Course Type	Course Code	Name of Course	L	T	P	Credit
ESO	MNE 203	Introduction to Applied Artificial Intelligence	3	0	0	9

Course Objective
The course examines the concepts and algorithms that lay the foundation for technologies like self-driving cars, recommendation systems, and medical diagnostics. Using simple use cases, students will gain exposure to AI algorithms through case study-based exercises
Learning Outcomes
Upon successful completion of this course, students will develop:

- Hands on experience in libraries and open-source platforms of machine learning
- Knowledge of artificial intelligence principles and the most important techniques
- Ability to identify, formulate, and solve complex engineering problems by applying principles of AI

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	**Introduction to Artificial Intelligence (AI):** What is AI and main paradigms within AI. Machine Learning (ML) techniques and its significance	4	Foundations of artificial intelligence and the recent applications. Brief overview of ML and its significance
2	**Basic Concepts of Python Programming:** Python's Operators, functions, statements modules and ML libraries. Google Colab and Jupyter notebook IDE	7	Learn how to read and write code as well as how to test and "debug" it in Python. Run the code in the cloud, share and store data
3	**Feature Engineering** Variable Types, Scales of Measurement, Visual representation of data in plots, handling outliers etc.	4	Students will develop an understanding Preliminary Data Exploration and selecting most important features for building models
4	**Introduction to ML Algorithms** Supervised and Unsupervised learning techniques; classification and regression problems; loss function; gradient descent optimizer; regularization	8	Students will learn to build models on data sets using different ML techniques
5	**Measures of Algorithm performance:** Cross validation, hyperparameter tuning, overfitting, tradeoff between bias and variance, confusion matrix, evaluation metrics	4	Evaluate the accuracy of predictions for classification and regression problems
6	**AI and ML Cloud platforms:** Dataiku, Orange, Microsoft Azure, Google AI, etc. Python packages: scikit learn, keras; ML frameworks: TensorFlow	4	Learn about platforms that enables non specialists with no or less coding expertise to use AI/ ML and build models
7	**Neural Networks:** Multi-Layer Perceptron (MLP), Activation-functions, BP algorithm, convolutional neural network (CNN), recurrent neural network (RNN) and long short-term memory (LSTM)	5	Students learn how to design architecture of simple and deep neural networks. Apply various algorithms developed for object detection, forecasting in videos and images and time series data
8	**Natural Language Processing** Tokenization, Stemming, Lemmatization, POS Tagging	2	Students will learn basic model in NLP
9.	**Capstone project:** Solve a couple of simple machine learning case studies using the AI platforms or Python	4	Use the information learnt in the class to solve real-life problems

Text Books:

1. Deep Learning with Python by Francois Chollet– 22 December 2017
2. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems, by Aurélien Géron; Third Edition– 10 October 2022

Reference Books:

    a. The Hundred-Page Machine Learning Book, Andriy Burkov; 1 January 2019

    b. Machine Learning Using Python, Manaranjan Pradhan, U Dinesh Kumar; Wiley (1 January 2019)