

St. Xavier's College (Autonomous), Ahmedabad

Syllabus of Semester – I of the following departments under
Faculty of Data Science based on Undergraduate Curriculum
Framework to be implemented from the Academic Year 2025-26.

DEPARTMENT OF DATA SCIENCE

Category II

BSc. Artificial Intelligence and Machine Learning (Hons.)

Multi-Disciplinary Course: Beyond Algorithms; Ethics and the social impact of Artificial Intelligence

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course Title & Code	Credit Distribution of The Course			Eligibility Criteria	Prerequisite(s) of the Course (if any)
	Lecture	Tutorial	Practical / Practice		
Beyond Algorithms: Ethics and the social impact of Artificial Intelligence	4	0	0	10 + 2 from a recognized board in any stream	Nil

Course Objectives:

- CO1: Explain the fundamental concepts, evolution, and significance of Artificial Intelligence, including its role in everyday life and society.
- CO2: Describe the applications of Artificial Intelligence across diverse domains such as healthcare, agriculture, education, finance, science, and smart governance.
- CO3: Demonstrate the effective use of Generative AI tools by applying prompt engineering techniques to solve academic and real-world problems.
- CO4: Interpret the basic principles of AI prediction models, evaluate their applications, and recognize their limitations in decision-making.
- CO5: Analyze ethical, legal, and societal issues related to Artificial Intelligence, including fairness, privacy, bias, misinformation, and responsible AI practices.
- CO6: Apply AI tools responsibly to enhance learning, productivity, and interdisciplinary problem-solving while adhering to ethical and professional standards.

After completing this course, students will be able to:

- Define Artificial Intelligence and explain its evolution, characteristics, and impact on modern society.
- Identify AI-powered applications used in daily life and across various scientific and professional domains.
- Use popular Generative AI tools effectively for content creation, research, communication, and academic tasks.
- Construct clear and effective prompts using established prompt engineering frameworks to obtain accurate AI-generated responses.
- Explain the basic concepts of AI prediction models, including regression and

classification, through real-world examples.

- Evaluate AI-generated outputs by identifying hallucinations, misinformation, bias, and reliability issues.
- Discuss ethical, legal, and privacy concerns associated with AI technologies and recommend responsible AI practices.
- Apply AI tools to improve productivity, support decision-making, and solve interdisciplinary problems while understanding their capabilities and limitations.

UNIT	TOPICS / SUBTOPICS	Hours
1	• The AI Revolution • Introduction to Intelligence: What makes a human "smart" vs. what makes a machine "intelligent"? • The Evolution Timeline: From early calculators to ChatGPT—how AI became part of our furniture. • AI in the Wild: How it powers your Spotify recommendations, Google Maps routes, and Instagram filters. • The Ghost in the Machine: The role of Data—why AI is "hungry" for information. • Automation & The Future of Work: Will robots take my job? Understanding Human–AI collaboration and "Augmented Intelligence." • Busting the Myths: Addressing common fears (like the "Terminator" scenario) vs. real-world benefits and risks. • Generative AI 101: A look at how DALL-E and Midjourney "paint" and how ChatGPT "writes." • The Economy of AI: How free services make money and the value of your personal data. • [Activity]: "The Filter Bubble Audit"—Students analyze their own social media feeds to see how AI shapes their reality	15
2	• AI Applications • The Digital Doctor: AI in healthcare—how machines help spot tumors in X-rays and monitor patient vitals in real-time. • Smart Farming (Agri-Tech): Using drones and AI to predict crop yields, detect pests, and save water. • Personalized Education: How AI acts as a 24/7 tutor, adapting to a student's individual learning speed. • FinTech & Security: How your bank uses AI to stop credit card fraud before it happens. • Smart Cities & Governance: Managing traffic flow and public services using data-driven "brain" systems. • Cross-Disciplinary Magic: Why a Chemist or a Botanist needs to understand AI today. • AI in Chemistry & Physics: How AI accelerates drug discovery and detects exoplanets in astronomical data. • Biology's New Map: Exploring AlphaFold and how AI solved the 50-year-old "Protein Folding" mystery.	15
3	• Prompt Engineering & The AI Toolbox (15 Lectures) • The AI Landscape: Mapping the world of AI tools—Text	15

(ChatGPT/Claude), Search (Perplexity), Images (Midjourney), and Video/Slides (Canva/Gamma).

- Tool Selection Logic: When to use a "Creative" AI vs. an "Analytical" AI vs. a "Fact-checking" AI.
- The Anatomy of a Basic Prompt: Learning the "Instructions + Context" formula.
- The CRAFT Framework: Mastering Context, Role, Action, Format, and Target.
- Talking to the Machine: How to set a "Persona" (e.g., "Act as a Biology Professor") to change the tone of the answer.
- The "Step-by-Step" Trick: How asking AI to "think slowly" or "list its reasoning" improves accuracy in math and science.
- Giving Examples (Few-Shot): Teaching the AI your style by providing 2–3 examples of how you want a lab report to look.
- The Iterative Loop: Learning that the first answer is just a draft—how to give follow-up feedback to refine results.
- AI for Student Productivity:
- Prompting for better Summarization of long textbook chapters.
- Prompting for Time Management and study schedules.
- Prompting for Grammar and Clarity in scientific writing.
- Identifying "AI Lies": How to spot hallucinations and verify AI claims using search-linked tools.
- [Interactive Activity]: "The Tool Matchmaker"—Students are given 5 complex tasks and must present which AI tools they would use and the specific prompts they would write.

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• **The AI Toolkit: Real-World Case Studies**

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- The "Trend Spotter" (Linear Models): Using the logic of "Line of Best Fit" to predict continuous changes ($y = mx + c$).
- *Case Study*: Predicting Air Pollution (PM2.5 levels) or House Prices based on environment/location.
- The "Gatekeeper" (Logistic Models): Understanding how AI makes Yes/No decisions (Probability mapping).
- *Case Study*: A Disease Risk Screening tool or a Loan Approval system.
- Inputs & Outputs: Mapping out what information goes into a model and what the result looks like.
- Predicting Performance: *Case Study*: Using past data to predict Student Success or Crop Yields.
- The "Black Box" Problem: Discussing the limitations—why AI can't always explain why it made a decision.
- Ethics & Fairness: A closing workshop on avoiding bias in AI to ensure technology helps everyone equally.
- The Sustainability Challenge: Using AI to design energy-efficient materials and tackle climate change.
- Deepfakes & Digital Trust: A practical session on spotting AI-generated misinformation and "Fake News."

Essential / Recommended Readings:

- AI in Society, a book contribution by OECD

Suggestive Readings: Christo EI Morr (2023) AI and Society Tensions and Opportunities, CRC Press, Taylor and Francis Group.