment, access remote servers, and effectively debug their code. Additionally, the course aims to extensively cover data structures, including their implementation, manipulation, and analysis, while also teaching concepts such as file I/O formats, data readers, data visualization techniques like t-SNE, and the concept of Big-O notation. By the end of the course, students will have gained the necessary knowledge and tools to analyze data effectively using Python and navigate the Linux environment.

   b) **Broad contents:**
      1. Introduction to basic programming and scripting
      2. Data visualization
      3. Data structures

7. Course contents:

Sr. No.	Broad Title	Topics	No. of Hours
1.	Introduction and Preliminaries	1. Introduction to programming in python 2. Shell scripting 3. Working in Linux 4. Accessing remote servers 5. Debugging	6
2.	Data reading	6. File I/O formats 7. Data readers	2
3.	Visualization	8. Data Visualization, 9. t-SNE	2
4.	Data structures	10. Big-O notation 11. Data structures	6

1. Course evaluation scheme:

There will be online short quizzes (objective or brief answer based) – total 20%
Class participation – 10%
Programming assignment (practical, real-world problem solving) – total 20%
Final end-term exam – total 50%

8. Reference books:

(a) Maheshwari, Anil. "Data analytics made accessible." *Seattle: Amazon Digital Services* (2014).

(b) Documentation of python libraries (available online)