The University of Faisalabad

Course	Course Title	Contact Hrs./Week	Total Lectures Allocated
Navttc	Artificial Intelligence (Machine Learning & Deep Learning)	20	60

Discipline	Commencement of the Course	Course Duration	Course Termination Date
All Discipline		12-Weeks	

1. COURSE LEVEL
Undergraduate and Graduate

2. PREREQUISITES
There is basic python pre-requisite for this course

3. COURSE Objective:
This course provides an in-depth training program focused on developing employable skills in Artificial Intelligence (AI), with a specialization in Natural Language Processing (NLP) and Microsoft Azure AI. The course aims to equip participants with both theoretical knowledge and practical skills, encouraging professional behavior and critical thinking. Delivered by a team of experienced instructors, the curriculum emphasizes hands-on learning, problem-solving, and practical assessments. It also fosters personal development traits such as responsibility, self-reliance, and adaptability. By the end of the course, trainees are expected to have a solid understanding of AI and machine learning concepts, be familiar with modern ML techniques, and gain practical experience using key tools and libraries such as scikit-learn, pandas, NumPy, TensorFlow, PyTorch, and Keras.

4. KEY SKILLS AND ATTRIBUTES TO BE DEVELOPED BY THE COURSE

Analytical Thinking and Problem-Solving	-Ability to analyze data and derive meaningful insights. Identifying the right algorithms for specific machine learning and deep Learning tasks.
Technical Proficiency and Critical Evaluation	- Mastery of machine learning models and frameworks, assessing model performance using evaluation metrics and improving through tuning.
Practical Application	- Applying ML techniques to solve real-world problems with large datasets
Collaboration and Communication	-Working on group projects and presenting findings effectively.

Weeks	Lecture No.	Contents
Week 1	Day 1	Introduction to AI, Course Overview, Career Survey, Software Installation
	Day 2	Linux Basics (commands, shutdown, environment variables)
	Day 3	Python Basics: values, expressions, string ops, input & type casting
	Day 4	Data Structures: lists, tuples, dictionaries, sets
	Day 5	Control Flow: if/else, loops, list comprehension, iterators
Week 2	Day 1	Functions, lambda, file & exception handling
	Day 2	OOP concepts: classes, inheritance, access specifiers
	Day 3	Polymorphism, magic methods, abstract classes
	Day 4	Data types, quantitative/qualitative variables
	Day 5	Central tendency & dispersion: mean, mode, std deviation, z-score
Week 3	Day 1	Correlation, univariate/multivariate plots, probability basics

	Day 2	Conditional probability, distributions, Bayesian probability
	Day 3	NumPy arrays: creation, reshaping, operations
	Day 4	NumPy indexing, broadcasting, arithmetic operations
	Day 5	Intro to Pandas, DataFrames, missing data handling
Week 4	Day 1	Pandas merge/join/groupby, plotting
	Day 2	Seaborn plots (distplot, boxplot, heatmap, etc.)
	Day 3	ML Pipeline Overview
	Day 4	Supervised ML: Regression and Classification
	Day 5	Linear Regression (with/without vectorization)
Week 5	Day 1	Multivariate Linear Regression
	Day 2	Polynomial Regression
	Day 3	Logistic Regression (Binary)
	Day 4	Logistic Regression (Multiclass)
	Day 5	Practice Day (ML models coding)
Week 6	Day 1	NLP Introduction, preprocessing, NLTK/SpaCy
	Day 2	Tokenization, POS, NER, BoW
	Day 3	Evaluation metrics, dataset imbalance
	Day 4	SVM and Decision Trees
	Day 5	Random Forest
Week 7	Day 1	Boosting Algorithms
	Day 2	MLP Neural Networks: forward/backpropagation
	Day 3	Neural Network implementation with TensorFlow/Keras
	Day 4	CNNs: 2D and 1D
	Day 5	Practice: Neural Network coding
Week 8	Day 1	Recurrent Neural Networks (RNNs)
	Day 2	Long-Short-Term-Memory Networks (LSTM)
	Day 3	LSTM Code Practice
	Day 4	Gated Recurrent Unit Networks
	Day 5	GRU Code Practice
Week 9	Day 1	Word2Vec, CBOW, Skip-gram
	Day 2	Gensim and Custom Training
	Day 3	Sequence Models
	Day 4	Sequence Models, 1-to-1, 1-to-Many
	Day 5	Many-to-1, Many-to-Many
Week 10	Day 1	Bi-directional RNN/LSTM
	Day 2	Attention Mechanism

	Day 3	Attention Mechanism in Models
	Day 4	Project selection
	Day 5	Planning, architecture discussion
Week 11	Day 1	Choosing Azure AI services (vision, language, decision)
	Day 2	Speech services, responsible AI, security
	Day 3	Azure resource management, cost monitoring
	Day 4	Deployment, CI/CD integration, anomaly detection, personalization
	Day 5	Image/video analysis, classification
Week 12	Day 1	Video processing
	Day 2	Azure NLP: Text, speech, translation
	Day 3	Language understanding, Q&A bots
	Day 4	Knowledge mining
	Day 5	Conversational AI solution implementation
Week 13	**Final Exams**	

5. TEACHING AND LEARNING METHODS

Duration: 12 weeks, 240 hours in total
Lectures: 60 (20 hours per week)
Per Lecture: 04 hours

-Live lecture sessions using Multimedia
-Question Answer Session
-Discussion on covered and continuous topics with students during the class lectures
-Case Studies
-Video links of related topics will be providing to students
- Providing hand-outs on relevant topics
- Assignments: Reading Topics and Written assignments using internet and books

6. TECHNOLOGY REQUIREMENTS

-Computer System
-Learning Management System
-Supporting Software (e.g. Anaconda, Vsc, Tensorflow, Scikit-Learn, Pandas)
- Internet Facility
- Digital Library Access

7. REQUIRED LEARNING RESOURCES

Text Book(s):	
Reference Book(s):	
Journals/Periodicals: (Title, Publisher)	None
Websites:	W3 School,

8. COURSE ASSESSMENT

-Homework exercise in the form of supplementary reading materials will be given to students according to the course progress; homework will be not marked and will not be counted towards the course assessment.
-2 quiz and 3 assignments will be given during the course
-1 final exam will be performed.

9. GUIDELINES FOR SUBMISSION OF ASSIGNMENTS

Read the assignment requirements carefully, including any specific instructions on length, formatting, style, etc., provided for every assignment. If no specific instructions are given, here are some general suggestions for you to follow:
-Include sufficient identification on every assignment submitted (e.g., your name; the course name, course code, and the assignment number or title).
-For assignments with multiple questions, identify the question number and restate each assignment question before providing your answer.
-Review your assignment before submitting it to make sure you have completed the assignment in full. Also, carefully proofread your work for spelling and grammatical errors that could affect your grade.
-Submit assignment on LMS till due date.
-Also, unless you have registered for an extension, assignments submitted after the due date, will be returned to you ungraded.

10. CONTRIBUTION OF COURSE TO MEET THE PROFESSIONAL COMPONENT

This course prepares students to work professionally in the area of artificial intelligence and machine learning fields. Students should be able to apply knowledge of machine learning to identify and address the problems which may be solved by machine learning and artificial intelligence.

11. DISCLAIMER

This course outline is tentative; I reserve the right to change the deadlines, readings, or assignments during the course.

Note: -The above course outline covers all contents of the course AI (ML and DL) as prescribed by National Vocational and Technical Training Commission
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Instructor's name: Muhammad Saeed   **Signature & Date**: _____   **HOS/COS**:_____