Artificial Intelligence
Course Project

Total Marks: 15 **Due Date: 11/01/2026**

Introduction:

The purpose of this course project is to provide students with hands-on experience in designing and developing an AI-based system by applying the concepts, techniques, and tools covered throughout the course. Artificial Intelligence plays a vital role in addressing real-world challenges across diverse domains such as healthcare, education, environment, business, security, and social development. This project encourages students to understand how AI models are formulated, implemented, tested, and evaluated in practical settings.

Through this project, students will not only strengthen their conceptual understanding but also enhance their problem-solving, teamwork, research, and programming skills. They are expected to analyze a real-life problem, select appropriate AI approaches (such as search techniques, optimization algorithms, machine learning, neural networks, NLP, or computer vision methods), and justify their design choices.

The project should demonstrate:

- A clear problem definition
- Proper system design and workflow
- Correct implementation of AI techniques using Python
- Meaningful validation and performance evaluation
- Structured documentation and effective presentation of results

This project aims to support your growth as emerging AI practitioners, enabling you to build systems that are intelligent, purposeful, and socially impactful.

Important Instructions:

1. This is a group project, and each group may consist of a maximum of 3 members.
2. Each group must select one project topic and submit a brief project proposal for approval.
3. The system must be implemented in Python, using appropriate AI libraries or frameworks where needed.
4. The work should reflect original effort. Plagiarism or direct code copying from the internet will result in marks deduction or disqualification.
5. **Each group must submit:**
    - Project Proposal Document (Problem, Dataset, AI Technique, Expected Output) in a week
    - AI System Design/Architecture (Architecture, components, flowchart/PEAS where applicable)
    - Implementation (Source Code + Demo Video)
    - Performance Evaluation (accuracy, confusion matrix, F1-score, runtime comparison, or other relevant metrics)
    - Final Report and Presentation/Viva
6. Active participation of all group members is expected; contribution and collaboration will be evaluated.

AI Project Ideas for University-Level and Pakistan-Context Problems

Track 1: Campus and Academic Management Systems

1. **Automated Classroom Attendance System (Face Recognition)**
   Detect and recognize students using classroom camera images/video frames and automatically mark attendance, along with class headcount.
2. **Intelligent Timetable Scheduling System (Genetic Algorithm / Optimization)**
   Generate conflict-free timetables considering rooms, teachers, courses, and sections.
3. **Automatic Clash Detection and Resolution System for Timetables**
   Identify student, lecturer, room, and time slot conflicts based on enrollment and schedule.
4. **Student Demographic and Academic Performance Analytics Dashboard**
   Analyze academic trends based on demographic attributes (district, gender, schooling type, etc.) to support targeted advising.
5. **Student Performance Prediction & Early Warning System**
   Predict which students are at risk of failure or dropout and suggest early interventions.
6. **Adaptive Quiz System with Personalized Feedback**
   Evaluate student performance and dynamically adjust question difficulty based on previous answers.
7. **Course Enrollment Guidance Chatbot (Academic Advisor Bot)**
   Chatbot recommends suitable courses based on completed prerequisites and degree requirements.
8. **Academic Policies and Regulations Chatbot**
   Chatbot answers student queries regarding GPA rules, semester freeze, attendance policy, fee policy, and exam regulations.

Track 2: Security, Monitoring & Campus Efficiency

9. **On-Campus Crowd / Mobility Counting System Using CCTV Feeds**
   Track real-time crowd density in corridors, cafeteria, playground, exam halls for security and resource planning.
10. **Campus Security Analytics System**
    Detect abnormal activities (fights, intrusions, objects left behind) using surveillance feeds.

Track 3: Student Support, Growth & Welfare

11. **Educational Dropout Prediction System**
    Predict which students are likely to discontinue studies based on attendance, grades, family and socio-economic factors.
12. **AI Career Guidance System for Pakistani Students**
    Analyze student interests, strengths, grades, and job market trends to recommend suitable study and career paths.

Track 4: Environmental Sustainability and Public Health

13. **AI-Based Smog Source Classification from Satellite Images**
    Use CNNs to identify industrial smoke zones, crop burning, and traffic pollution sources.
14. **Smog Level Prediction & Health Risk Awareness System**
    Forecast smog severity based on AQI, temperature, humidity, and wind patterns; provide mask-use and outdoor safety recommendations.

Track 5: Commercial and Service Automation

15. **AI-Driven Chatbot for Point-of-Sale (POS) Systems**
    Chatbot integrated with retail POS to answer customer queries, track product availability, suggest items, and help with billing support.