Course code		INDUSTRY 4.0: ARTIFICIAL INTELLIGENCE APPLICATIONS (Reference)	L	T	P	C
Core/Elective/Supportive		Core / Elective	4		0	4
Pre-requisite		Nil	Syllabus Version			

Course Objectives:

The main objectives of this course are to:

1. To introduce Artificial Intelligence in detail from its basics to future applications and tools of Industry 4.0
2. To provide insights on technological advancements and focuses on preparing students and researchers for Industry 5.0
3. To impart the importance of AI technologies in assistive technology
4. To discuss the available applications of AI for promoting early diagnosis of diseases
5. To understand the various AI technologies

Unit:1	Artificial Intelligence Insight	12-- hours

Artificial Intelligence: What and Why (1-1.2) – History of AI (1-1.3) – What is AI – The Basics (5-5.1.1) - AI Environment (1-1.5) - Challenges in AI (1-1.8) – Current work in AI for environment (3-3.1) – Customer Experience (CX) and the use of AI (5-5.2) – Future of AI (5-5.6) – Future challenges in AI (7-7.5)

Unit:2	Influence of AI in Machine Learning	12-- hours

Definition (14-14.1) – What is Machine Learning (14-14.2) - Importance of Machine Learning (14-14.1.2) – Types of Machine Learning (14-14.3) – Approaches of Machine Learning (17-17.2) - Machine Learning Algorithm (14-14.4) – Programming Languages (14-14.5.1) – Frameworks (14-14.5.2) – Databases (14-14.5.3) – Deployment tools (14-14.5.4) – Methodology for Model Building (16-16.2) – Machine learning methods (16-16.6) – Statistical Measures (16-16.7) - Application areas of Machine Learning (14-14.6) – Medical Machine Learning (17-17.4) – Influence of AI and ML in Clinical and Genomic Diagnostics (17-17.5)

Unit:3	Artificial Intelligence in Healthcare sector & Assistive Technology (AT)	12-- hours

AI in diagnosis of Genetic Diseases (8-8.4) – Cancer (8-8.4.1) – Diabetes (8-8.4.2) – AI in Diagnosis of Syndrome (8-8.5) – AI in diagnosis of Psychiatric Disorders (8-8.6) – Depression (8-8.6.1) – Alzheimer's Disease (8-8.6.2) – Autism Spectrum Disorder (8-8.6.3) – Anxiety (8-8.6.4) – Parkinson's Disease (8-8.6.5) – AI in other Diagnosis (8-8.7) – Infectious Disease (8-8.7.1) – Lung and Brain Disease (8-8.7.2) - Case studies on AI in systems Biology (7-7.4) – AI technologies in Systems Biology towards Pharmacogenomics (7-7.4.1) – AI in Systems Biology for Cancer Cure (7-7.4.2) – Applications of AI for COVID-19 Pandemic (7-7.4.3) - Transformative impact of AI on AT (13-13.3) – AI experience and AT for disables people in India (13-13.5) – AI Powered technology for an inclusive world (13-13.6)

Unit:4	Artificial Intelligence in Agriculture (10)	12-- hours

Need of AI in Agriculture (10-10.3) – Emerging Agricultural Technologies (10-10.4) – Soil and water sensors (10-10.4.1) – Weather Tracking (10-10.4.2) – Satellite Imaging Agriculture (10-10.4.3) – Automation Systems (10-10.4.4) – RFID Technology (10-10.4.5) – Potential Agricultural Domain for Modernization (10-10.5) – AI transformation in Agricultural Scenarios (10-10.6)		
Unit:5	**Artificial Intelligence in Radiotherapy (6)**	**12-- hours**
Importance of Artificial Intelligence in Radiotherapy (6-6.2) – AI tools for automated treatment planning (ATP) (6-6.3) – Present ATP techniques (6-6.3.1) – AI applications, Advancements and Research Guidance in ATP (6-6.3.2) – AI challenges in ATP (6-6.3.3) – AI in Intensity modulated Radiotherapy (IMRT) (6-6.4) – AI for IMRT Dose Estimation (6-6.4.1) – AI for IMRT Planning Support (6-6.4.2) – AI for Modeling IMRT outcome and plan deliverability (6-6.4.3) – AI for AUTO-Segmentation of OAR in IMRT (6-6.4.4) – AI in Brachytherapy (6-6.5) – AI in Radiotherapy Quality Assurance (6-6.6) – Challenges associate with AI for Quality Assurance in RT (6-6.6.4) – Future directions to improve AI-based Quality Assurance in RT (6-6.6.5) – AI in Radiation Biology (6-6.7) – AI in Radiation Protection/Safety (6-6.8) – Motivations to develop AI-Based systems for Radiation protection (6-6.8.1)		
	Total Lecture hours	**60-- hours**

Reference Book	
1	Kaliraj, P., & Devi, T. (Eds.). (2021). Artificial Intelligence Theory, Models, and Applications (1st ed.). CRC Press, Taylor & Francis Group, Boca Raton, ebook ISBN 9781032008097 Auerbach Publications. https://doi.org/10.1201/9781003175865

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