Data and Astronomy

Session - 1

1. Pulsars – A brief history and a beautiful phenomenon
    a. A strange event.
    b. Supernovae!
    c. A theoretical explanation
    d. Quiz-1
2. Super Massive Black Holes
    a. Why, astronomers, why?
    b. What do we observe?
    c. Why do we observe what we do?
    d. Accretion Disk of a Black Hole
    e. Active Galactic Nuclei (AGN)
    f. Cross-Matching Algorithm
    g. Quiz-2
3. The Cosmological distance scale
    a. Stage 1: The Parallax Method
    b. Stage 2: The Cepheid Variable
    c. Stage 3: An Explosion
4. Redshifts
    a. What is a Redshift?
    b. Fundamental Property of Elements
    c. Hubble's Law

d. Mapping out the cosmos using Redshifts.
e. Quiz-3

5. Python Basics
    a. Variables and Strings
    b. Operators and Comparisons
    c. Input Handling
    d. Conditional Statements and Loops
    e. Lists in Python
6. Scientific Python
    a. Numpy (import numpy as np)
    b. Numpy arrays and their operations
    c. Astropy
    d. Loading data with numpy and astropy
    e. Scikit-Learn (sklearn)
    f. Machine Learning with sklearn

Session 2

7. Data Science
    a. Mean Stacking
    b. Median Stacking
8. Machine Learning
    a. What is ML?
    b. Supervised Techniques
    c. Regression
    d. Classification
    e. Decision Tree Regressor (DTR)

f. Estimating Redshifts using DTR
g. Quiz-4