**Project Title:** Building a Recommendation System for E-commerce

**Total Duration:** 14 Days

**Project Goal:** Develop a hybrid recommendation system using collaborative and content-based filtering techniques on an e-commerce dataset.

**Day 1: Project Setup and Dataset Selection**

* Choose a dataset (e.g., Amazon Product Reviews, RetailRocket, or any E-commerce dataset with user-product interaction).
* Load the dataset into a Jupyter Notebook or IDE.
* Understand data structure and perform initial exploration.
* Create project folder structure (data/, notebooks/, models/, etc.).

**Day 2: Data Cleaning and Preprocessing**

* Handle missing values, duplicates, and inconsistent data types.
* Encode user and item identifiers.
* Normalize or scale numerical data if required.
* Save the cleaned dataset.

**Day 3: Exploratory Data Analysis (EDA)**

* Visualize user and product distribution.
* Find most popular products, most active users.
* Examine ratings distribution, sparsity, and other key metrics.

**Day 4: Content-Based Filtering (Textual Data Preparation)**

* Extract product metadata (titles, descriptions, categories).
* Apply TF-IDF vectorization to product descriptions.
* Calculate cosine similarity between items.

**Day 5: Content-Based Recommender System**

* Build a recommender using cosine similarity scores.
* Recommend similar items based on a selected product.
* Test for a few sample users.

**Day 6: Collaborative Filtering - Data Preparation**

* Create a user-item matrix.
* Split data into train-test sets.
* Prepare data for matrix factorization models.

**Day 7: Collaborative Filtering with Matrix Factorization**

* Build a matrix factorization model using SVD or a neural network.
* Train the model on training data.
* Predict ratings on test data.

**Day 8: Model Evaluation - RMSE**

* Evaluate model performance using RMSE.
* Tune hyperparameters to improve accuracy.

**Day 9: Model Evaluation - Precision@K and Recall@K**

* Calculate top-K recommended items for each user.
* Compute Precision@K and Recall@K.

**Day 10: Model Evaluation - MAP (Mean Average Precision)**

* Calculate MAP for your model.
* Interpret the results and assess how well your model ranks items.

**Day 11: Hybrid Recommendation System (Combine both approaches)**

* Create a weighted hybrid model using content-based and collaborative scores.
* Normalize scores from both models.
* Generate final recommendations.

**Day 12: Evaluation of Hybrid Model**

* Recalculate RMSE, Precision@K, Recall@K, and MAP.
* Compare hybrid model performance with individual models.

**Day 13: Data Visualization and Reporting**

* Visualize performance metrics using Matplotlib and Seaborn.
* Create charts for user activity, rating distribution, etc.
* Document all findings.

**Day 14: Final Touches and Submission**

* Clean up code and notebooks.
* Write a comprehensive README.
* Prepare a slide deck (optional) and final project report.