KONGUNADUARTSANDSCIENCECOLLEGE (AUTONOMOUS)

COIMBATORE–641029

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING (UG)

Certificate Programme

in

Artificial Intelligence and Machine Learning

CURRICULUM AND SCHEME OF EXAMINATIONS

(2025 - 2026 onwards)

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

Vision:

To produce world class leaders in artificial Intelligence and Machine Learning through Excellence in education and research and build an ecosystem to contribute significantly to the society.

Mission:

The Department of Artificial Intelligence and Machine Learning is committed to:

- Impart rigorous training to generate knowledge through the state-of-the-art concepts and technologies in Artificial Intelligence and Machine Learning.
- Initiate, sustain and nourish research groups in Artificial Intelligence.
- Establish centers of excellence in leading areas of computing and Artificial Intelligence.
- Transform the Department of Artificial Intelligence and Machine Learning as a leader in imparting Artificial Intelligence and Machine Learning education and research.
- To motivate the learner community for exploiting the potential of start-ups and innovations in this area and connecting them with the real-life problems of industry.

PROGRAMMEOUTCOME (PO)

PO1	To Understand the meaning, purpose, scope, stages, applications, and effects of AI.
PO2	To analyze and understand machine learning concepts and range of problems that can be handled by machine learning.
PO3	To develop various real time applications using latest technologies and programming languages.
PO4	To understand concept of knowledge representation and predicate logic and transform the real-life information in different representation.
PO5	To implement deep learning algorithms, understand neural networks and traverse the layers of data abstraction which will empower you to understand data like never before.

PROGRAMMESPECIFIC OUTCOME (PSO)

On successful completion of this programme you will have knowledge and understanding of:

PSO1 An ability to apply scientific and technological principles underlying of Artificial Intelligence.

PSO2 An ability to apply current techniques, skills, Specialist tools and techniques used to design, analyze, implement and verify AI systems.

PSO3 An ability to apply design and develo principles in the construction of software systems of varying complexity.

PSO4 An ability to use knowledge in various domains to identify real world problems and hence to provide solution to new ideas and innovations.

PSO5 Use different machine learning techniques to design AI machine and enveloping applications for real world problems.

CAI-1

KONGUNADU ARTS AND SCIENCECOLLEGE [Autonomous]
COIMBATORE - 641 029.

DEPARTMENT OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

CERTIFICATE PROGRAMME IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

CURRICULUM & SCHEME OF EXAMINATION
Duration: (Six Months)
[APPLICABLE TO THE STUDENTS ADMITTED DURING THE ACADEMIC YEAR 2025-2026 ONWARDS]

Semester	Subject code	Title of the Paper	Instruction Hours/Cycle	Exam.Marks			Duration of Exam(hrs)	Credits
				CIA	ESE	Total		
	25CAI101	Core Paper 1 - Python with Data Science	3	25	75	100	3	2
	25CAI102	Core Paper 2 - Artificial Intelligence and Machine Learning	3	25	75	100	3	2
	25CAI1CL	Core Practical 1 – Python With Data Science Lab	3	40	60	100	3	2
	25CAI1CM	Core Practical 2 – Artificial Intelligence and Machine Learning Lab	3	40	60	100	3	2
		Total	**12**	**-**	**-**	**400**	**-**	**8**

Part-wise Total Marks:

SUBJECT	MARKS	TOTALCREDITS
Core Theory	200	4
Core Practical	200	4

CIA–Continuous Internal Assessment

ESE–End –of- Semester Examination

Internal 25 marks applicable for theory subjects and 40 marks for Practical subjects.

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Components of Continuous Internal Assessment (50 Marks)

Components		Marks	Total
Theory			
CIAI	75	(75+75) Converted to15	25
CIA II	75		
Assignment/Seminar		5	
Attendance		5	
Practical			
CIA Practical		25	40
Observation Notebook		10	
Attendance		5	

* Class Participation, Case Studies Presentation, Field Work, Field Survey, Group Discussion, Term Paper, Workshop/Conference Participation. Presentation of Papers in Conferences, Quiz, Report/Content writing. Etc.

******Two Assignments to be given. (Each5 marks).

BLOOM'S TAXONOMY BASED ASSESSMENT PATTERN

K1-Remembering; **K2**-Understanding; **K3**-Applying; **K4**-Analyzing; **K5**-Evaluating

1. ESE Theory Examination:

(i) CIA I & II and ESE: 75 Marks

Knowledge Level	Section	Marks	Description	Total
K1 Q1 to 10	A (Answer all)	10 x 1 = 10	MCQ	75
K1 – K5 Q11 to 15	B (Either or pattern)	5 x 5 = 25	Short Answers	
K2 – K5 Q16 to 20	C (Either or pattern)	5 x 8 = 40	Descriptive / Detailed	

2. ESE Practical Examination:

Knowledge Level	Section	Marks	Total
K3	Experiments	50	60
K4	Record Work	10	
K5			

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Table of Content

Sub.Code:25CAI101

ProgrammeCode: 12	CERTIFICATE PROGRAMME IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING			
Title of the Paper : Core Paper1 – Python with Data Science				
Batch	**Hours/Week**	**Total Hours**	**Credits**	**Skill Development**
2024-2025	**3**	**45**	**2**	

Course Objectives

1. To demonstrate the use of built-in objects of Python
2. To implement numerical programming, data handling through NumPy Modules.
3. To Visualize through MatplotLib modules.
4. To Manipulate Pandas DataFrame.

Course Outcomes (CO)

K1toK5	CO1	Implement the concepts lists, tuples and dictionaries
	CO2	Understand the use of built-in objects of Python
	CO3	Implement numerical programming, data handling through NumPy Modules
	CO4	Applying MatplotLib modules on datasets for visualization
	CO5	Manipulating Pandas DataFrame and Summarize Data

Syllabus

Unit I **(9 Hours)**

Introduction to Python for Data Science : Introduction to Python and its applications in Data Science, Python installation and setup (Anaconda, Jupyter Notebook, Google Colab), Basic Python syntax: Variables, Data types, Operators, Control structures: Conditional statements, Loops, Functions, Modules, and Libraries, Introduction to NumPy: Arrays, Operations, Indexing

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Unit II **(9 Hours)**

Data Handling and Preprocessing: Introduction to Pandas: Series and DataFrames, Data manipulation: Filtering, Sorting, Grouping, Handling missing data, Duplicate values, Data cleaning techniques, Data visualization with Matplotlib and Seaborn, Exploratory Data Analysis (EDA)

Unit III **(9 Hours)**

Introduction to Statistics and Data Analysis :Basics of Statistics: Mean, Median, Mode, Standard Deviation, Probability Basics and Distributions, Correlation and Regression Analysis, Introduction to Scikit-learn (Simple Machine Learning concepts), Supervised Learning: Linear Regression, Classification (Logistic Regression)

Sub.Code:25CAI101

Unit IV **(9 Hours)**

Understanding Machine Learning concepts: Supervised vs. Unsupervised Learning - Basic Classification Algorithms: Decision Trees, K-Nearest Neighbors (KNN) - Introduction to Clustering (K-Means) - Model Evaluation: Accuracy, Precision, Recall

Unit V **(9 Hours)**

Capstone Project and Applications :Introduction to Time Series and Forecasting Basics - Introduction to Natural Language Processing (NLP) Basics - Working with Real-world Data (Simple Projects) - Introduction to Model Deployment (Flask/Streamlit) - Capstone Project: End-to-End Data Science Mini-Project

Teaching Methods:

ChalkandTalk, SmartClassRoom, PowerpointPresentation, Seminar, Quiz & Discussion

Text Books:

1. ReemaThareja – Python Programming: Using Problem Solving Approach, 2nd Edition, Oxford University Press (2023).
2. Jake VanderPlas – Python Data Science Handbook: Essential Tools for Working with Data, 2nd Edition, O'Reilly Media (2022).

Reference Books:

1. Wes McKinney – Python for Data Analysis: Data Wrangling with Pandas, NumPy, and Jupyter, 3rd Edition, O'Reilly Media (2022).
2. Sebastian Raschka&VahidMirjalili – Python Machine Learning: Machine Learning and Deep Learning with Python, Scikit-learn, and TensorFlow 2, 3rd Edition, Packt Publishing (2020).
3. AurélienGéron – Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, 3rd Edition, O'Reilly Media (2022).

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	H	H
CO2	S	S	H	M	S
CO3	H	S	H	S	H
CO4	S	S	H	S	H
CO5	S	H	H	S	M

S–Strong **H**–High **M**–Medium **L** –Low

CAI-6

Sub.Code:25CAI102

ProgrammeCode:12	**CERTIFICATE PROGRAMME IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING**			
Title of the Paper : Core Paper 2 – Artificial Intelligence and Machine Learning				
Batch	**Hours/Week**	**Total Hours**	**Credits**	**Skill Development**
2024-2025	**3**	**45**	**2**	

Course Objectives

1. Understand and implement loops and basic arithmetic operations.
2. understand and implement the concept of Narrow AI
3. learn the practical workflow of building a machine learning model with Scikit-Learn.
4. Evaluate the performance and accuracy of the rules generated by the algorithm.
5. Learn the basic principles of logistic regression and how it can be applied to classification problems.
6. Implement the Apriori algorithm to extract frequent itemsets and association rules from transactional data.

Course Outcomes (CO)

K1 to K5	CO1	Understanding: Comprehend how to use loops to generate repetitive calculations dynamically.
	CO2	Remember the basic concepts of Narrow AI and machine learning algorithms.
	CO3	Create and modify algorithms to navigate robots efficiently through obstacles**.**
	CO4	Analyze the generated association rules to find significant market trends.
	CO5	Evaluate the model's performance in terms of accuracy and precision.

Syllabus

Unit I **(9 Hours)**

Artificial Intelligence Overview - History & Evolution – AI Types - **Narrow AI**- General AI - Super AI- AI Challenges – AI Tools Frameworks – PyTorch - Scikit-Learn - Microsoft Cognitive Toolkit – Keras – TensorFlow –XGBoost - AI Example - AI Ethics & Bias.

Unit II **(9 Hours)**

Branches of AI – AI Natural Language Processing - AI Robotics - AI Fuzzy Logic Systems- Artificial Intelligence - Neural Networks - Intelligent system AI – Problem solving in AI – AI Expert System – AI Application.

Unit III **(9 Hours)**

Introduction to Machine Learning – Importance - Examples of Machine Learning Applications - Machine Learning Life Cycle - Main Challenges of Machine Learning -Machine Learning Limitations.

Sub.Code:25CAI102

Unit IV **(9 Hours)**

Types of Machine Learning - Supervised Learning – Classification – Regression - Algorithms for Supervised Learning - Advantages and Disadvantages of Supervised Learning- Unsupervised Machine Learning – Clustering - Association Rule Mining - Algorithms for Unsupervised Learning - Advantages and Disadvantages of Unsupervised Learning.

Unit V **(9 Hours)**

Reinforcement Learning - Elements - Types - Algorithms - Advantages of Reinforcement Learning - Disadvantages of Reinforcement Learning - Applications of Reinforcement Learning.

Teaching Methods:

ChalkandTalk, SmartClassRoom, PowerpointPresentation, Seminar, Quiz & Discussion

Text Books:

1. Stuart Russell, Peter Norvig, (2020) Artificial Intelligence: A Modern Approach, , Fourth edition, Pearson Publishing.
2. EthemAlpaydm, (2015) "Introduction to Machine Learning", PHI Learning Pvt. Ltd.; Third edition

Reference Books:

1. Ian Witten, (2016) Data mining: Practical Machine Learning Tools and Techniques, Fourth edition, Morgan Kaufmann Publishers.
2. Tom M. Mitchell (1997). Machine Learning, Tata McGraw-Hill, New Delhi
3. Suresh Samudrala,(2019), Demystifying Machine Learning, Neural Networks and deep learning, Notion Press
4. Bernard Marr, Artificial Intelligence in Practice: How 50 Successful Companies Used AI and Machine Learning to Solve Problems, Wiley Publications, 2019

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	H	H
CO2	S	S	H	S	S
CO3	S	H	H	S	H
CO4	S	S	S	S	M
CO5	S	S	S	H	M

S–Strong **H**–High **M**–Medium **L** –Low

CAI-8

Sub.Code:24CAI1CL

ProgrammeCode:12	**CERTIFICATE PROGRAMMEINARTIFICIAL INTELLIGENCE AND MACHINELEARNING**		
Core Practical 1– Python with Data Science Lab			
Batch	**Hours/Week**	**Total Hours**	**Credits**
2024-2025	**3**	**45**	**2**

Course Objectives

1. To gain knowledge about the concepts of Built-in functions and User-defined functions.
2. To understand the concepts of Numpy and Pandas.
3. To learn Python Programming and Key Python Libraries related to AI.
4. To implement classification, clustering and regression algorithms in Python.
5. To develop programs using Matplotlib.

Course Outcomes (CO)

K3 to K5	CO1	Implement the concepts of built-in functions in python programming.
	CO2	Implement various machine learning algorithms using python programming.
	CO3	Understand the basics of Matplotlib.
	CO4	Analyze the concept of Decision Tree.
	CO5	Implement the concepts of Numpy and Pandas.

List of Practical Programs

1. Write a Python program to perform basic operations on lists, tuples, and dictionaries. (Add, remove, update elements in a list and dictionary. Tuple unpacking and indexing.)
2. Write a Python program to read a CSV file using Pandas and display the first 5 rows. (Use Pandas read_csv() function. Display data types of each column.)
3. Write a Python program to handle missing values in a dataset using Pandas. (Fill missing values using mean, median, mode. Drop rows with missing values.)
4. Write a Python program to visualize data using Matplotlib and Seaborn. (Create a bar chart, histogram, and scatter plot. Customize charts with titles and labels.)
5. Write a Python program to calculate mean, median, standard deviation, and correlation for a given dataset.(Use NumPy and Pandas for statistical calculations.)
6. Write a Python program to create a heatmap for correlation between different numerical columns in a dataset. (Use Seaborn'sheatmap() function.)
7. Write a Python program to implement Linear Regression using Scikit-learn.
8. Write a Python program to implement K-Means Clustering
9. Write a Python program to perform sentiment analysis on text data using NLP techniques.
10. Write a Python program to build a simple Decision Tree classifier using Scikit-learn.

Sub.Code:25CAI1CL

Guidelines to the distribution of marks for Practical Examinations:

Two Questions will be given for each student. (3 Hours / 60 marks)

Record: 10 marks

Particulars	Program1 (Marks)	Program2 (Marks)
Algorithm	5	5
Program Coding	15	15
Execution& Modifications	5	5

Teaching Methods:

Presentation and Program Demonstration using Projector

Mapping

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	S	S	S	S	S
CO2	S	S	S	S	S
CO3	S	S	M	S	H
CO4	S	S	S	S	S
CO5	S	S	S	S	H

S–Strong **H**–High **M**–Medium **L** –Low

CAI-10

Sub.Code:25CAI1CM

ProgrammeCode:12	**CERTIFICATE PROGRAMME IN ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING**		
Title o f the Paper: Core Practical 2– Artificial Intelligence and Machine Learning Lab			
Batch	**Hours/Week**	**Total Hours**	**Credits**
2025-2026	**3**	**45**	**2**

Course Objectives

1. Understand and implement loops and basic arithmetic operations.
2. understand and implement the concept of Narrow AI
3. learn the practical workflow of building a machine learning model with Scikit-Learn.
4. Evaluate the performance and accuracy of the rules generated by the algorithm.
5. Learn the basic principles of logistic regression and how it can be applied to classification problems.
6. Implement the Apriori algorithm to extract frequent itemsets and association rules from transactional data.

Course Outcomes (CO)

K1 to K5	CO1	Understand to use loops to generate repetitive calculations dynamically.
	CO2	Remember the basic concepts of Narrow AI and machine learning algorithms.
	CO3	Create and modify algorithms to navigate robots efficiently through obstacles**.**
	CO4	Analyze the generated association rules to find significant market trends.
	CO5	Evaluate the model's performance in terms of accuracy and precision.

LIST OF PRACTICAL PROGRAMS

1. Write a program Construct a multiplication table for the given number.
2. Write a program for Narrow AI using Scikit-Learn
3. Write a program for Demonstrating bias in AI
4. Write a program for AI-based robot navigating a grid using a basic decision-making algorithm.
5. Write a program for Association Rule Mining using Apriori Algorithm:
   (Dataset: Use Groceries dataset for market basket analysis)
6. Write a program for Classification with Logistic Regression (Dataset: Use the Iris dataset)
7. Write a program to implement supervised, unsupervised learning.
8. Write a program for Neural Network using frameworks like Keras**or**TensorFlow**.**
9. Write a program for Spam Identification using Naive Bayes algorithm
10. Write a program to implement reinforcement learning.

CAI-11

Sub.Code:25CAI1CM

Guidelines to the distribution of marks for Practical Examinations:

Two Questions will be given for each student. (3 Hours / 60 marks)

Record: 10 marks

Particulars	Program1 (Marks)	Program2 (Marks)
Algorithm	5	5
Program Coding	15	15
Execution& Modifications	5	5

Teaching Methods:

ChalkandTalk, SmartClassRoom, PowerpointPresentation, Seminar, Quiz & Discussion

Text Books:

1. Stuart Russell, Peter Norvig, (2020) Artificial Intelligence: A Modern Approach, , Fourth edition, Pearson Publishing.
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4. Bernard Marr, Artificial Intelligence in Practice: How 50 Successful Companies Used AI and Machine Learning to Solve Problems, Wiley Publications, 2019

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PSO / CO	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	S	S	H	S	S
CO2	S	S	S	H	M
CO3	S	H	M	H	S
CO4	S	M	S	M	H
CO5	S	H	H	S	S

S – Strong **H** – High **M** – Medium **L** – Low