

Name of the Department: Pharmaceutical Sciences
Name of the Course: Certificate Course in AI and ML in Pharmaceutical Sciences

Revised Syllabus and eligibility w.e.f session 2026-27

Eligibility: Senior Secondary Examination (10+2) in Science (With Physics, Chemistry, Biology/Mathematics as compulsory subjects) with atleast 50% marks (47.50% in case of SC/Blind/Differently abled etc. candidates of Haryana, Bhiwani or any other examination recognized by MDU, Rohtak as equivalent thereto).

Syllabus:

Course Code	23PHRC01	Course Credits	(L: 2; T: 0; P: 0)
Max. Marks : 50			
Learning Objectives: 1. Key elements of Artificial Intelligence (AI) and Machine learning (ML) in the pharmaceutical sector. 2. Modernization in Pharmaceutical Research and Discovery. 3. Basics of newly developed pharmaceutical products and services with Artificial Intelligence (AI) and Machine learning (ML) technology. 4. Challenges and opportunities of AI/ML Adoption in the pharmaceutical Industries.			
Learning Outcomes: Upon the completion of this course, the student shall be able to learn: • Basics of AI and ML • Values of Artificial Intelligence (AI) and Machine learning (ML) in the pharmaceutical sector. • Modern approaches and requirements pharmaceutical market. • Digitalization aspects in the pharmaceutical sector.			
Unit - I			
Basics of AI and ML: Introduction of AI and ML in Pharmaceutical Sciences, Artificial Intelligence (AI), Machine Learning (ML), Deep Learning (DL), Neural Network (NN), Data Types and Resources, Data Management, History of AI and ML in the Pharmaceutical and Healthcare Sector, Opportunities and Challenges of AI and ML in Pharmaceutical Sciences, Digital Technology Trends in the Pharmaceutical Industry.			
Unit – II			
AI and ML in Research and Development (R&D), Modern Pharmaceutical Sector: AI and ML Derived Drug Discovery, Drug Target Identification, Selection and Prioritisation with compound Screening and design, Random Forest (RF) and Naive Bayesian (NB) in Pharmaceutical Research and Development, Naive Bayesian (NB), Support Vector Machines (SVMs), Virtual Screening (VS), Prediction of Safety, Efficacy and Toxicity (SET), Role of Pharmacist in the Modern Pharmaceutical Sector, AI/ML Based Medical Devices (MDs), Digital Therapeutics (DTx), AI/ML for Medical			

Imaging and Analysis.

Unit – III

AI and ML in Clinical Care and Healthcare Operations: AI and ML for Diagnostics and Prognosis, Electronic Health Records (EHR) with AI/ML Clinical Decision Support (CDS), AI/ML for Disease Surveillance and Outbreak Decision, Resource Allocation and Capacity Planning with AI and ML in Healthcare Sector, AI and ML in Clinical Evaluation of Drugs, Devices and Software, AI & ML in Clinical Development: Real-World Patient Data Analysis, Decentralised Clinical Trials (DCTs). AI and ML for Predictive Maintenance and Remote Monitoring, AI/ML for Patient Monitoring and Signal Analysis, AI/ML Transformation in Pharmaceuticals with Robotics, AI/ML-Driven Wearable Technology and Biosensors, AI/ML in Pharmaceutical Supply Chain Management.

Unit – IV

Future of AI and ML in Pharmaceutical Sciences and Healthcare: Pharmaceutical Industry, Digital Health Initiatives (DHIs) and Pharmaceutical Regulatory Environment, World Health Organization (WHO): Ethics and Governance of Artificial Intelligence for Health, Digital Health vs. e-Health, e-Prescription, Telemedicine, Digital Health Interventions –and its Case Studies, U-report/UNICEF Uganda Strategy - Ebola Outbreak, Ayushman Bharat Digital Mission (ABDM), Robotics Middleware for Healthcare (RoMi-H) in Singapore Public Health Institutions, Transforming Pneumonia Care: CAPE AI Predictive Engine, CoWIN - Revolutionizing Vaccination Through Digital Innovation in India, Digital Data Safety, Data Privacy Impact on the Pharmaceutical Sector.

Suggested Readings:

1. Ashenden, S. K. (2021). ERA of Artificial Intelligence, Machine Learning, and data science in the pharmaceutical industry. Academic Press.
2. Philip, A., Shahiwala, A., Rashid, M., & Faiyazuddin, M. (2023). A Handbook of Artificial Intelligence in Drug Delivery. Academic Press, an imprint of Elsevier.
3. Artificial Intelligence in Pharma: From Drug Discovery to Patient Care by Yseop
4. Artificial Intelligence: Emerging Applications in Biotechnology and Pharma David Sahner, David C Spellmeyer. Biotechnology Entrepreneurship, 399-417, 2020
5. Daniel D. Lee AI Pharma: Artificial Intelligence in Drug Discovery and Development (Code and Compassion
6. Deep Medicine: How Artificial Intelligence Can Make Healthcare Human Again by Eric Topol
7. Dureja, H. (2025). AI and ML in Pharmaceutical Sciences (1st ed.). PharmaMed Press / BSP Books. https://bspbooks.net/book_detail.php?bid=1878