IntegralUniversity,Lucknow

Effective from Session:2024-2025							
Course Code	ME331	**Title of the Course**	AI in Mechanical Engineering	**L**	**T**	**P**	**C**
Year	3	**Semester**	6	3	1	0	4
Pre-Requisite		**Co-requisite**					
Course Objectives	Impart knowledge of basic concepts of Artificial Intelligence (AI) and Machine Learning (ML). Develop capability to apply the basic concepts of AI and ML to Automations and in different manufacturing systems.						

Course Outcomes	
CO1	Understand the basic concepts of artificial intelligence in mechanical engineering with industrial applications and its scope.
CO2	Understand the basic concepts of artificial intelligence including a basic knowledge of the different classifiers used in machine learning.
CO3	Apply the knowledge and concept of of AI in product design development, AI in robotics.
CO4	Apply the knowledge and concepts of machine learning to problems in industrial engineering.
CO5	Apply the knowledge and concepts of machine learning to problems in production engineering.

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Introduction to artificial intelligence	History and evolution of AI, comparison of human and computer skill, Component of AI, Scope and significance in different domains, Ethical considerations in AI development and deployment, Intelligent Agent, logical agent. **Problem solving through AI:** Defining problem as a state space search, analyzing the problem, solving problem by searching, informed search and Uninformed Search	08	CO-1
2	Machine Learning Basics	Neural networks and deep learning, Supervised and unsupervised learning, Feature selection and engineering, learning from observation, knowledge in learning. **Natural Language Processing:** Brief history of NLP, Text processing, Sentiment analysis, language translation, Early NLP system, ELIZA system, LUNAR system, General NLP system	08	CO-2
3	AI in Product Design & Development	Generative design and topology optimization using AI, Robotics & Automation with AI, Use of AI in Robotic Control and path planning, , AI enhanced Automation,. Integration of machine learning in product lifecycle management.	08	CO-3
4	AI in Industrial Engineering	AI applications in condition monitoring, fault detection, Reliability analysis & optimization using machine learning, Problems in forecasting, scheduling, transportation, inventory models, quality control, Real time monitoring & maintenance planning.	08	CO-4
5	AI in Production Engineering & Applications	Optimal parameter selection in manufacturing processes, Process optimization and control using AI techniques, AI application in additive manufacturing and CNC applications, Human Machine Interaction. Implementation of AI techniques in mechanical engineering project.	08	CO-5

ReferenceBooks:

1. Hands on Machine Learning with Python: Concepts and Applications for Beginners" by John Anderson, AI Sciences 2018
2. "Hands on Machine Learning with Scikit-learn and Tensor Flow" by Aurelien Geron, O'Reilly Publishers, 2016.
3. "Introduction to Operations Research" by Lieberman, G. J., & Hillier, F. S. New York, NY, USA: McGraw-Hill, (2015).
4. Head-First Python: A Brain-Friendly Guide (2nd Edition), Paul Barry

e-LearningSource:

https://nptel.ac.in/courses/106/106/106106202/

https://www.analyticsvidhya.com/

https://nptel.ac.in/courses/112/103/112103280/

PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO5
CO1	3	3	2	3	2					1		3	3	3	2	2
CO2	3	3	2			2				1		3	3	3	3	3
CO3	3	3								1		3	3	3	3	3
CO4	3	2		2						1		3	3	3	3	3
CO5	3	2	2	1	1	1	2			1		2	3	1	3	1

1- Low Correlation;2-ModerateCorrelation;3-SubstantialCorrelation

Name &SignofProgramCoordinator	**Sign&SealofHoD**