Frantz Fanon University

Course Title: Artificial Intelligence

Course Code: IT305

Credit Hours: 3

Prerequisite(s): Python, Probability, Statistics, Linear Algebra & Calculus.

Course Description: This course aims to provide advanced background on Artificial Intelligence. It provides the basic concepts of AI & ML to apply it to IP & NLP problems.

Mode of Delivery: *Lectures* - preferably interactive (ask questions, intervene in discussions) *& Lab sessions*.

Instructor(s): Suleiman Gargaare *(MSc in CS, MSc in PM & BSc in IT).*

Learning Outcomes: At the end of this course, students will be able to

- Understand the scope of Artificial Intelligence.
- Understand the application areas of Artificial Intelligence.
- Explain Artificial Intelligence as representation and search problem.
- Explain and Implement Machine Learning Algorithms.
- Solve Image Processing and Computer Vision Problems.
- Solve Natural Language Processing issues that Human Languages have.

Course Content:

1. **Introduction** of Artificial Intelligence, Machine Learning, Image Processing, Natural Language Processing and Deep Learning.
2. **Artificial Intelligence (AI):** Roots and Scope of AI, Definition, Knowledge Base in AI, Search Problems in AI including Heuristic Search.
    - ✓ In this course we will cover the following Algorithms
        - Dept First Search
        - Breadth First Search
        - Greedy Best First Search

- A* Search
- Mini Max

3. **Machine Learning:** Types of Machine Learning including Supervised, Unsupervised and Reinforcement Learning. Classification, Regression and Clustering Algorithms.
    - ✓ In this chapter we will cover the following Algorithms
        - Support Vector Machine (SVM)
        - K Nearest Neighbor (KNN)
        - Perceptron
        - Gaussian Naïve Bayes
4. **Computer Vision and Image Processing (CV & IP):** Low-level techniques, such as color enhancement and noise removal, Medium-level techniques, such as compression and binarization, and higher-level techniques involving segmentation, detection, and recognition algorithms extract semantic information from the captured data.
    - ✓ In this chapter we will cover the following Algorithms
        - Histogram Equalization.
        - Binarization
        - Erosion and Dilation
5. **Natural Language Processing (NLP):** Phonetics, Phonology, Morphology, Syntax, Semantics, Pragmatics, Discourse, Parsing & Part of Speech Tagging.
    - ✓ In this chapter we will cover the following Algorithms
        - Stemming
        - Context Free Grammar
        - POS Tagging
6. **Introduction to Neural Networks and Deep Learning:** Definitions, Applications & Algorithms of Neural Networks and Deep Learning.

Reference Books:

1. Artificial Intelligence A Modern Approach, 3rd Edition by Stuart J. Russell & Peter Norvig.
2. Natural Language Processing with Python by Steven Bird, Ewan Klein and Edward Loper.
3. Programming Computer Vision with Python Jan Erik Solem.