Plane:

- **Data Science:**
  - ❖ **Step 1:**
    1. Python Programming
    2. Django
    3. Flask
    4. Rest API
    5. Fast API
    6. MySQL
    7. MongoDB
    8. PostgreSQL
    9. Apache Spark
    10. Web Scraping (BeautifulSoup, Selenium)
  - ❖ **Step 2: Mathematics for Machine Learning**
    1. R Programming
    2. Algebra:
       - Understand basic operations like addition, subtraction, multiplication, and division.
       - Familiarize yourself with exponents, radicals, factorials, summations, and scientific notation.
    3. Linear Algebra:
       - Scalars: Single numbers (real or natural).
       - Vectors: Lists of numbers representing points in space along axes.
       - Matrices: 2-D arrays of numbers with two indices.
       - Tensors: N-D arrays (N>2) used in machine learning and deep learning.
       - Eigenvectors & Eigenvalues: Special vectors and their corresponding scalar quantities.
       - Singular Value Decomposition: Factorization of a matrix into three matrices.
       - Principal Component Analysis (PCA): Useful for dimensionality reduction.
    4. Calculus:
       - Understand derivatives (addition, product, chain rule, etc.) and partial derivatives.
       - Be aware of hyperbolic derivatives (tanh, cosh, etc.).
    5. Statistics:

- Interpret results from learning algorithms and understand data distributions.

❖ **Step 3: Mathematics for Deep Learning**

1. Linear Algebra:
   - Understand vectors, matrices, and tensors.
   - Learn about eigenvalues, eigenvectors, and matrix decomposition.
   - Explore operations like eigendecomposition and singular value decomposition.
2. Calculus:
   - Master differentiation (including partial derivatives) and integration.
   - Backpropagation in neural networks involves gradients and chain rule.
3. Probability and Statistics:
   - Probability distributions (Gaussian, Poisson, etc.).
   - Expectation, variance, and covariance.
   - Bayes' theorem and conditional probabilities.
4. Multivariate Calculus:
   - Gradients, Jacobians, and Laplacians.
   - Optimization techniques (gradient descent).
5. Integral Calculus:
   - Understand multiple integrals and change of variables.
6. Random Variables:
   - Discrete and continuous random variables.
   - Probability density functions and cumulative distribution functions.
7. Statistics:
   - Evaluate estimators and conduct hypothesis tests.

❖ **Step 4: Mathematics for Data Science**

1. Linear Algebra & Matrix:
   - Vectors, matrices, and linear combinations.
   - Transpose, inverse, determinant, and dot product.
   - Vector spaces, basis, and dimension.
   - Singular Value Decomposition (SVD).
2. Probability & Statistics:
   - Probability distributions (binomial, Poisson, normal).
   - Mean, median, mode, standard deviation, and variance.
   - Hypothesis testing (t-tests, p-values, F-tests).
3. Calculus:

    - Derivatives, gradients, and backpropagation.
    - Maxima, minima, and Taylor series.
    - Gradient Descent for optimization.
4. Geometry & Graph Knowledge:
    - Understand angles, proportions, and graphs.
    - Visualize data using distribution plots and scatter plots.

- MNC
    - ❖ Cpp Programming
    - ❖ DSA
    - ❖ Coding Wars / Hacker Rank / Leatcode