



**Vidya Pratishthan's Kamalnayan Bajaj
Institute of Engineering and Technology,
Baramati**

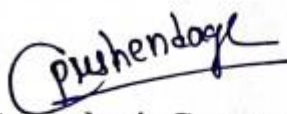
Department of Artificial Intelligence and Data Science

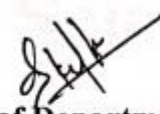
S.Y. B. Tech Syllabus 2024-25 (As per NEP 2020)


Syllabus: HONORS Artificial Intelligence and Data Science
w. e. f. AY: 2024-2025
SEMESTER-III

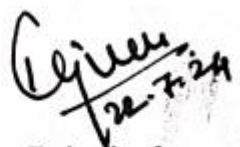
Honors in Computational Intelligence

SEM	Course Code	Courses Name	Teaching Scheme			Examination Scheme and Marks							Credits			
			TH	PR	TUT	Activity	ISE	ESE	TW	PR	OR	Total	TH	PR	TUT	Total
III	AI23281	Introduction to Computational Intelligence	2	2		10	20	50	20	20		120	2	1		3


 Dept. Academic Coordinator
 Mr. Pradip Shendage


 Head of Department
 Dr. C. S. Kulkarni


 Dean Academic
 Dr. S. M. Bhosle


 Principal
 Dr. R.S. Bichkar

Head
 Department of Artificial Intelligence
 & Data Science,
 VPKBIET, Baramati

Bucket of HONORS DEGREE

<p>HONORS DEGREE</p>
<p>(only for students having CGPA ≥ 7.5)</p>
<p>Honor: Computational Intelligence</p>



Vidya Pratishthan's
Kamalnayan Bajaj Institute of Engineering and Technology, Baramati
(Autonomous Institute)

AI23281- Introduction to Computational Intelligence

Teaching Scheme: Theory: 2 Hours/Week Practical: 2 Hour/Week	Credits 03	Examination Scheme: Activity: 10 Marks ISE: 20 Marks ESE: 50 Marks Term Work: 20 Marks Practical: 20 Marks
Prerequisites: Python Programming		
Course Objectives: <ul style="list-style-type: none">To provide a strong foundation on fundamental concepts in Computational Intelligence.To apply these techniques in applications which involve perception, reasoning and learning.To apply Computational Intelligence techniques for pattern recognition.To apply Computational Intelligence techniques primarily for machine learning activities like classification, clustering etc.		
Course Outcomes (COs): The students will be able to learn: CO1: Apply concepts of computational intelligence to real-world problems. CO2: Analyze and implement machine learning models on various data sets. CO3: Interpret the results of probabilistic models and inference techniques in practical applications. CO4: Evaluate the effectiveness of various computational intelligence techniques in case studies, including IoT applications and decision-making processes.		
Course Contents		
Unit I Introduction to Computational Intelligence (06 Hours) History, Biological neurons & Artificial models, intelligence machine, man-machine interaction, data mining for IoT, Relation between AI, ML, DL, data science and CI. Types of data analytic – predictive, prescriptive, descriptive, and diagnostic, Data analytic rule, web scrapping		
Unit II Classification (06 Hours) Forms of Learning, Supervised Learning , Learning Decision Trees , Regression and Classification with Linear Models, Artificial Neural Networks, Non parametric Models, Support Vector Machines, Statistical Learning, Learning with Complete Data, Learning with Hidden Variables- The EM Algorithm, Reinforcement Learning.		
Unit III Probabilistic Models (06Hours) Probability basics, Bayes Rule and its Applications, Bayesian Networks, Exact and Approximate Inference in Bayesian Networks.		
Unit IV Deep Learning and case studies (06Hours) Convolution Neural Network, Recurrent Neural Network, Case Study-Hand Written Digit Recognition, VGG16 pre-trained model for image classification, Restricted Boltzmann Machines (RBM)		
Text Books: <ol style="list-style-type: none">Andreis P. Engelbrecht, “Computational Intelligence an introduction”, 2nd edition, Wiley publicationNazmul Siddique, Hojjat Adeli, “Computational Intelligence, Synergies of Fuzzy logic, Neural Networks and Evolutionary computing”, Wiley publication		

3. Stuart Russell, Peter Norvig, —Artificial Intelligence: A Modern Approach, Third Edition, Pearson Education / Prentice Hall of India, 2010.
4. Elaine Rich and Kevin Knight, —Artificial Intelligence, Third Edition, Tata McGrawHill, 2010.

Reference Books:

1. James M. Keller, Derong Liu, David B. Fogel, “Fundamentals of Computational Intelligence: Neural Networks, Fuzzy Systems, and Evolutionary Computation”, John Wiley & Sons, 2016.
2. Mitchell Melanie, “An Introduction to Genetic Algorithms”, The MIT Press Cambridge, Massachusetts, MIT Press paperback edition, 1998.
3. Dan W.Patterson, —Introduction to Artificial Intelligence and Expert Systems, PHI, 2006.
4. Nils J. Nilsson, —Artificial Intelligence: A new Synthesis, Harcourt Asia Pvt. Ltd., 2000.

E-Resources:

1. <https://nptel.ac.in/courses/106102220>
2. https://onlinecourses.nptel.ac.in/noc23_cs87/preview
3. https://onlinecourses.nptel.ac.in/noc22_ee21/preview

List of Assignments

1. Comparison of regression models on predicting the medical expenses, In this assignment you will be implementing a learning model of regression which will predict the expenses through insurance data, You will be writing a code in jupyter notebook. Grading of this assignment will be based on following points
 1. Data cleaning
 2. Feature scaling
 3. Gradient Descent
 Link for dataset <https://raw.githubusercontent.com/MintForever/CS4774/master/insurance.csv>
2. Non linear classification with Support Vector Machine, In this assignment will be responsible to implement your own SVM not the provided by scikitlean library.
3. Clustering with K-Mean Algorithm link to download the dataset <https://www.kaggle.com/camnugent/california-housing-prices>
4. Build a neural network of XOR dataset, In this assignment you will be able to implement your own neural network for XOR dataset.
The link for this dataset <https://www.kaggle.com/datasets/bipinmaharjan/xor-dataset>
5. Build a CNN model to recognize the classes of the vehicle, In this assignment you will be able write a program which will identify the class of the vehicle based upon learning experience. The dataset used can be downloaded from <https://www.kaggle.com/datasets/dataclusterlabs/indian-vehicle-dataset>