CIS-142 Machine Learning and AI Essentials

📘 Course Description

This course introduces students to the **core concepts, algorithms, and tools of Machine Learning (ML) and Artificial Intelligence (AI)**. It starts with the history and principles of AI, moves into working with data, and progresses through supervised and unsupervised learning, neural networks, and deep learning. Students also learn about model evaluation, deployment, ethics, and emerging trends. The course combines **theory with hands-on practice**, giving students the skills to design, implement, and assess ML models for real-world applications.

✅ Course Expectations

- **Participation & Attendance:** Students are expected to actively participate in discussions, labs, and group projects. Attendance will be recorded after each class.
- **Preparation:** Complete all readings, assignments, and labs on time. Late work is accepted for partial credit only up to one week after the due date.
- **Academic Integrity:** Plagiarism and disruptive behavior are not tolerated. Students must properly acknowledge sources and maintain professionalism.
- **Engagement:** Whether attending in person or online, students are expected to stay focused, limit distractions, and speak up if they need help.
- **Technology Requirements:** Students must have access to a computer that meets course requirements and be able to use Canvas and Microsoft Teams.

🎯 Learning Outcomes

By the end of the course, students will be able to:

1. **Understand AI & ML Foundations** – Explain the history, principles, and evolution of AI and ML.
2. **Work with Data** – Collect, clean, preprocess, and analyze data for machine learning tasks.
3. **Implement Algorithms** – Apply supervised (regression, decision trees, SVMs) and unsupervised (clustering, PCA) learning techniques.
4. **Build Neural Networks** – Design and train basic neural networks, CNNs, and RNNs using frameworks like TensorFlow/Keras.
5. **Evaluate Models** – Use cross-validation, performance metrics, and tuning techniques to assess and optimize models.
6. **Deploy AI Solutions** – Understand deployment strategies, MLOps practices, and real-world integration of ML models.
7. **Apply Ethics** – Recognize and address issues of bias, fairness, and responsible AI use.
8. **Explore Trends** – Discuss emerging AI applications in fields like healthcare, autonomous vehicles, and generative models.