Course Code	Course Name	Credits
26CH613	ETHICAL AI AND FUTURE TRENDS	04

Course Objectives

- To develop a rigorous understanding of ethical frameworks applicable to artificial intelligence.
- To evaluate bias, fairness, accountability, and transparency in machine learning models.
- To explore emerging trends in AI and their ethical implications in science, healthcare, and industry.
- To enable critical assessment of AI deployment in interdisciplinary domains (e.g., chemistry, medicine, climate science).

Learning Outcomes

Upon successful completion of this course it is intended that a student will be able to:

- Interpret ethical dilemmas using formal frameworks.
- Differentiate between philosophical approaches to AI ethics.
- Quantitatively evaluate fairness in ML models.
- Design bias mitigation strategies.

Unit 1 - Foundations of AI Ethics (12 Hrs.)

Definition and scope of AI ethics; historical evolution of ethical concerns in AI; ethical theories including utilitarianism, deontology, and virtue ethics; responsible AI principles including beneficence, non-maleficence, autonomy, and justice.

Unit 2 – Bias, Fairness, and Accountability (12 Hrs.)

Types of bias; Dataset bias - Algorithmic bias - Societal bias. Fairness metrics; Demographic parity; Equalized odds; Explainability and interpretability; Accountability and auditability in AI systemspolyatomic molecules.

Unit 3 - Privacy, Security, and Data Governance (12 Hrs.)

Data protection principles; Privacy-preserving techniques: Differential privacy; Federated learning; Surveillance and data ethics; Cybersecurity risks in AI.

Unit 4 – AI Governance and Regulation (14 Hrs.)

National and international AI policies; Ethical guidelines; OECD AI Principles; UNESCO AI Recommendations; Risk-based regulation; AI in public policy and governance.

Unit 5 - Human-AI Interaction and Societal Impact (12 Hrs.)

Trust and human-AI collaboration- Job displacement and economic impact; AI and social inequality; Psychological and behavioral implications.

Reference Books:

1. Russell, Stuart, & Norvig, Peter. Artificial Intelligence: A Modern Approach. 4th Edition, Pearson, 2021.
2. Coeckelbergh, Mark. AI Ethics. MIT Press, 2020.
3. Boddington, Paula. Towards a Code of Ethics for Artificial Intelligence. Springer, 2017.
4. Floridi, Luciano. The Ethics of Artificial Intelligence: Principles, Challenges, and Opportunities. Oxford University Press, 2022.

Websites and eLearning Sources:

1. https://onlinelibrary.wiley.com/doi/full/10.1111/insr.12492
2. https://montrealethics.ai/human-ai-interactions-and-societal-pitfalls/
3. https://www.youtube.com/watch?v=eXdVDhOGqoE

COs and Bloom's Taxonomy Mapping – 26CH613		
Course Outcomes	**On completing P.G. program the students will be able to**	**BTL**
CO1	Define and explain the fundamental concepts, principles, and historical evolution of AI ethics, including major ethical theories such as utilitarianism, deontology, and virtue ethics.	K1, K2
CO2	Examine different forms of bias, fairness metrics, accountability mechanisms, and interpretability issues in AI systems. Apply privacy-preserving techniques, data governance principles, and cybersecurity measures in ethical AI system design.	K3
CO3	Analyze national and international AI regulations, policy frameworks, and ethical guidelines for governance and responsible deployment of AI technologies.	K4
CO4	Evaluate the societal, economic, and psychological impacts of human–AI interaction, including issues of trust, inequality, and job displacement.	K5
CO5	Design and propose ethically responsible AI solutions by integrating fairness, privacy, governance, and societal considerations in real-world scenarios.	K6

BTL K1 and K2 – remembering and understanding, K3- Applying, K4 – Analyse, K5- Evaluate and K6- Create

Relationship Matrix – 26CH613												
Course Outcomes	**Programme Outcomes (POs)**						**Programme Specific Outcomes (PSOs)**					**Mean Score of Cos**
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**	
CO1	3	3	2	1	1	2	3	2	3	1.5	2	2.1
CO2	2	3	1.5	2	2	3	3	3	3	2	1	2.3
CO3	3	3	3	3	1	3	2	3	3	2	1	2.4
CO4	3	3	2	3	2	2	3	3	3	2	1.5	2.5
CO5	2	3	3	1.5	2	1	2	3	3	3	3	2.5
											Total	2.3

Mean Score: 3- High, 2- Medium/Moderate, 1-Low