

CBSE | DEPARTMENT OF SKILL EDUCATION

CURRICULUM FOR SESSION 2023-2024

ARTIFICIAL INTELLIGENCE (SUB. CODE 417)

CLASS – IX & X

OBJECTIVES OF THE COURSE:

The objective of this module/curriculum - which combines both Inspire and Acquire modules is to develop a readiness for understanding and appreciating Artificial Intelligence and its application in our lives. This module/curriculum focuses on:

1. Helping learners understand the world of Artificial Intelligence and its applications through games, activities and multi-sensorial learning to become AI-Ready.
2. Introducing the learners to three domains of AI in an age-appropriate manner.
3. Allowing the learners to construct meaning of AI through interactive participation and engaging hands-on activities.
4. Introducing the learners to AI Project Cycle.
5. Introducing the learners to programming skills - Basic python coding language.

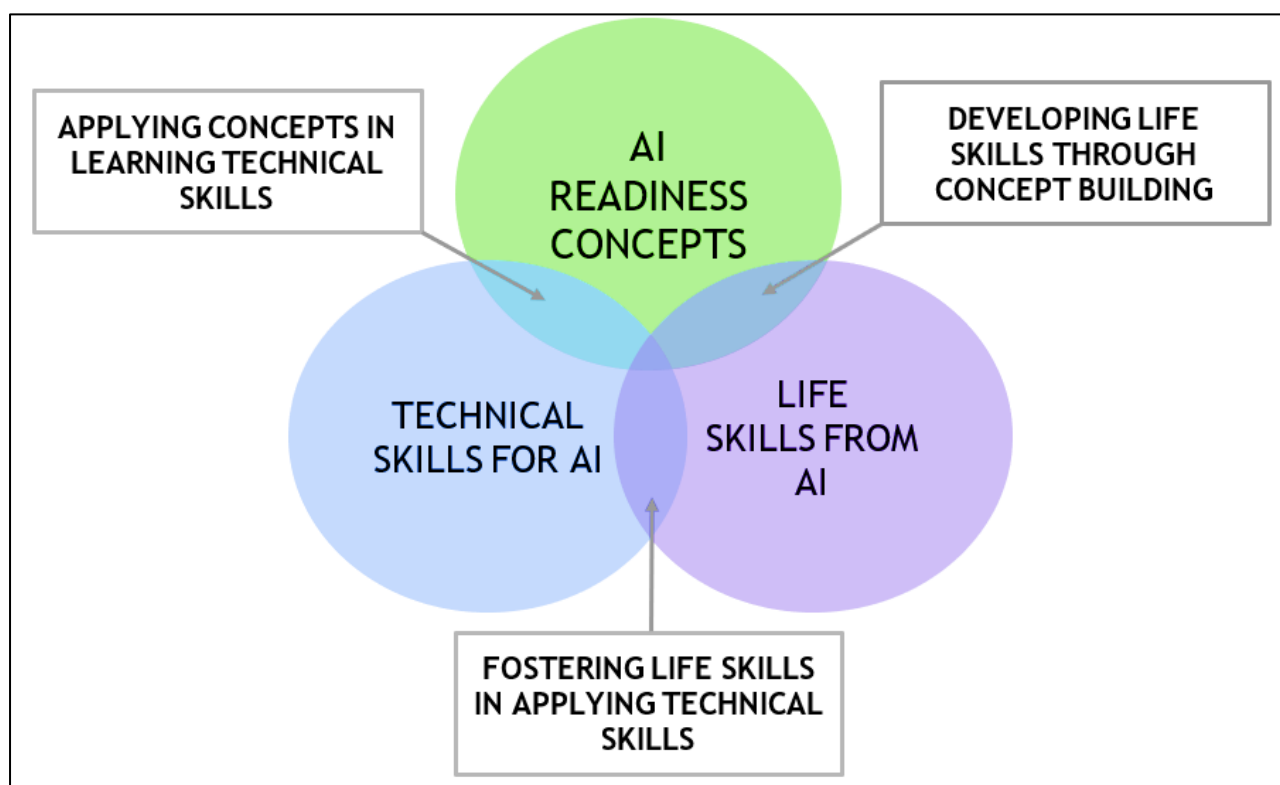
LEARNING OUTCOMES:

Learners will be able to

1. Identify and appreciate Artificial Intelligence and describe its applications in daily life.
2. Relate, apply and reflect on the Human-Machine Interactions to identify and interact with the three domains of AI: Data, Computer Vision and Natural Language Processing and Undergo assessment for analysing their progress towards acquired AI-Readiness skills.
3. Imagine, examine and reflect on the skills required for futuristic job opportunities.
4. Unleash their imagination towards smart homes and build an interactive story around it.
5. Understand the impact of Artificial Intelligence on Sustainable Development Goals to develop responsible citizenship.
6. Research and develop awareness of skills required for jobs of the future.
7. Gain awareness about AI bias and AI access and describe the potential ethical considerations of AI.
8. Develop effective communication and collaborative work skills.
9. Get familiar and motivated towards Artificial Intelligence and Identify the AI Project Cycle framework.
10. Learn problem scoping and ways to set goals for an AI project and understand the iterative nature of problem scoping in the AI project cycle.

11. Brainstorm on the ethical issues involved around the problem selected.
12. Foresee the kind of data required and the kind of analysis to be done, identify data requirements and find reliable sources to obtain relevant data.
13. Use various types of graphs to visualize acquired data.
14. Understand, create and implement the concept of Decision Trees.
15. Understand and visualize computer's ability to identify alphabets and handwritings.
16. Understand and appreciate the concept of Neural Network through gamification and learn basic programming skills through gamified platforms.
17. Acquire introductory Python programming skills in a very user-friendly format.

SKILLS TO BE DEVELOPED:



SCHEME OF STUDIES:

This course is a planned sequence of instructions consisting of units meant for developing employability and vocational competencies of students of Class IX opting for skill subject along with other education subjects.

The unit-wise distribution of hours and marks for class IX & X is as follows:

ARTIFICIAL INTELLIGENCE (SUBJECT CODE 417)

CLASS – IX (SESSION 2023-2024)

Total Marks: 100 (Theory-50 + Practical-50)

	UNITS	NO. OF HOURS for Theory and Practical	MAX. MARKS for Theory and Practical
PART A	Employability Skills		
	Unit 1: Communication Skills-I	10	2
	Unit 2: Self-Management Skills-I	10	2
	Unit 3: ICT Skills-I	10	2
	Unit 4: Entrepreneurial Skills-I	15	2
	Unit 5: Green Skills-I	05	2
	Total	50	10
PART B	Subject Specific Skills		
	Unit 1: Introduction to Artificial Intelligence (AI)		10
	Unit 2: AI Project Cycle		15
	Unit 3: Neural Network		05
	Unit 4: Introduction to Python		10
Total		40	
PART C	Practical Work		
	Unit 4: Introduction to Python Practical File (minimum 15 programs)		15
	Practical Examination <ul style="list-style-type: none">• Simple programs using input and output function• Variables, Arithmetic Operators, Expressions, Data Types• Flow of control and conditions• Lists * Any 3 programs based on the above topics		15
	Viva Voce		5
	Total		35
PART D	Project Work / Field Visit / Student Portfolio * relate it to Sustainable Development Goals (Any one has to be done)		15
	Total		15
	GRAND TOTAL	200	100

DETAILED CURRICULUM/TOPICS FOR CLASS IX:

PART-A: EMPLOYABILITY SKILLS

S. No.	Units	Duration in Hours
1.	Unit 1: Communication Skills-I	10
2.	Unit 2: Self-management Skills-I	10
3.	Unit 3: Information and Communication Technology Skills-I	10
4.	Unit 4: Entrepreneurial Skills-I	15
5.	Unit 5: Green Skills-I	05
	TOTAL	50

NOTE: Detailed curriculum/ topics to be covered under Part A: Employability Skills can be downloaded from CBSE website.

PART-B – SUBJECT SPECIFIC SKILLS

- ❖ Unit 1: Introduction to Artificial Intelligence (AI)
- ❖ Unit 2: AI Project Cycle
- ❖ Unit 3: Neural Network
- ❖ Unit 4: Introduction to Python

UNIT 1: INTRODUCTION TO ARTIFICIAL INTELLIGENCE (AI)

SUB-UNIT	LEARNING OUTCOMES	SESSION / ACTIVITY / PRACTICAL
Excite	To identify and appreciate Artificial Intelligence and describe its applications in daily life.	Session: Introduction to AI and setting up the context of the curriculum Ice Breaker Activity: Dream Smart Home idea <ul style="list-style-type: none">• Learners to design a rough layout of floor plan of their dream smart home.• Recommended Activity: Make a statement about lighting and LUIS will interpret and adjust the house accordingly (https://aidemos.microsoft.com/luis/demo)
	To relate, apply and reflect on the Human-Machine Interactions. To identify and interact with the three domains of AI: Data, Computer Vision and Natural Language Processing.	Recommended Activity: The AI Game <ul style="list-style-type: none">• Learners to participate in three games based on different AI domains.<ul style="list-style-type: none">- Game 1: Rock, Paper and Scissors (based on data) (https://next.rockpaperscissors.ai/)- Game 2: Semantris (based on Natural Language Processing - NLP) (https://research.google.com/semantris/)- Game 3: Quick Draw (based on Computer Vision - CV) (https://quickdraw.withgoogle.com/)
	To undergo an assessment for analysing progress towards acquired AI-Readiness skills.	Recommended Activity: <ul style="list-style-type: none">• AI Quiz (Paper Pen/Online Quiz)

SUB-UNIT	LEARNING OUTCOMES	SESSION / ACTIVITY / PRACTICAL
	To imagine, examine and reflect on the skills required for futuristic job opportunities.	Recommended Activity: To write a letter. Writing a Letter to one's future self <ul style="list-style-type: none"> Learners to write a letter to self-keeping the future in context. They will describe what they have learnt so far or what they would like to learn someday
Relate	Learners to relate to application of Artificial Intelligence in their daily lives.	Video Session: To watch a video <ul style="list-style-type: none"> Introducing the concept of Smart Cities, Smart Schools and Smart Homes
	To unleash their imagination towards smart homes and build an interactive story around it. To relate, apply and reflect on the Human-Machine Interactions.	Recommended Activity: Write an Interactive Story <ul style="list-style-type: none"> Learners to draw a floor plan of a Home/School/City and write an interactive story around it using Inklewriter. (https://www.inklewriter.com/)
Purpose	To understand the impact of Artificial Intelligence on Sustainable Development Goals to develop responsible citizenship.	Session: <ul style="list-style-type: none"> Introduction to UN Sustainable Development Goals
		Recommended Activity: <ul style="list-style-type: none"> Go Goals Board Game: Learners to answer questions on Sustainable Development Goals AI for Ocean- "helping to conserve oceans is by fighting plastic pollution with machine learning." (https://code.org/oceans)
Possibilities	To research and develop awareness of skills required for jobs of the future. To imagine, examine and reflect on the skills required for the futuristic opportunities. To develop effective communication and collaborative work skills.	Session: Theme-based research and Case Studies <ul style="list-style-type: none"> Learners will listen to various case-studies of inspiring start-ups, companies or communities where AI has been involved in real-life. Learners will be allotted a theme around which they need to search for present AI trends and have to visualise the future of AI in and around their respective theme.
		Recommended Activity: Job Ad Creating activity <ul style="list-style-type: none"> Learners to create a job advertisement for a firm describing the nature of job available and the skill set required for it 10 years down the line. They need to figure out how AI is going to transform the nature of jobs and create the Ad accordingly.
AI Ethics	To understand and reflect on the ethical issues around AI.	Video Session: Discussing about AI Ethics Recommended Activity: Ethics Awareness <ul style="list-style-type: none"> Students play the role of major stakeholders, and they have to decide what is ethical and what is not for a given scenario. Students to explore Moral Machine (https://www.moralmachine.net/) to understand more about the impact of ethical concerns

SUB-UNIT	LEARNING OUTCOMES	SESSION / ACTIVITY / PRACTICAL
	To gain awareness around AI bias and AI access.	Session: AI Bias and AI Access <ul style="list-style-type: none"> • Discussing about the possible bias in data collection • Discussing about the implications of AI technology
	To let the students analyse the advantages and disadvantages of Artificial Intelligence.	Recommended Activity: Balloon Debate <ul style="list-style-type: none"> • Students divide in teams of 3 and 2 teams are given same theme. One team goes in affirmation to AI for their section while the other one goes against it. • They have to come up with their points as to why AI is beneficial/ harmful for the society.

UNIT 2: AI PROJECT CYCLE:

SUB-UNIT	LEARNING OUTCOMES	SESSION / ACTIVITY / PRACTICAL
Problem Scoping	Identify the AI Project Cycle framework.	Session: Introduction to AI Project Cycle <ul style="list-style-type: none"> • Problem Scoping • Data Acquisition • Data Exploration • Modelling • Evaluation
	Learn problem scoping and ways to set goals for an AI project.	Activity: Brainstorm around the theme provided and set a goal for the AI project. <ul style="list-style-type: none"> • Discuss various topics within the given theme and select one. • Fill in the 4Ws problem canvas and a problem statement to learn more about the problem identified in the community/ society • List down/ Draw a mind map of problems related to the selected topic and choose one problem to be the goal for the project.
	Identify stakeholders involved in the problem scoped. Brainstorm on the ethical issues involved around the problem selected.	Activity: To set actions around the goal. <ul style="list-style-type: none"> • List down the stakeholders involved in the problem. • Search on the current actions taken to solve this problem. • Think around the ethics involved in the goal of your project.
	Understand the iterative nature of problem scoping for in the AI project cycle. Foresee the kind of data required and the kind of analysis to be done.	Activity: Data and Analysis <ul style="list-style-type: none"> • What are the data features needed? • How will the features collected affect the problem? • Where can you get the data? • How frequent do you have to collect the data? • What happens if you don't have enough data? • What kind of analysis needs to be done? • How will it be validated? • How does the analysis inform the action?

SUB-UNIT	LEARNING OUTCOMES	SESSION / ACTIVITY / PRACTICAL
	Share what the students have discussed so far.	Presentation: Presenting the goal, actions and data. Teamwork Activity: <ul style="list-style-type: none"> Brainstorming solutions for the problem statement.
Data Acquisition	Identify data requirements and find reliable sources to obtain relevant data.	Activity: Introduction to data and its types. <ul style="list-style-type: none"> Students work around the scenarios given to them and think of ways to acquire data. Activity: Data Features <ul style="list-style-type: none"> Identifying the possible data features affecting the problem. Activity: System Maps <ul style="list-style-type: none"> Creating system maps considering data features identified.
Data Exploration	To understand the purpose of Data Visualisation	Session: Data Visualisation <ul style="list-style-type: none"> Need of visualising data Ways to visualise data using various types of graphical tools. Quiz Time
	Use various types of graphs to visualise acquired data.	Recommended Activities: Let's use Graphical Tools <ul style="list-style-type: none"> Selecting an appropriate graphical format and presenting the graph sketched. Understanding graphs using (https://datavizcatalogue.com/) Listing of newly learnt data visualization techniques. Top 10 Song Prediction: Identify the data features, collect the data and convert into graphical representation. Collect and store data in a spreadsheet and create some graphical representations to understand the data effectively.
Modelling	Understand modeling (Rule-based & Learning-based)	Session: Modeling <ul style="list-style-type: none"> Introduction to modeling and types of models (Rule-based & Learning-based) Recommended Activity: Rule-based & Learning-based <ul style="list-style-type: none"> Rule-based: Students can be asked to create text to speech bot using (https://theaiplayground.com/blocks/new) Learning-based Activity: Students can be asked to use (https://teachablemachine.withgoogle.com/)
	Understand, create and implement the concept of Decision Trees.	Session: Decision Tree <ul style="list-style-type: none"> To introduce basic structure of Decision Trees to students. Recommended Activity: Decision Tree <ul style="list-style-type: none"> To design a Decision Tree based on the data given. (Spot the Elephant)

SUB-UNIT	LEARNING OUTCOMES	SESSION / ACTIVITY / PRACTICAL
	Understand and visualise computer's ability to identify alphabets and handwritings.	<p>Recommended Activity: Pixel It</p> <ul style="list-style-type: none"> To create an "AI Model" to classify handwritten letters. Students develop a model to classify handwritten letters by dividing the alphabets into pixels. Pixels are then joined together to analyse a pattern amongst same alphabets and to differentiate the different ones.

UNIT 3: NEURAL NETWORK:

LEARNING OUTCOMES	SESSION / ACTIVITY / PRACTICAL
Understand and appreciate the concept of Neural Network through gamification.	<p>Session: Introduction to neural network</p> <ul style="list-style-type: none"> Relation between the neural network and nervous system in human body Describing the function of neural network.
	<p>Recommended Activity: Creating a Human Neural Network</p> <ul style="list-style-type: none"> Students split in four teams each representing input layer (X students), hidden layer 1 (Y students), hidden layer 2 (Z students) and output layer (1 student) respectively. Input layer gets data which is passed on to hidden layers after some processing. The output layer finally gets all information and gives meaningful information as output. <p>Teamwork Activity:</p> <ul style="list-style-type: none"> Students in groups shall be assigned the task to create and present the neural networks on a cardboard/chart paper.

UNIT 4: INTRODUCTION TO PYTHON:

LEARNING OUTCOMES	SESSION / ACTIVITY / PRACTICAL
Learn basic programming skills through gamified platforms.	<p>Recommended Activity:</p> <ul style="list-style-type: none"> Introduction to programming using Online Gaming portals like Code Combat.
Acquire introductory Python programming skills in a very user-friendly format.	<p>Session:</p> <ul style="list-style-type: none"> Introduction to Python language Introducing python programming and its applications
	<p>Theory + Practical: Python Basics</p> <ul style="list-style-type: none"> Students go through lessons on Python Basics (Variables, Arithmetic Operators, Expressions, Comparison Operators, logical operators, Assignment Operators, Data Types - integer, float, strings, type conversion, using print() and input() functions) Students will try some simple problem-solving exercises on Python Compiler.

LEARNING OUTCOMES	SESSION / ACTIVITY / PRACTICAL
	Practical: Flow of control and conditions 1. Students go through lessons on conditional and iterative statements (if, for and while) 2. Students will try some basic problem-solving exercises using conditional and iterative statements on Python Compiler.
	Practical: Python Lists 3. Students go through lessons on Python Lists (Simple operations using list) 4. Students will try some basic problem-solving exercises using lists on Python Compiler.

PART-C: PRACTICAL WORK

UNIT 4: INTRODUCTION TO PYTHON: Suggested Program List

PRINT	<ul style="list-style-type: none"> To print personal information like Name, Father's Name, Class, School Name. To print the following patterns using multiple print commands- <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <pre> * ** *** **** ***** ***** **** *** ** *</pre> </div> To find square of number 7 To find the sum of two numbers 15 and 20. To convert length given in kilometers into meters. To print the table of 5 up to five terms. To calculate Simple Interest if the principle_amount = 2000 rate_of_interest = 4.5 time = 10
INPUT	<ul style="list-style-type: none"> To calculate Area and Perimeter of a rectangle To calculate Area of a triangle with Base and Height To calculating average marks of 3 subjects To calculate discounted amount with discount % To calculate Surface Area and Volume of a Cuboid
LIST	<ul style="list-style-type: none"> Create a list in Python of children selected for science quiz with following names- Arjun, Sonakshi, Vikram, Sandhya, Sonal, Isha, Kartik Perform the following tasks on the list in sequence- <ul style="list-style-type: none"> Print the whole list Delete the name "Vikram" from the list Add the name "Jay" at the end Remove the item which is at the second position. Create a list num=[23,12,5,9,65,44] <ul style="list-style-type: none"> Print the length of the list Print the elements from second to fourth position using positive indexing Print the elements from position third to fifth using negative indexing

	<ul style="list-style-type: none"> • Create a list of first 10 even numbers, add 1 to each list item and print the final list. • Create a list List_1=[10,20,30,40]. Add the elements [14,15,12] using extend function. Now sort the final list in ascending order and print it.
IF, FOR, WHILE	<ul style="list-style-type: none"> • Program to check if a person can vote • To check the grade of a student • Input a number and check if the number is positive, negative or zero and display an appropriate message • To print first 10 natural numbers • To print first 10 even numbers • To print odd numbers from 1 to n • To print sum of first 10 natural numbers • Program to find the sum of all numbers stored in a list
Important Links	<ul style="list-style-type: none"> • https://cbseacademic.nic.in/web_material/Curriculum21/publication/secondary/Python_Content_Manual.pdf • http://bit.ly/loops_jupyter • https://bit.ly/40uovYK

PART-D: Project Work / Field Visit / Student Portfolio
(relate it to Sustainable Development Goals)

Suggested Projects/ Field Visit / Portfolio (Any one has to be done)

Suggested Projects	<ol style="list-style-type: none"> 1. Create an AI Model using tools like- <ul style="list-style-type: none"> ○ Teachable Machine (https://teachablemachine.withgoogle.com/) ○ Machine Learning For Kids (https://machinelearningforkids.co.uk/) 2. Choose an issue that pertains to the objectives of sustainable development and carry out the actions listed below. <ul style="list-style-type: none"> ○ To understand more about the problem identified, create a 4Ws problem canvas. ○ Identify the data features and create a system map to understand relationship between them ○ Visualize the data collected graphically (Spreadsheet software to be used store and visualize the data) ○ Suggest an AI enabled solution to it (Prototype/Research Work)
Suggested Field Visit	<p>Visit to an industry or IT company or any other place that is creating or using AI applications and present the report for the same. Visit can be in physical or virtual mode.</p>
Suggested Student Portfolio	<p>Maintaining a record of all AI activities and projects (For Example Letter to Futureself, Smart Home Floor Plan, Future Job Advertisement, Research Work on AI for SDGs and AI in Different Sectors, 4Ws canvas, System Map). (Minimum 5 Activities)</p>