CBSE | DEPARTMENT OF SKILL EDUCATION

CURRICULUM FOR SESSION 2024-2025

ARTIFICIAL INTELLIGENCE (SUB. CODE - 843)

JOB ROLE: AI Assistant

CLASS – XI

OBJECTIVES OF THE COURSE

AI is a discipline in computer science that focuses on developing intelligent machines, machines that can learn and then teach themselves. These machines, then, can process vast amounts of data than humans can, and several times faster. However, AI can go across all disciplines to change the world for the better– from creating new healthcare solutions, to designing hospitals of the future, improving farming and our food supply, helping refugees acclimatize to the new environments, improving educational resources and access, and even cleaning our oceans, air, and water supply. The potential for humans to improve the world through AI is endless, as long as we know how to use it.

LEARNING OUTCOMES

In this course, the students will develop knowledge, skills and values to understand AI and its implications for our society and the world and to use AI to solve authentic problems, now and in the future. The students will engage with a host of multi-media online resources, as well as hands-on activities and sequence of learning experiences.

The following are the main objectives of the course:

1. Develop informed citizens with an understanding of AI and the skills to think critically and knowledgeably about the implications of AI for society and the world.
2. Develop engaged citizens with a rigorous understanding of how AI can be harnessed to improve life and the world we live in.
3. Stimulate interest and prepare students for further study to take up careers as AI scientists and developers to solve complex real-world problems.

SCHEME OF UNITS

This course is a planned sequence of instructions consisting of units meant for developing employability and vocational competencies of students opting for skill subject along with other education subjects. The unit-wise distribution of hours and marks for class XI is as follows:

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ARTIFICIAL INTELLIGENCE (SUBJECT CODE - 843)

CLASS – XI (SESSION 2024-2025)

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

	UNITS	NO OF HOURS		MAX MARKS
PART A	**Employability skills**			
	Unit 1: Communication Skills – III	15		2
	Unit 2: Self-Management Skills – III	10		2
	Unit 3: ICT Skills – III	15		2
	Unit 4: Entrepreneurial Skills – III	10		2
	Unit 5: Green Skills – III	10		2
	TOTAL	**60**		**10**
PART B	**Subject specific skills**	**Theory**	**Practical**	
	Introduction: Artificial Intelligence for Everyone	4	10	4
	Unlocking your Future in AI	6	10	5
	Python Programming	10	20	5
	Introduction to Capstone Project	6	15	5
	Data Literacy – Data Collection to Data Analysis	6	15	6
	Machine Learning Algorithms	9	15	6
	Leveraging Linguistics and Computer Science	5	10	5
	AI Ethics and Values	4	5	4
	TOTAL	**50**	**100**	**40**
PART C	**PRACTICAL WORK / PROJECT WORK**			
	IBM Skills Build Certification/any other industry certification			5
	Capstone Project			12
	Bootcamps/ Internship/other startups			7
	Practical File			10
	Written Exam (based on practical file)			10
	Viva Voce (based on practical file)			6
	TOTAL			**50**
	GRAND TOTAL			**100**

DETAILED CURRICULUM/TOPICS:

Part-A: EMPLOYABILITY SKILLS

S. No.	Units	Duration in Hours
1.	Unit 1: Communication Skills – III	15
2.	Unit 2: Self-Management Skills – III	10
3.	Unit 3: Basic Information and Communication Technology Skills – III	15
4.	Unit 4: Entrepreneurial Skills – III	10
5.	Unit 5: Green Skills – III	10
	TOTAL	**60**

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: Artificial Intelligence for Everyone
- Unit 2 – Unlocking your Future in AI
- Unit 3 – Python Programming
- Unit 4 – Introduction to Capstone Project
- Unit 5 – Data Literacy – Data Collection to Data Analysis
- Unit 6 – Machine Learning Algorithms
- Unit 7 – Leveraging Linguistics and Computer Science
- Unit 8 – AI Ethics and Values

UNIT 1 - INTRODUCTION: ARTIFICIAL INTELLIGENCE FOR EVERYONE

LEARNING OUTCOMES	THEORY	PRACTICAL
Students will be able to – • Communicate effectively about AI concepts and applications in written and oral formats. • Describe the historical development of AI. • Differentiate between various types and domains of AI, including their applications. • Recognize the key terminologies and concepts related to machine learning and deep learning. • Formulate informed opinions on the potential benefits and limitations of AI in various contexts.	• What is Artificial Intelligence? • Evolution of AI • Types of AI • Domains of AI • AI Terminologies • Benefits and limitations of AI	• Categorize the given applications into the three domains IBM Skills Build – Introduction to AI

UNIT 2 - UNLOCKING YOUR FUTURE IN AI

LEARNING OUTCOMES	THEORY	PRACTICAL
Students will be able to – • Articulate the demand for AI professionals and the diverse career opportunities available in the field. • Identify the requisite skills and tools needed to pursue a career in artificial intelligence. • Understand the potential roles and responsibilities of AI professionals across different industries. • Explore resources for further learning and skill development in the field of AI. • Evaluate their own interests and skills to determine potential pathways for a career in AI.	• The Global Demand • Some Common Job Roles In AI • Essential Skills and Tools for Prospective AI Careers • Opportunities in AI across Various Industries	• Identify ten companies currently hiring employees for in specific AI positions. • Note down the technical skills and soft skills listed by any two companies for the specific AI position. IBM Skills Build : Your Future in AI: The Job Landscape

UNIT 3 - PYTHON PROGRAMMING

LEARNING OUTCOMES	THEORY	PRACTICAL
Students will be able to – • Explain the basics of python programming language and write programs with basic concepts of tokens. • Use selective and iterative statements effectively. • Gains practical knowledge on how to use the libraries efficiently.	**Level 1 :** Basics of python programming, character sets, tokens, modes, operators, datatypes, Control Statements **Level 2 :** CSV Files, Libraries – Numpy, Pandas, Scikit-learn	• Minimum five programs to be taught using operators, data types, control statements (**Level 1**) • Minimum 5 programs on Numpy, Pandas, Scikit-learn (**Level 2**) IBM SkillsBuild - Python for Data Science

UNIT 4 - INTRODUCTION TO CAPSTONE PROJECT

LEARNING OUTCOMES	THEORY	PRACTICAL
Students will be able to – • Decompose any problem using the 5W1H method. • Apply Design thinking methodology. • Create empathy maps. • Align problems to SDGs. • Apply all the learnings in solving real world problems. • Comfortably express their solution to a problem in non-technical words.	• Design Thinking • Empathy Map • Sustainable Development Goals • Capstone Project	• Create an empathy map for a given scenario • Project Abstract Creation Using Design Thinking Framework IBM SkillsBuild - What is Design thinking?

UNIT 5 - DATA LITERACY – DATA COLLECTION TO DATA ANALYSIS

LEARNING OUTCOMES	THEORY	PRACTICAL
Students will be able to – • Explain the importance of data literacy in AI. • Identify different data collection methods and their applications. • Comprehend mathematical concepts related to matrices, its operations, and applications. • Apply basic data analysis techniques to analyse data. • Visualize the data using different techniques.	• What is Data Literacy? • Data Collection • Exploring Data • Statistical Analysis of data • Representation of data, Python Programs for Statistical Analysis and Data Visualization • Introduction to Matrices • Data Pre-processing • Data in Modelling and Evaluation	• Identification of the level of measurement • Python programs to demonstrate the use of mean, median, mode, standard deviation and variance • Python programs to visualise the line graph, bar graph, histogram, scatter graph and pie chart using matplotlib IBM SkillsBuild - Data Visualisation with Python (Modules 1,2,3)

UNIT 6 – MACHINE LEARNING ALGORITHMS

LEARNING OUTCOMES	THEORY	PRACTICAL
Students will be able to – • Differentiate the different types of machine learning methods. • They will be able to understand the concept behind each machine learning methods. • Apply these methods to develop simple solutions for some day-to-day situations. • Build up this knowledge to the next level to apply during Capstone Project development.	• Machine Learning in a nutshell • Types of Machine Learning • Supervised Learning • Understanding Correlation, Regression, Finding the line, Linear Regression algorithm • Classification – How it works, Types, k – Nearest Neighbour algorithm • Unsupervised Learning • Clustering – How it works, Types, k -means Clustering algorithm	• Calculation of pearson correlation coefficient in MS – Excel. • Demonstration of Linear regression in MS – Excel / using python program. • Demonstration of k – Nearest Neighbour using python program. • Demonstration of k – means clustering using python program. IBM SkillsBuild - Machine learning with Python

UNIT 7 – LEVERAGING LINGUISTICS AND COMPUTER SCIENCE

LEARNING OUTCOMES	THEORY	PRACTICAL

Students will be able to –
• Develop a better understanding of the complexities of language and the challenges involved in NLP tasks.
• Learn new techniques and algorithms for NLP tasks.
	• Understanding Human Language Complexity
	• Introduction to Natural Language Processing (NLP) - Emotion Detection and Sentiment Analysis, Classification Problems, Chatbot
	• Phases of NLP
	• Applications of NLP
		• Write an article on “IBM Project Debater – Interesting facts”
		• Create a chatbot on ordering ice-creams using any of the following platforms:
		  • Google Dialogflow
		  • Botsify.com
		  • Botpress.com
		IBM SKillsBuild - Natural Language Processing

UNIT 8 – AI ETHICS AND VALUES

LEARNING OUTCOMES	THEORY	PRACTICAL
Students will be able to – • Demonstrate an understanding of the fundamental principles of ethics and gain insight into ethical considerations related to AI technologies. • Develop an understanding of AI bias, its sources, and its real-world implications, as well as the ethical considerations. • Identify and apply strategies for mitigating bias in AI systems to promote fairness and transparency in technology. • Recognize the significance of AI policies in promoting responsible, safe, and ethical use of AI technologies.	• Ethics in Artificial Intelligence • The five pillars of AI Ethics • Bias, Bias Awareness, Sources of Bias • Mitigating Bias in AI Systems • Developing AI Policies • Moral Machine Game • Survival of the Best Fit Game	• Summarize your insights and interpretations from the video "Humans need not apply.” • Activity: Role Play on biased AI systems IBM SkillsBuild - AI Ethics • Comparative study of AI policies (that involve examining guidelines and principles) established by various organizations and regulatory bodies • Understanding ethical dilemma using Moral machine Survival of the best fit

PART – C

1. Practical File

Note: The following to be included in Practical File

- ***one certification (IBM Skills Build /any other industry certification)***
- ***at least one activity from each unit***
- ***one participation certificate of bootcamp/internship***

1. Categorize the given applications into the three domains.
2. IBM Skills Build – Introduction to AI
3. Identify ten companies currently hiring employees for in specific AI positions.
4. Note down the technical skills and soft skills listed by any two companies for the specific AI position.
5. Python programs using operators, data types, control statements (**Level 1**)
6. Python programs on Numpy, Pandas, Scikit-learn (**Level 2**)
7. Create an empathy map for a given scenario.
8. Project Abstract Creation Using Design Thinking Framework.
9. Python programs to demonstrate the use of mean, median, mode, standard deviation and variance.
10. Python programs to visualise the line graph, bar graph, histogram, scatter graph and pie chart using matplotlib.
11. Calculation of pearson correlation coefficient in MS – Excel.
12. Demonstration of Linear regression in MS – Excel / using python program.
13. Demonstration of k – Nearest Neighbour using python program.
14. Demonstration of k – means clustering using python program.

(Sample programs for regression, classification and clustering along with the dataset is in this link.)

15. Create a chatbot on ordering ice-creams using any of the following platforms:
    a. Google Dialogflow
    b. Botsify.com
    c. Botpress.com
    d. Any other online platform
16. Python program to demonstrate the working of a chatbot.
17. Python program to summarise the given text.
18. Summarize your insights and interpretations from the video "Humans need not apply."
19. Comparative study of AI policies (that involve examining guidelines and principles) established by various organizations and regulatory bodies.
20. Understanding ethical dilemma using
    Moral machine
    Survival of the best fit

2. Capstone Project

Note: Problem definition, The Users, Brainstorming and Design stages must be completed in the (IBM) Log Book

LIST OF EQUIPMENT/ MATERIALS:

The list given below is suggestive and an exhaustive list should be compiled by the teacher(s) teaching the subject. Only basic tools, equipment and accessories should be procured by the Institution so that the routine tasks can be performed by the students regularly for practice and acquiring adequate practical experience.

S. No.	ITEM NAME, DESCRIPTION & SPECIFICATION	QUANTITY
A	**HARDWARE**	
1.	Computer with latest configuration or minimum core I5 Processor or equivalent with minimum 8 GB RAM, 512 GB SSD, 17" LED Monitor, NIC Card, 3 button Mouse, Camera, 105 keys key board and built-in speakers, mic with WiFi / Internet connectivity.	15
2.	Printer – (Color/Black)	01
3.	Graphic Card: Integrated graphics	
4.	Online UPS 5 KVA	01
5.	16 Port Switches	01
6.	Air Conditioner 1.5 ton	02
7.	Telephone line (For Internet)	01
8.	Fire extinguisher	01
B	**SOFTWARE**	
1.	Operating System Linux and Windows	
2.	Anti-Virus Latest version	
3.	Productivity Suite, Example – Microsoft Office	
4.	Anaconda Navigator Distribution – Python IDE installed with software: NumPy, Pandas, Matplotlib, Seaborn, Scikit Learn)	
C	**FURNITURE**	
1.	Class room chairs and desks	25
2.	Computer Tables	15
3.	Straight back revolving & adjustable chairs (Computer Chairs)	15
4.	Printer Tables	01
5.	Trainers Table	01
6.	Trainers Chair	01
7.	Steel cupboards drawer type	02
8.	Cabinet with drawer	01
9.	Steel Almira - big size	01
10.	Steel Almira- small size	01

Additional Recommendations:

- Ensure regular updates and maintenance for all installed software to benefit from bug fixes, security patches, and new features.
- Provide licenses for commercial software, such as MS Office, as per the school's requirements and budget.
- Encourage teachers and students to stay updated with the latest versions of the software and tools and provide resources for learning and support.
- Consider implementing version control systems (e.g., Git) to facilitate collaborative coding and project management.

TEACHER'S/ TRAINER'S QUALIFICATIONS:

Qualification and other requirements for appointment of teachers/trainers for teaching this subject, on contractual basis should be decided by the State/ UT. The suggestive qualifications and minimum competencies for the teacher should be as follows:

Qualification	Minimum Competencies	Age Limit
Diploma in Computer Science/ Information Technology **OR** Bachelor Degree in Computer Application/ Science/ Information Technology (BCA, B.Sc. Computer Science/ Information Technology) **OR** Graduate with PGDCA OR DOEACCA Level Certificate. The suggested qualification is theminimum criteria. However higher qualifications will also be acceptable.	The candidate shouldhave a minimum of 1 year of work experiencein the same job role. S/he should be able to communicate in English and local language. S/he should have knowledge of equipment, tools, material, Safety, Health & Hygiene.	• 18-37 years (as onJan. 01 (year)) • Age relaxation to be provided as per Govt. rules

Teachers/Trainers form the backbone of Skill (Vocational) Education being imparted as an integral part of Rashtriya Madhyamik Shiksha Abhiyan (RMSA). They are directly involved in teaching of Skill (vocational) subjects and also serve as a link between the industry and the schools for arranging industry visits, On-the-Job Training (OJT) and placement.

These guidelines have been prepared with an aim to help and guide the States in engaging quality Teachers/Trainers in the schools. Various parameters that need to be looked into while engaging the Vocational Teachers/Trainers are mode and procedure of selection of Teachers/ Trainers, Educational Qualifications, Industry Experience, and Certification/ Accreditation.

The State may engage Teachers/Trainers in schools approved under the component of scheme of Vocationalisation of Secondary and Higher Secondary Education under RMSA in following ways:

(i) Directly as per the prescribed qualifications and industry experience suggested by the PSS Central Institute of Vocational Education (PSSCIVE), NCERT or the respective Sector Skill Council (SSC).

OR

(ii) Through accredited Vocational Training Providers accredited under the National Quality Assurance Framework (NQAF*) approved by the National Skill Qualification Committee on 21.07.2016. If the State is engaging Vocational Teachers/Trainers through the Vocational Training Provider (VTP), it should ensure that VTP should have been accredited at NQAF Level2 or higher.

The National Quality Assurance Framework (NQAF) provides the benchmarks or quality criteriawhich the different organizations involved in education and training must meet in order to be accredited by competent bodies to provide government- funded education and training/skills activities. This is applicable to all organizations offering NSQF-compliant qualifications.

The educational qualifications required for being a Teacher/Trainer for a particular job role are clearly mentioned in the curriculum for the particular NSQF compliant job role. The State should ensure that teachers/ trainers deployed in the schools have relevant technical competencies for the NSQF qualification being delivered. Teachers/Trainers preferably should be certified by the concerned Sector Skill Council for the particular Qualification Pack/Job role which he will be teaching. Copies ofrelevant certificates and/or record of experience of the teacher/trainer in the industry should be kept as record.

To ensure the quality of the Teachers/Trainers, the State should ensure that a standardized procedure for selection of (Vocational) Teachers/Trainers is followed. The selection procedure should consist of the following:

(i) Written test for the technical/domain specific knowledge related to the sector;
(ii) Interview for assessing the knowledge, interests and aptitude of trainer through a panel of experts from the field and state representatives; and
(iii) Practical test/mock test in classroom/workshop/laboratory.

In case of appointment through VTPs, the selection may be done based on the above procedure by a committee having representatives of both the State Government and the VTP. The State should ensure that the Teachers/ Trainers who are recruited should undergo induction training of 20 days for understanding the scheme, NSQF framework and Vocational Pedagogy beforebeing deployed in the schools. The State should ensure that the existing trainers undergo in-service training of 5 days every year tomake them aware of the relevant and new techniques/approaches in their sector and understand thelatest trends and policy reforms in vocational education. The Head Master/Principal of the school where the scheme is being implemented should facilitate and ensure that the (Vocational) Teachers/Trainers:

- Prepare session plans and deliver sessions which have a clear and relevant purpose and which engage the students;
- Deliver education and training activities to students, based on the curriculum to achieve the learning outcomes;
- Make effective use of learning aids and ICT tools during the classroom sessions;
- Engage students in learning activities, which include a mix of different methodologies, such as project-based work, team work, practical and simulation-based learning experiences;
- Work with the institution's management to organise skill demonstrations, site visits, on job trainings, and presentations for students in cooperation with industry, enterprises and other workplaces;
- Identify the weaknesses of students and assist them in up-gradation of competency;
- Cater to different learning styles and level of ability of students;
- Assess the learning needs and abilities, when working with students with different abilities
- Identify any additional support the student may need and help to make special arrangements for that support;
- Provide placement assistance

Assessment and evaluation of (Vocational) Teachers/Trainers is very critical for making them aware of their performance and for suggesting corrective actions. The States/UTs should ensure that the performance of the (Vocational) Teachers/Trainers is appraised annually. Performance based appraisal in relation to certain pre-established criteria and objectives should be done periodically to ensure the quality of the (Vocational) Teachers/Trainers.

Following parameters may be considered during the appraisal process:

- Participation in guidance and counseling activities conducted at Institutional, District and State level;
- Adoption of innovative teaching and training methods;
- Improvement in result of vocational students of Class X or Class XII;
- Continuous up-gradation of knowledge and skills related to the vocational pedagogy, communication skills and vocational subject;
- Membership of professional society at District, State, Regional, National and International level;
- Development of teaching-learning materials in the subject area;
- Efforts made in developing linkages with the Industry/Establishments;
- Efforts made towards involving the local community in Vocational Education
- Publication of papers in National and International Journals;
- Organization of activities for promotion of vocational subjects;
- Involvement in placement of students/student support services.