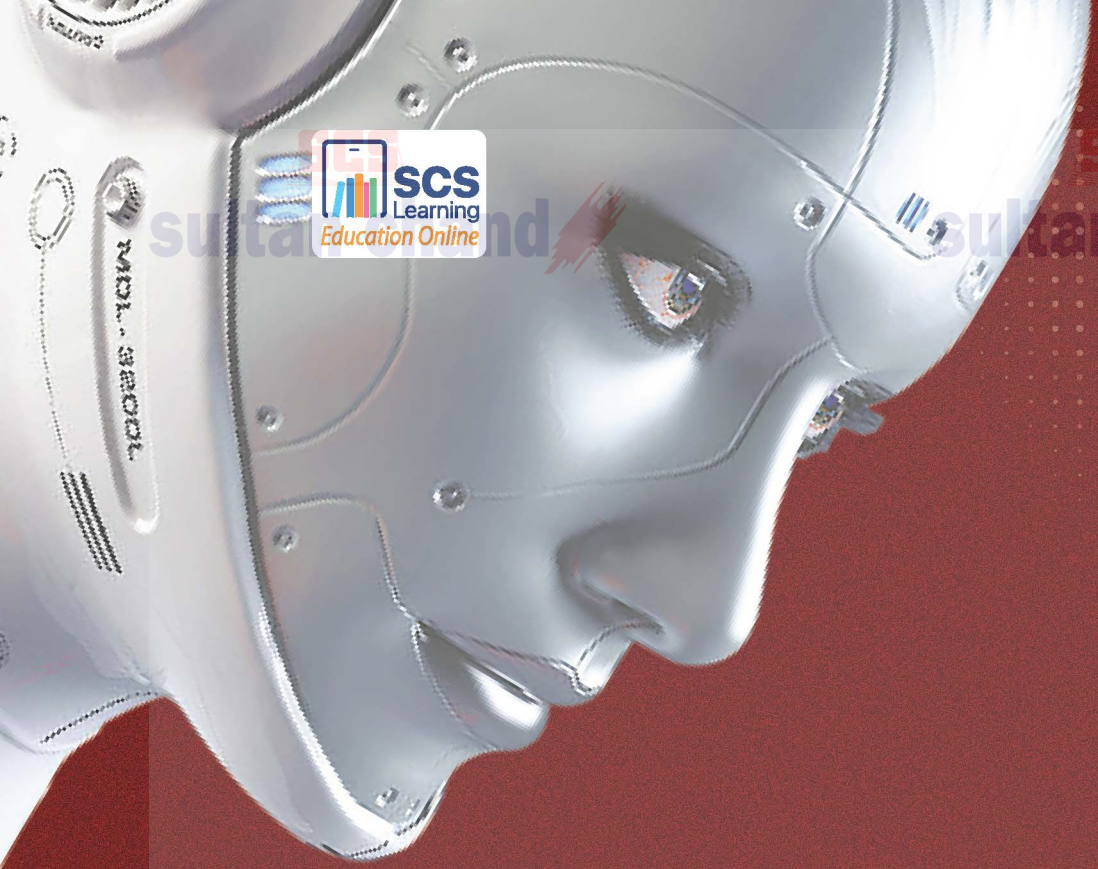


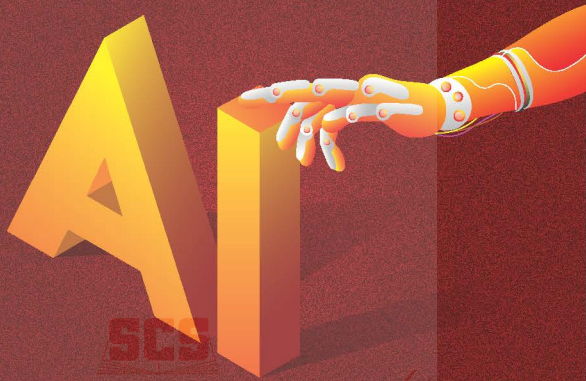
SCS Learning Education Online

Class X
January 2025 Syllabus

Aligned with NEP

DECODING ARTIFICIAL INTELLIGENCE

LESSON PLANS



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Decoding Artificial Intelligence–X

LESSON PLANS

Unit 1: Revisiting AI Project Cycle & Ethical Frameworks for AI

Theory Sessions (11 Hours)

Hour	Topic	Timeline & Activities (Aligned with Chapter Content)	Tools/Examples
1	Introduction	0–10 min: Warm-up (Discuss everyday projects like buying a laptop). 10–20 min: Explain AI as a Problem-Solver. 20–40 min: Introduce Domains of AI. 40–60 min: Activities–Domains of AI	Chapter case studies and Activities.
2.	Problem Scoping	0–10 min: Introduce AI Project Cycle. 10–25 min: Introduce Problem Scoping and explain 4Ws Problem Canvas. 25–45 min: DIY Activity – 4Ws Canvas (e.g., Medicine Wastage case study). 45–60 min: Group presentations & feedback.	4Ws Canvas template, SDG examples.
3.	SDGs & AI	0–15 min: Introduce SDGs & relevance to AI. 15–30 min: Fun Time – Climate Change Impact Filter activity. 30–50 min: Group brainstorming – AI solutions for SDGs (*e.g.*, clean energy). 50–60 min: Share ideas.	Climate Change tool, SDG charts.
4.	Data Acquisition	0–15 min: Explain training/testing data (*e.g.*, weather forecasting). 15–30 min: Discuss data authenticity. 30–50 min: Activity – List data sources for Energy Management System. 50–60 min: Recap.	Sample datasets (energy consumption), Excel.
5.	Data Exploration	0–15 min: Explain structured/unstructured data. 15–30 min: Fun Time – AutoDraw Activity (AI interprets sketches). 30–50 min: DIY – Energy Visualization Task (create graphs). 50–60 min: Discuss trends.	AutoDraw tool, Energy dataset.

6.	Rule-Based AI	0–15 min: Explain IF-THEN rules (*e.g.*, grading system). 15–35 min: DIY – Rule-Based Scenarios (smart home security). 35–50 min: Simulate rule outcomes. 50–60 min: Discuss limitations.	Pseudocode templates, Chatbot example.
7.	Learning-Based AI	0–15 min: Introduction to ML (*e.g.*, self-driving cars). 15–35 min: Fun Time – Waymo 360 Experience video. 35–50 min: Compare rule-based vs learning-based. 50–60 min: Q&A.	Waymo video, Teachable Machine.
8.	Evaluation Metrics	0–15 min: Explain accuracy, precision, confusion matrix. 15–35 min: Activity – Calculate metrics for healthcare diagnosis example. 35–50 min: Discuss bias in evaluation. 50–60 min: Recap.	Confusion matrix worksheet, Healthcare dataset.
9.	Ethical Frameworks	0–25 min: Explain frameworks and discuss AI ethics (*e.g.*, Amazon recruiting bias). 25–35 min: Fun Time – Moral Machine Activity. 35–50 min: Debate – "Should AI prioritize passengers or pedestrians?" 50–60 min: Summarize frameworks.	Moral Machine platform, Ethics chart.
10.	Bias in AI	0–15 min: Introduction to bias (*e.g.*, healthcare algorithms). 15–35 min: DIY – MyGoodness game. 35–50 min: Group discussion – Mitigating bias. 50–60 min: Reflection.	MyGoodness game, Bias case studies.
11.	Project Cycle Recap	0–20 min: Recap stages using Energy Management case. 20–40 min: Activity – Map a new problem to the cycle. 40–55 min: Discuss challenges. 55–60 min: Q&A.	Project cycle flowchart, Problem templates.

Practical Sessions (4 Hours)

Hour	Topic	Activities	Tools/Outputs
1.	Problem Ideation	0–20 min: Brainstorm AI projects using 4Ws Canvas. 20–40 min: Dot voting for best idea. 40–60 min: Refine problem statements.	4Ws Canvas, Voting board.
2.	Data Handling	0–20 min: Clean energy consumption dataset. 20–40 min: Create visualizations (Excel/Sheets). 40–60 min: Present findings.	Energy dataset, Excel.

3.	Model Prototyping	0–30 min: Customize pre-built model (Teachable Machine). 30–50 min: Test model outcomes. 50–60 min: Document results.	Teachable Machine, Model logbook.
4.	Ethics Simulation	0–30 min: Role-play – Address bias in Amazon recruiting case. 30–50 min: Design ethical guidelines. 50–60 min: Peer review.	Role-play cards, Ethics checklist.

Unit 2: Advanced Concepts of Modelling in AI

Theory Sessions (18 Hours)

Hour	Topic	Timeline & Activities (Aligned with Chapter Content)	Tools/Examples
1.	Introduction	0–10 min: Warm-up (Discuss modelling). 10–30 min: Explain and discuss the Four Industrial Revolutions. 30–50 min: Emphasize the Fourth Revolution, which focuses on Autonomous Systems, AI and Machine Learning. 50–60 min: Recap & Q&A.	Industrial Revolutions
2.	AI Taxonomy	0–20 min: Discuss Hierarchy of AI, ML and DL. 20–35 min: Explain AI and its usage. 35–50 min: Understanding Machine Learning as a subset of AI. 50–60 min: Group Discussion & feedback.	Subsets of AI
3.	AI Taxonomy (contd.)	0–20 min: Understand Deep Learning as a subset of AI. 20–35 min: Do You Know? – Discuss the field of Generative AI. 35–50 min: Experience AI – Adobe Firefly. 50–60 min: Share ideas.	Adobe Firefly
4.	Data Terminologies in AI	0–10 min: Discuss reliance of AI on data. 10–30 min: Discuss topics; Dataset, Features and Labels. 30–50 min: Understand Labelled and Unlabelled Datasets and Training and Testing Data. 50–60 min: Recap.	Data and its Terms
5.	Rule-Based vs Learning-Based Approach	0–15 min: Introduction to primary approaches of AI. 15–30 min: Understanding the Rule-Based Approach. 30–45 min: Understanding the Learning-Based Approach. 45–60 min: Compare the two approaches.	Rule-Based AI vs Learning-Based AI

6.	Traditional vs Machine Learning Algorithm	0–20 min: Introduce traditional algorithms like logical or mathematical equations. 20–50 min: Discuss machine learning algorithms with examples. 50–60 min: Recap and Q&A.	Predicting or Categorizing data
7.	Types of Machine Learning	0–20 min: Introduce different types of machine learning 20–40 min: Introductory discussion on supervised learning. 40–55 min: Understand the importance of labelled data in supervised learning. 55–60 min: Q&A.	Supervised Machine Learning
8.	Supervised Machine Learning	0–15 min: Explain regression problems. 15–35 min: Discuss classification problems. 35–50 min: Activity – Teachable Machine. 50–60 min: Recap.	Teachable Machine
9.	Unsupervised Machine Learning	0–20 min: Understand unsupervised learning. 20–40 min: Understand the concept of clustering. 40–60 min: Compare supervised learning and unsupervised learning.	Clustering
10.	Reinforcement Learning	0–20 min: Activity – Infinite Drum Machine. 20–30 min: Myth Busters – Discuss about AI models and their complexity. 30–50 min: Understand Reinforcement Learning. 50–60 min: Reflection.	Google Infinite Drum Machine
11.	Subcategories: Supervised Learning Model	0–20 min: Introduce Classification Models and understand their working. 20–40 min: Understand Regression Models and their working. 40–55 min: Discuss challenges. 55–60 min: Q&A.	Classification and Regression Models
12.	Subcategories: Unsupervised Learning Model	0–20 min: Introduce the concept of Clustering and understand its working. 20–40 min: Understand Association Rules with the help of examples. 40–60 min: Test Your Knowledge	Clustering and Association Rule Mining
13.	Neural Networks	0–15 min: Introduce Neural Networks. 15–25 min: Understand the correlation of the Biological Neural Network. 25–40 min: Fun Time: Decision-making YouTube video. 40–60 min: Discuss Artificial Neural Networks (ANN).	Biological Neuron and Artificial Neuron

14.	Deep Learning	0–15 min: Understanding the concept of deep learning. 15–30 min: Discuss deep learning story "Neuronia". 30–50 min: Understand the working of Layers, Feedback and Backpropagation. 50–60 min: Discuss "Deep Learning: When Simple Learning isn't enough".	Layers of Neural Networks
15.	Artificial Neural Networks (ANN)	0–20 min: Understand and discuss ANNs. 20–50 min: Understanding Perceptron: A basic unit of ANN. 50–60 min: Recap & Q&A.	Perceptron
16.	Artificial Neural Networks (ANN) (contd.)	0–25 min: Understand the mathematical interpretation of ANN. 25–40 min: Discuss features of ANN. 40–55 min: Discuss various applications of ANN.	Mathematical Example of ANN
17.	Convolutional Neural Networks (CNN)	0–25 min: Understand the concept of Convolutional Neural Networks (CNN). 25–50 min: Discuss features of CNN. 50–60 min: Recap.	Layers of CNN
18.	Dimensionality Reduction	0–20 min: Introduce the concept of Dimensionality Reduction. 20–50 min: Understanding Dimensionality Reduction and its need. 50–60 min: Recap.	Students' Performance Example

Unit 3: Evaluating Models

Theory Sessions (21 Hours)

Hour	Topic	Timeline & Activities (Aligned with Chapter Content)	Tools/Examples
1.	Introduction to Evaluation	0–10 min: Warm-up discussion on Evaluation. 10–30 min: Introduction to the Evaluation Phase of the AI project cycle. 30–50 min: Defining Evaluation. 50–60 min: Recap & Q&A.	Discuss Generalization
2.	Evaluation	0–20 min: Discuss the purpose of model evaluation. 20–50 min: Understand why model evaluation is essential. 50–60 min: Group Discussion & feedback.	Importance of model evaluation
3.	Model Evaluation Techniques	0–30 min: Understanding pattern to prediction fit–Underfitting, Overfitting and Perfect Fit. 30–60 min: Discuss the common model evaluation techniques.	Pattern to Prediction Fit

4.	Evaluation Metrics	0–30 min: Introduce Evaluation Metrics. 30–50 min: Understand the requirement for different evaluation metrics for different models. 50–60 min: Recap.	Quantitative Measures
5.	Regression Metrics	0–20 min: Understand the Regression Metrics. 20–50 min: Discuss MAE, MSE, RMSE and R^2 Score. 50–60 min: Compare all the approaches.	Regression Metrics
6.	Classification Metrics	0–20 min: Understand the Classification Metrics. 20–50 min: Discuss Confusion Matrix, Accuracy, Precision, Recall and F1 Score. 50–60 min: Recap and Q&A.	Classification Metrics
7.	Train-Test Split	0–30 min: Introduce train-test split using an analogy. 30–50 min: Understand Training and Testing Set. 50–60 min: Q&A.	Training and Testing Sets
8.	Train-Test Split	0–30 min: Evaluate the classification model by splitting the data into training and testing sets with the help of an example. 30–50 min: Understand the 70-30 split. 50–60 min: Recap.	70-30 split
9.	Train-Test Split (contd.)	0–20 min: Understand the splitting of train and test data visually. 20–50 min: Discuss and interpret the whole process of the train-test split visually. 50–60 min: Recap and Q&A.	Visual Explanation of train-test split.
10.	Accuracy and Error	0–25 min: Understand Accuracy and error. 25–50 min: Discuss the importance of Accuracy and Error. 50–60 min: Reflection.	Model's Accuracy and Error
11.	Classification Metrics	0–20 min: Introduce and discuss classification metrics. 20–50 min: Understand the terms: True Positive, True Negative, False Positive and False Negative. 50–60 min: Discuss challenges.	Confusion Matrix
12.	Accuracy and Error	0–30 min: Understand and discuss calculating Accuracy and Error mathematically. 30–50 min: Calculate Accuracy and Error with the help of examples. 50–60 min: Test Your Knowledge	Mathematical Formula for Calculating Accuracy and Error
13.	Accuracy and Error (contd.)	0–40 min: Case Study: Classifying Rare Disease vs Healthy. 40–60 min: DIY: Analyze values of TP, TN, FP, and FN. Also calculate the accuracy and error.	Disease Classification

14.	Confusion Matrix	0–20 min: Understand the Confusion Matrix. 20–40 min: Discuss four key components of the Confusion Matrix. 40–60 min: Fun Time: Why Confusion Matrix is so named.	Confusion Matrix
15.	Confusion Matrix (contd.)	0–20 min: Understand Confusion Matrix interpretation using an example. 20–55 min: DIY: 1. Email Spam Detection. 2. Confusion Matrix Challenge. 55–60 min: Recap & Q&A.	Spam Detection
16.	Evaluation Methods	0–15 min: Introduce Evaluation Methods. 15–40 min: Discuss commonly used evaluation methods like accuracy, precision, recall, specificity and F1 Score. 40–60 min: Discuss formula, significance and problem with Accuracy.	Mathematical Calculation of Accuracy
17.	Evaluation Methods (contd.)	0–30 min: Case Study: Understanding imbalanced datasets. 30–50 min: Introduce and discuss Precision. 50–60 min: Recap.	Imbalance Datasets
18.	Precision	0–20 min: Understand Precision in spam detection example. 20–40 min: Understand the significance of Precision. 40–60 min: DIY: Assessing Suitability of Precision Metric in Model Evaluation.	Precision in Spam Detection
19.	Recall	0–20 min: Understand Recall (Sensitivity or True Positive Rate). 20–35 min: Discuss formula for recall with an example. 35–60 min: Discuss significance of Recall over Precision and Precision-Recall Trade-off.	Cancer Disease Classification to interpret Precision
20.	F1 Score	0–20 min: Introduce and discuss the formula for F1 Score. 20–45 min: Analyze "Which Evaluation Model is more Suitable?" 45–60 min: Discuss the significance of F1 Score.	F1 Score Calculation
21.	Evaluation Metrics Guidelines and Applications	0–20 min: Discuss Summary Guidelines for Evaluation Metrics. 20–40 min: Discuss Metrics Application–Real-World Case Studies. 40–60 min: Understand Ethical Concerns around Model Evaluation.	Transparency of Models

Unit 4: Statistical Data

Practical Sessions (28 Hours)

Hour	Topic	Timeline & Activities (Aligned with Chapter Content)	Tools/Examples
1.	Introduction	0–20 min: Warm-up discussion on Statistical Data. 20–30 min: Discussion on Quote. 30–50 min: Introduce Statistical Data. 50–60 min: Recap & Q&A.	Statistics
2.	Defining Statistical Data	0–20 min: Define and understand statistical data. 20–40 min: Discuss Numerical Data (Quantitative). 40–60 min: Discuss Categorical Data (Qualitative).	Categorize Statistical Data
3.	Application of Data Science	0–20 min: Understanding Applications of Data Science. 20–40 min: Discuss Healthcare as the application of Data Science. 40–60 min: Discuss Business and Marketing as the application of Data Science.	Data Science in Healthcare, Business and Marketing
4.	Application of Data Science (contd.)	0–15 min: Discuss Finance and Marketing as the application of Data Science. 15–30 min: Discuss Government and Policymaking as the application of Data Science. 30–45 min: Discuss E-commerce and Retail as the application of Data Science. 45–60 min: Discuss Sports and Performance Analysis as the application of Data Science.	Data Science in various domains
5.	Statistical Data and AI	0–20 min: Understand the demand for AI and Statistical data. 20–45 min: Discuss programming for handling statistical data. 45–60 min: Discussion on AI-based solutions for analyzing statistical data.	Integrating AI into statistical data
6.	No-Code AI and Low-Code AI	0–20 min: Introduce No-Code AI. 20–50 min: Understand how tools like Orange Data Mining Tool can perform Statistical Analysis and Machine Learning tasks. 50–60 min: Recap and Q&A.	No-Code AI
7.	No-Code AI and Low-Code AI (contd.)	0–20 min: Discuss need for No-Code Tools. 20–50 min: Understand the advantages of No-Code AI tools. 50–60 min: Class discussion and Q&A.	Benefits of No-Code AI tools

8.	No-Code AI and Low-Code AI (contd.)	0–20 min: Understand the disadvantages of No-Code AI Tools. 20–40 min: Discuss Examples of No-Code tools–Azure Machine Learning. 40–60 min: Discuss Examples of No-Code tools–Google Cloud AutoML.	Azure Machine Learning, Google Cloud AutoML
9.	No-Code AI and Low-Code AI (contd.)	0–20 min: Discuss Examples of No-Code tools–Orange Data Mining. 20–40 min: Discuss Examples of No-Code tools–Lobe AI. 40–60 min: Discuss Examples of No-Code tools–Teachable Machine.	Orange Data Mining, Lobe AI, Teachable Machine
10.	No-Code AI and Low-Code AI (contd.)	0–20 min: Introduce Low-Code AI. 25–50 min: Discuss and compare High Code, No-Code and Low-Code AI. 50–60 min: Reflection.	Comparing various AI tools
11.	Important Concepts of Statistics	0–20 min: Introduce important concepts of statistics. 20–40 min: Discuss Statistical Sampling. 40–60 min: Discuss types of Statistical Sampling.	Statistical Sampling
12.	Important Concepts of Statistics (contd.)	0–20 min: Understand Descriptive Statistics. 20–50 min: Discuss types of descriptive statistics–Mean, Median and Mode. 50–60 min: Test Your Knowledge	Descriptive Analysis
13.	Important Concepts of Statistics (contd.)	0–20 min: Understand Distributions and how data is spread across different values. 20–40 min: Discuss types of Distributions–Normal and Skewed Distribution. 40–50 min: Analyse graphs of Negatively and Positively Skewed. 50–60 min: Recap and Q&A.	Distributions
14.	Important Concepts of Statistics (contd.)	0–25 min: Understand Probability. 25–50 min: Discuss terms of Probability–Independent Events, Dependent Events and Formula. 50–60 min: Recap and Q&A.	Probability
15.	Important Concepts of Statistics (contd.)	0–25 min: Understand Variance and Standard Deviation. 25–50 min: Discuss interpretability for low and high variance. 50–60 min: Understand the concept of outliers.	Variance and Standard Deviation
16.	Orange Data Mining Tool	0–15 min: Introduce the Orange Data Mining tool. 15–30 min: Discuss key features of the Orange Data Mining tool. 30–60 min: Understand the steps for installing this software.	Orange Data Mining

17.	Project	0–60 min: Project: Loan Classification.	Loan Classification
18.	No-Code AI – Orange Data Mining	0–20 min: Understanding No-Code interface of Orange Data Mining Tool. 20–40 min: Understand the significance of the use case of the project 'Loan Classification'. 40–60 min: Discuss Data Acquisition with respect to Orange Data Mining Tool.	Problem Understanding and Data Acquisition
19.	No-Code AI – Orange Data Mining (contd.)	0–60 min: Understand and perform the steps for executing Exploratory Data Analysis.	Exploratory Data Analysis
20.	No-Code AI – Orange Data Mining (contd.)	0–30 min: Introduce and understand the concept of Imputation and its widget. 30–60 min: DIY: Handling missing values.	Feature Statistics in Orange
21.	No-Code AI – Orange Data Mining (contd.)	0–30 min: Understand and discuss how to split data in Orange Data Mining. 30–60 min: Understanding the Data Sampler widget.	Data Sampler Widget
22.	No-Code AI – Orange Data Mining (contd.)	0–30 min: Understand the Modelling phase of the AI Project Cycle concerning the project. 30–60 min: Understand Machine Learning models available in Orange Data Mining Tools.	Modelling Orange Data Mining Tool
23.	No-Code AI – Orange Data Mining (contd.)	0–30 min: Discuss and understand the use of the Test & Score widget. 30–60 min: Discuss about different learners and their properties.	Test & Score Widget
24.	No-Code AI – Orange Data Mining (contd.)	0–60 min: Learn to apply different learners to check comparative performance.	Comparative Analysis
25.	No-Code AI – Orange Data Mining (contd.)	0–30 min: Understand the Evaluation phase concerning the project. 30–60 min: Discuss use of widgets like Confusion Matrix, ROC Analysis, etc.	Evaluate Tab
26.	No-Code AI – Orange Data Mining (contd.)	0–30 min: Understand the concept of Prediction on New Unseen Data. 30–60 min: Discuss the use of the Predictions widget.	Prediction
27.	No-Code AI – Orange Data Mining (contd.)	0–60 min: Activity: Palmer Penguins.	Palmer Penguins
28.	No-Code AI – Orange Data Mining (contd.)	0–60 min: Activity: MS Excel for Statistical Data.	MS Excel

Unit 5: Computer Vision

Theory Sessions (10 Hours)

Hour	Topic	Timeline & Activities (Aligned with Chapter Content)	Tools/Examples
1.	Introduction	0–20 min: Warm-up discussion and Introduction to Computer Vision. 20–30 min: Discuss what constitutes the Eyes of a Computer. 30–45 min: Understand CV as Computer Vision = Digital Images + Artificial Intelligence. 45–60 min: Activity: Emoji Scavenger Hunt.	Human Vision vs Machine Vision, Emoji Scavenger Hunt
2.	Defining Computer Vision	0–20 min: Define and understand Computer Vision. 20–30 min: Discuss the difference between Computer Vision and Image Processing. 30–50 min: Discuss Computer Vision applications with the 'Experience AI' sections. 50–60 min: Discuss Computer Vision applications in smartphones.	Face Filters, Google Lens and other applications.
3.	Computer Vision Tasks	0–20 min: Understand the classification of Computer Vision Tasks for single objects and multiple objects. 20–40 min: Discuss Classification and Classification+Localization. 40–60 min: Understand and differentiate between Object Detection vs Image Segmentation.	Object Detection and Image Segmentation
4.	Image Segmentation	0–15 min: Understand types of Image Segmentation. 15–30 min: Discuss Instance Segmentation and Semantic Segmentation. 30–45 min: Fun Time: Segment Analysis. 45–60 min: Understand the Basics of Images.	Activity–w3schools
5.	Understanding Pixels	0–20 min: Understand and observe individual pixels, image vs pixels and how CV uses pixels. 20–45 min: Activity: Pixel Art Project. 45–60 min: Understand Features of Image.	Pixel Art Project
6.	Convolutional Neural Networks (CNN)	0–10 min: Introduce Convolutional Neural Networks (CNN). 10–20 min: Discuss CNN–An Analogy. 20–35 min: Understand Feature Extraction and Convolution Operation. 35–45 min: Understand and discuss Image Kernels. 45–60 min: Understand the Kernel Double-Flip.	Kernels and Matrix

7.	Convolutional Neural Networks (CNN) (contd.)	0–30 min: Learn to calculate Convolution Values. 30–50 min: Summarize the Convolution Operation. 50–60 min: Class discussion and Q&A.	Calculation of Convolution
8.	Convolutional Neural Networks (CNN) (contd.)	0–25 min: Understand and explain the Convolutional Visually. 25–40 min: Introduction to Layers of CNN. 40–60 min: Understand Rectified Linear Unit (ReLU).	Layers of CNN
9.	Convolutional Neural Networks (CNN) (contd.)	0–20 min: Discuss and understand the Pooling Layer. 20–30 min: Fun Time: Max Pooling Visualised. 30–40 min: Discuss and understand the Fully Connected Layer. 40–50 min: Discuss and understand the Output Layer. 50–60 min: Activity: Creating our own Convolutions.	Feature Extraction Game with TensorFlow Playground, Hands-on CNN Training with Teachable Machine
10.	No-Code Computer Vision Tools	0–10 min: Understand No-Code Computer Vision Tools 10–20 min: Discuss examples of No-Code Computer Vision Tools. 20–30 min: Project: Classifying Dandelions vs Sunflowers using Orange Data Mining Tool. 30–40 min: DIY: Compare Performance, Interpret Confusion Matrix, Analyze ROC Curve. 40–50 min: Activity: AUC curves using Orange. 50–60 min: Activity: Coral Bleaching Classification	No-Code Tools for Computer Vision

Unit 6: Natural Language Processing

Theory Sessions (20 Hours)

Hour	Topic	Timeline & Activities (Aligned with Chapter Content)	Tools/Examples
1.	Introduction	0–10 min: Warm-up on Natural Language Processing (NLP). 10–30 min: Introduction to NLP. 30–45 min: Understand why human languages are complex. 45–60 min: Fun Time: Languages Spoken in India.	Human Languages and Their Complexity
2.	Natural Language Processing	0–25 min: Activity: Google Translate. 25–40 min: Understand how does NLP help. 40–60 min: Understand Features of Natural Languages.	Google Translate

3.	Natural Language Processing (contd.)	0–30 min: Understand Applications of NLP. 30–60 min: Discuss and understand the Stages of Natural Language Processing (NLP).	Voice Assistants, Auto-Generated Captions, Language Translation, Sentiment Analysis, etc.
4.	Chatbots	0–15 min: Discuss Chatbots. 15–35 min: Understand how they are useful for Human and Computer Interaction. 35–50 min: Understand Categories of Chatbots–Script-Based Chatbots and Smart Chatbots. 50–60 min: Recap.	Human–Computer Interaction
5.	Chatbots (contd.)	0–20 min: Understand Script-Based Chatbots. 20–45 min: Understanding Smart Chatbots. 45–60 min: Try some popular chatbot applications and their features.	Siri, Alexa, Cleverbot, Google Assistant, etc.
6.	Human Languages vs Computer Languages	0–25 min: Introduce and compare Human Languages and Computer Languages. 25–50 min: Discuss and compare Programming Language Processing and Natural Language Processing. 50–60 min: Recap and Q&A.	Programming Languages vs Natural Languages
7.	Human Languages vs Computer Languages (contd.)	0–25 min: Discuss the challenges of understanding Human Languages. 25–50 min: Understand Arrangements of Words and their Meanings. 55–60 min: Q&A.	Challenges and Arrangements
8.	Multiple Meanings of a Word	0–25 min: Understand the problem of multiple meanings of a word in NLP. 25–50 min: Discuss the term 'Perfect Syntax, No Meaning'. 50–60 min: Recap.	Writing words having the same spelling but multiple meanings and writing words having proper syntax but no meaning
9.	Data Processing in NLP	0–25 min: Introduce and discuss Data Processing in NLP. 25–50 min: Understanding Natural Language Toolkit (NLTK). 50–60 min: Class discussion and recap.	NLTK
10.	Data Processing in NLP (contd.)	0–60 min: Installing and understanding how to use Natural Language ToolKit (NLTK).	Google Infinite Drum Machine
11.	Data Processing in NLP (contd.)	0–25 min: Introduce and understand Text Normalization. 25–55 min: Understand Sentence Segmentation. 55–60 min: Q&A.	Text Normalization and Sentence Segmentation
12.	Data Processing in NLP (contd.)	0–30 min: Introduce the concept of Tokenization. 30–50 min: DIY: Apply Sentence Segmentation and Tokenization. 50–60 min: Test Your Knowledge	Tokenization

13.	Data Processing in NLP (contd.)	0–20 min: Introduce and understand Punctuation Removal. 20–45 min: Discuss the process of stopword removal. 45–60 min: Discuss the concept of Lowering in Data Processing in NLP.	Punctuation Removal, Stopword Removal and Lowercasing
14.	Lemmatization & Stemming	0–20 min: Understand the concept of Lemmatization with its Python code. 20–45 min: Understand the concept of Stemming with its Python code. 45–60 min: DIY: Apply Lemmatization and Stemming techniques.	Lemmatization and Stemming techniques
15.	Part-of-Speech (POS) Tagging & Named Entity Recognition	0–25 min: Understand the concepts of POS Tagging. 25–50 min: Understand Named Entity Recognition (NER). 50–60 min: Recap & Q&A.	POS tagging and Named Entity Recognition
16.	Sentiment Analysis	0–25 min: Understand the concept of Sentiment Analysis. 25–40 min: Discuss and understand Bag of Words. 40–60 min: Steps to understand the example of Bag of Words.	Sentiment Analysis and Bag of Words
17.	TF-IDF: Term Frequency and Inverse Document Frequency	0–25 min: Understand the concept of TF-IDF. 25–50 min: Understand the numerical calculations for TF-IDF. 50–60 min: Recap.	TF-IDF
18.	TF-IDF: Term Frequency and Inverse Document Frequency (contd.)	0–30 min: Discuss TF-IDF example. 30–45 min: Applications of TF-IDF. 45–60 min: DIY: Apply Data Processing Tasks in NLP.	Examples and Applications of TF-IDF
19.	No-Code NLP	0–30 min: Introduce No-Code NLP. 30–45 min: Compare No-Code NLP with Code-Based NLP Libraries. 45–60 min: Discuss applications.	No-Code NLP Tools
20.	Project	0–30 min: Project: Sentiment Analysis using Orange Data Mining. 30–60 min: DIY: Sentiment Analysis on Movie Reviews using Orange Data Mining.	Orange Data Mining Tool for NLP Tasks

Unit 7: Advanced Python

Practical Sessions (10 Hours)

Hour	Topic	Timeline & Activities (Aligned with Chapter Content)	Tools/Examples
1.	Introduction	0–10 min: Warm-up discussion on Advanced Python. 10–20 min: Understand how to install Jupyter. 20–30 min: Understand Jupyter Dashboard. 30–40 min: Understand Creating a Jupyter Notebook. 40–50 min: Understand cells in Jupyter Notebook. 50–60 min: Learn how to execute the code.	Installing Jupyter and Understanding Its Components
2.	Jupyter Notebook & Virtual Environments	0–10 min: Learn to insert another cell. 10–20 min: Understand how to add Markdown. 20–30 min: Understand Reordering Cells in Jupyter Notebook. 30–40 min: DIY: Jupyter and your First Python Program. 40–50 min: Introduction to Virtual Environments. 50–60 min: Learn how to create and use a Virtual Environment.	Jupyter Notebook and First Python Program
3.	Introduction to Python	0–10 min: Introduce Python. 10–20 min: Understand Features of Python. 20–30 min: DIY: Match the Python Features and their corresponding descriptions. 30–45 min: Understand Versatile Applications of Python. 45–60 min: DIY: True/False Statements.	Game Development, Automation and Scripting, Scientific Computing
4.	Building Blocks of Python	0–10 min: Introduce the Building Blocks of Python. 10–20 min: Activity: Use the print() function. 20–30 min: Understand Comments in Python. 30–40 min: Understand Keywords and Identifiers. 40–50 min: DIY: Valid/Invalid Identifier. 50–60 min: Understand Python Variables.	Keywords, Identifiers and Comments in Python
5.	Building Blocks of Python (contd.)	0–10 min: DIY: Magic with Variables. 10–20 min: Understand Python Naming Conventions. 20–30 min: Understand Data Types in Python. 30–40 min: Understand Keywords and Identifiers. 40–50 min: Understand Sequence Data Type. 50–60 min: Understand Set Data Type.	Data Types in Python

6.	Building Blocks of Python (contd.)	0–10 min: Understand Python Data Types: Mutable vs Immutable. 10–20 min: DIY: Guess the Suitable Data Type. 20–45 min: Discuss Python Operators. 45–55 min: Understand Type Conversion. 55–60 min: DIY: Type Conversion.	Operators and Conversions in Python
7.	Statements and Expressions & Python Data Structures	0–10 min: Understand Statements and Expressions. 10–20 min: Differentiate between Statements and Expressions. 20–30 min: Understand Input and Output in Python. 30–40 min: DIY: Guess the Output of Code Snippets. 40–50 min: Introduce Python Data Structures. 50–60 min: Understand Lists as Data Structures.	Input function and print() function
8.	Python Data Structures (contd.)	0–10 min: Understand how to Access List Elements. 10–30 min: Discuss List Operations. 30–45 min: Understand Tuples. 45–50 min: DIY: Complete the Code Snippets. 50–60 min: Understand Sets as Data Structures.	Tuples
9.	Python Data Structures (contd.)	0–10 min: DIY: Stamp Collections. 10–20 min: Understanding Dictionaries as Data Structures. 20–30 min: Discuss Dictionary Operations. 30–40 min: Summarise Python Data Structures. 40–50 min: Introduce Control Structures in Python. 50–60 min: Understand Conditional Statements–*if, if-else, if-elif-else*.	Conditional Statements
10.	Loops and Python Libraries	0–30 min: Discuss and Understand Loops in Python–*for* loop, *while* loop and Nested Loops. 30–45 min: Discuss Python Libraries and Packages–How to Use? 45–60 min: Discuss Popular Python Libraries.	NumPy, Matplotlib, NLTK, etc.