



**INSTITUTE OF BUSINESS AND MANAGEMENT SCIENCES (IBMS)
THE UNIVERSITY OF AGRICULTURE, PESHAWAR
KHYBER PAKHTUNKHWA-PAKISTAN**

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Date: / /

Program: BS(CS)-VI
Course Name: Artificial Intelligence
Course Code: CS-502
Credit Hours: 03
Course Week: 16
Total Credit Hours: 48

Location: Programming Room, 27 & 28.

Office Hours and Contact Info.

Instructor: Dr. ABDULLAH

Office Hours; to be announced

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Fall (2022): BSIT 5th Semester

Prerequisite:

Object oriented programming, Data Structure,

Course Objectives:

In this age of rapid technological development, the importance of artificial intelligence cannot be underestimated. To bring more advancement in this field, a lot of work is needed to be done. The main objective of this course is to acquaint students with the basic knowledge of artificial intelligence that is, the concept, purpose and implementation. The course gives an overview of different areas like Expert Systems and robotics. The course also encompasses machine learning Neural network, Machine Translation and Natural Language Processing in details.

Week-1

Artificial Intelligence

- Introduction to A.I.
- Scope
- Natural intelligence vs. artificial intelligence
- AI computing vs. traditional computing

- Brief History
- Understanding the term Artificial Intelligence
- Daily life examples

Week-2

AI of Applications

Application areas of AI

- Expert systems
- Natural Language Processing (NLP)
- Computer vision
- Speech recognition and generation
- Robotics
- Neural network
- Virtual reality

Week-3

Machine Learning

- Course Pre-requisites
 - Basics of Machine Learning (ML)
 - Popular ML Approaches
 - Supervised Machine Learning
 - Unsupervised Machine Learning
 - Semi-Supervised Machine Learning
 - Reinforcement Learning
 - Limitations of Traditional ML
 - Applications
- Types of Machine learning ▪ Classification • Regression
▪ Clustering

Week-4

Neural Network

- Components of Neural Network
- Input layer • Bias/Threshold • Weights • Output layer
- Learn neural networks basics,
- Build your first network with Python and NumPy.
- Use the modern deep learning framework to build multi-layer neural networks, and analyze real data.
- Current Research Trends

Week-5

Types of ANN and its training algorithms

- Feed forward neural network
- Recurrent Neural Network (RNN)
- Back propagation
- Types of Recurrent Neural Network (RNN)
- Problem with RNN
- Advantage and disadvantage of ANN and RNN
- Reading Assignments

Week-6**Robotics**

- Robotics:
- Emergence
- Reasons to use a robot
- Main application areas
- Laws of robotics
- Types of robots
- Components of a typical robot
- Characteristics of robotics
- Robot sensors
- Robots programming tools

Week-7**Natural Language Processing (NLP)**

- Natural languages vs. computer languages
- Natural language understanding (NLU)
- Natural language generation (NLG)
- Domain areas of NLP
- Problems in Natural Languages
- Ambiguity:
 - Lexical
 - Syntactic
 - Discourse
 - Transient
- Imprecision
- Inaccuracy
- Incompleteness
- Solution of the NL problems
- NLU techniques
 - Syntactic analysis
 - Semantics
 - Morphology
 - Pragmatics

Week-8**Machine Translation (MT)**

- History of MT
- Need of MT
- Types of MT
- Bilingual & multilingual MT
- Categories of MT
- Advantages of MT
- Causes of failure of MT
- Problems with MT
- Translation steps

- Analysis
- Transfer
- Generation

Week-9 Intelligent Agents

- Agents and environments
- Rationality
- PEAS (Performance measure, Environment, Actuators, Sensors)

Week-10 Problem Solving in AI by Search and Optimization

- Types of search algorithms
- Informed Search
- **Search and Optimization**

Week-11 Search Optimization

- Search optimization
- Tree search
- Graph search
- Learning costs
- A* search

Week-12 Python Basics

- Variables and Data Types
- Calculations with Variables
- Lists
- List Operations
- List Methods
- Libraries

Week-13 Python libraries

- NumPy
- Pandas
- Pandas data frame
- Difference between Pandas and NumPy
- Matplotlib

Week-14 NumPy libraries

- NumPy Basic

- NumPy Exercise

Week-15 Pandas libraries

- Pandas Basics
- Pandas Data Structures
- Pandas Exercise

Week-16 Keras and Tensor flow

- What is Keras and Tensor flow
- Difference between Keras and Tensor flow
- Keras and Tensor flow exercise
- Project

Total Marks: 100

Recommended Books:

- UNDERSTANDING AI by Mishkoff
- CRASH COURSE IN ARTIFICIAL INTELLIGENCE & EXPERT SYSTEM by Louis E. Frenzd
- TEXT BASED MACHINE TRANSLATION by Dr.M. Abid.
- Machine Learning, Oxford – Nando de Freitas [Link](#)
- Deep Learning for Natural Language Processing, Stanford [Link](#)
- Russell, S. and Norvig, P. “Artificial Intelligence. A Modern Approach”, 3rd ed, Prentice Hall, Inc., 2015.
- Norvig, P., “Paradigms of Artificial Intelligence Programming: Case studies in Common Lisp”, Morgan Kaufman Publishers, Inc., 1992