**Project Title: AI-Powered Loan Eligibility Advisor**

**Project Statement:**

Loan approval decisions are often slow, inconsistent, and opaque—particularly in high-volume financial institutions. This project aims to build an AI-powered web application that automates loan eligibility analysis using machine learning. The system predicts approval likelihood based on user-provided financial information and generates transparent, PDF-based decision summaries. By integrating a financial guidance chatbot, the platform also assists users in understanding credit factors, improving transparency and access. Built with Streamlit, Python, and NLP tools, this solution empowers both applicants and lenders with real-time, explainable insights.

**Expected Outcomes:**

• **Loan Approval Prediction Engine**  
Users receive instant approval probability based on features like credit score, income, and loan history using trained machine learning models.

• **Personalized Financial Chatbot**  
A built-in NLP chatbot offers tailored guidance, explaining key concepts like EMI, credit score impact, and approval reasons using transformer models.

• **Explainable AI Outputs**  
Model decisions are visualized with tools like SHAP to help users understand how each input affected their result.

• **Professional PDF Report Generation**  
Each application generates a downloadable credit evaluation report summarizing the input data, predicted result, and interpretation visuals.

• **Real-time Loan Evaluation Workflow**  
The end-to-end system processes user input, performs inference, and provides feedback instantly through an interactive and responsive web interface.

**Modules to be Implemented:**

1. Data Ingestion and Preprocessing
2. Machine Learning Model Training & Inference
3. Explainability and Report Generation
4. Chatbot Integration & App Deployment

**Milestone 1: Weeks 1–2**  
**Data Ingestion and Preprocessing**  
**Objective**: Build a clean and structured dataset to train the loan approval model.

**Modules:**

1. **Streamlit Form Creation**
   * Develop user interface to collect applicant details (income, employment type, credit history, loan purpose).
   * Validate inputs for type and completeness.
2. **Data Cleaning & Transformation**
   * Handle missing data, perform categorical encoding, and normalize numeric fields.
   * Save preprocessing pipeline using joblib.
3. **Exploratory Data Analysis**
   * Visualize key trends: default rates by credit score, income brackets vs loan status.
   * Define useful derived features (e.g., debt-to-income ratio).

**Milestone 2: Weeks 3–4**

**Model Training and Evaluation**  
**Objective**: Train robust ML models to accurately predict loan eligibility.

**Modules:**

1. **Model Development**
   * Train classification models (Logistic Regression, Random Forest, or XGBoost) using labeled financial datasets.
   * Use GridSearchCV or manual tuning for hyperparameters.
2. **Performance Evaluation**
   * Evaluate model accuracy using AUC-ROC, precision-recall, and F1 score.
   * Save best-performing model pipeline.
3. **Threshold Tuning & Risk Banding**
   * Establish thresholds for approval, rejection, and review zones (e.g., ≥ 0.75 = Approve).
   * Tag risk bands in prediction output.

**Milestone 3: Weeks 5–6**

**Explainability and Report Generation**  
**Objective**: Deliver model transparency and generate professional documentation.

**Modules:**

1. **Explainable AI Integration**
   * Integrate SHAP to generate per-user feature importance plots.
   * Display local explanations in app interface.
2. **PDF Report Generator**
   * Design and implement a PDF summary using FPDF or ReportLab.
   * Include user inputs, decision status, confidence score, and SHAP visual.
3. **Interactive Visual Feedback**
   * Use matplotlib or Plotly to display risk breakdowns or score distributions.

**Milestone 4: Weeks 7–8**

**Chatbot & Deployment**  
**Objective**: Complete the product with a chatbot assistant and deploy it for real-world access.

**Modules:**

1. **NLP Chatbot Integration**
   * Fine-tune or use pre-trained transformer models (e.g., DistilGPT2) for chatbot.
   * Allow users to ask financial questions or get guidance on rejection causes.
2. **System Deployment**
   * Deploy using Streamlit Cloud or Hugging Face Spaces.
   * Add basic security: form validation, session-based input tracking.

**Evaluation Criteria:**

**• Milestone 1 (Week 2):** Streamlit app collects valid user inputs; cleaned and transformed dataset ready for modelling.  
**• Milestone 2 (Week 4):** Trained model achieves consistent performance metrics on validation set and can return predictions. **• Milestone 3 (Week 6):** SHAP-based explanations and PDF credit reports are generated per application. **• Milestone 4 (Week 8):** Full integration of chatbot and deployment of a usable, end-to-end system online.