SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
(Engineering College), VIDISHA M.P.
(An Autonomous Institute Affiliated to RGPV Bhopal)

M. TECH. COMPUTER SCIENCE & ENGINEERING

Semester II

Subject Category	DC	Subject Code:	MCSE-201	Subject Name:	Machine Learning

Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		L	T	P	
60	20	20			100	3	1		4

Prerequisites:

Course Objective:

Course Outcomes:

UNITs	Descriptions	Hrs.	CO's
I	**Introduction to Machine Learning:** Overview of Human Learning and Machine Learning, Types of Machine Learning, Applications of Machine Learning , Tools and Technology for Machine Learning . **Preparing to Model:** Machine Learning activities, Types of data in Machine Learning, Structures of data, Data quality and remediation, Data Pre-Processing: Dimensionality reduction, Feature subset selection. Modelling and Evaluation: Selecting a Model: Predictive/Descriptive, Training a Model for supervised learning, model representation and interpretability, Evaluating performance of a model, Improving performance of a model.		
II	**Basics of Feature Engineering:** Feature and Feature Engineering, Feature transformation: Construction and extraction, Feature subset selection : Issues in high-dimensional data, key drivers, measure and overall process **Bayesian Concept Learning:** Impotence of Bayesian methods, Bayesian theorem, Bayes' theorem and concept learning, Bayesian Belief Network		
III	**Overview of Probability:** Statistical tools in Machine Learning, Concepts of probability, Random variables, Discrete distributions, Continuous distributions, Multiple random variables, Central limit theorem, Sampling distributions, Hypothesis testing, Monte Carlo Approximation		
IV	**Supervised Learning:** Classification and Regression: Supervised Learning, Classification Model, Learning steps, Classification algorithms, Regression, Regression algorithms, **Unsupervised Learning:** Supervised vs. Unsupervised Learning, Applications, Clustering, Association rules		
V	**Neural Network:** Introduction to neural network, Biological and Artificial Neurons, Types of Activation functions, Implementation of ANN, Architecture, Leaning process, Backpropogation, Deep Learning		
Guest Lectures (if any)			
Total Hours		40	

Reference Books-

1. Machine Learning, Saikat Dull, S. Chjandramouli, Das, Pearson
2. Machine Learning with Python for Everyone, Mark Fenner, Pearson
3. Machine Learning, Anuradha Srinivasaraghavan, Vincy Joseph, Wiley
4. Machine Learning with Python, U Dinesh Kumar Manaranjan Pradhan, Wiley
5. Python Machine Learning, Sebastian Raschka, Vahid Mirjalili, Packt Publishing

Modes of Evaluation and Rubric

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M. TECH. COMPUTER SCIENCE & ENGINEERING

Semester II

Subject Category	DC	Subject Code:	MCSE-202	Subject Name:	Data Mining and Ware Housing

Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		L	T	P	
60	20	20			100	3	1		4

Prerequisites:

Course Objective:

Course Outcomes:

The students would be able to

UNITs	Descriptions	Hrs.	CO's
I	Introduction : Data Mining: Definitions, KDD v/s Data Mining, DBMS v/s Data Mining , DM techniques, Mining problems, Issues and Challenges in DM, DM Application areas.		
II	Association Rules & Clustering Techniques: Introduction, Various association algorithms like A Priori, Partition, Pincer search etc., Generalized association rules. Clustering paradigms; Partitioning algorithms like K-Medioid, CLARA, CLARANS; Hierarchical clustering, DBSCAN, BIRCH, CURE; categorical clustering algorithms, STIRR, ROCK, CACTUS.		
III	Other DM techniques & Web Mining: Application of Neural Network, AI, Fuzzy logic and Genetic algorithm, Decision tree in DM. Web Mining, Web content mining, Web structure Mining, Web Usage Mining.		
IV	Temporal and spatial DM: Temporal association rules, Sequence Mining, GSP, SPADE, SPIRIT, and WUM algorithms, Episode Discovery, Event prediction, Time series analysis. Spatial Mining, Spatial Mining tasks, Spatial clustering, Spatial Trends.		
V	Data Mining of Image and Video : A case study. Image and Video representation techniques, feature extraction, motion analysis, content based image and video retrieval, clustering and association paradigm, knowledge discovery.		
Guest Lectures (if any)			
Total Hours		40	

Reference Books-

1. Data Mining Techniques ; Arun K.Pujari ; University Press. 2. Data Mining; Adriaans & Zantinge; Pearson education. 3. Mastering Data Mining; Berry Linoff; Wiley. 4. Data Mining; Dunham; Pearson education. 5. Text Mining Applications, Konchandy, Cengage

Modes of Evaluation and Rubric

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M. TECH. COMPUTER SCIENCE & ENGINEERING

Semester II

Subject Category	DC	Subject Code:	MCSE-203	Subject Name:	Cloud Computing

Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		L	T	P	
60	**20**	**20**			**100**	**3**	**1**		**4**

Prerequisites:

Course Objective:

Course Outcomes:

UNITs	Descriptions	Hrs.	CO's
I	Cloud Computing Fundamentals- Definition, Evolution, Essential characteristics, Cloud Deployment Models, Cloud Service Models, Benefits, Cloud Architecture, Virtualization in Cloud, Cloud Data Centre, SLA, Cloud Applications.		
II	Cloud Security Challenges, Cloud Information Security Objectives, Cloud Security Services, Secure Cloud Software Requirements, Cloud Security Policy Implementation, Infrastructure Security, Data Security and Storage, Privacy in Cloud.		
III	Threats and Vulnerabilities to Infrastructure, Data, and Access Control; Risk Management and Risk Assessment in Cloud, Cloud Service Provider Risks, Virtualization Security Management in the Cloud, Trusted Cloud Computing, Identity Management and Access Control,		
IV	Cloud Computing and Business Continuity Planning/Disaster Recovery, Cloud Audit and Compliance: Internal Policy Compliance, Regulatory/External Compliance, Cloud Security Alliance.		
V	Standards for Security: SAML OAuth, OpenID, SSL/TLS, Encrypting Data and Key Management, Creating a Cloud Security Strategy, The Future of Security in Cloud Computing.		
Guest Lectures (if any)			
Total Hours		40	

Reference Books-

1. Ronald L. Krutz, Russell Dean Vines, "Cloud Security: A Comprehensive Guide to Secure Cloud Computing", Wiley Publishing, 2010.
2. Tim Mather, SubraKumaraswamy, and ShahedLatif, " Cloud Security and Privacy", Published by O'Reilly Media, Inc., 2009.

Modes of Evaluation and Rubric

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SAMRAT ASHOK TECHNOLOGICAL INSTITUTE
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M.Tech in Computer Science & Engineering

Semester II

Subject Category	DE	Subject Code:	MCSE-204	Subject Name:	Computer Vision

Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Quiz/Assignment		L	T	P	
60	20	20	-	-	100	3	1		4

Prerequisites:

Fundamental Concepts of Image Formation

Course Objective:

Course Outcomes:

UNITs	Descriptions	Hrs.	CO's
I	Introduction: Feature extraction and Pattern Representation, Concept of Supervised and Unsupervised Classification, Introduction to Application Areas. Statistical Pattern Recognition: Bayes Decision Theory, Minimum Error and Minimum Risk Classifiers, Discriminant Function and Decision Boundary, Normal Density, Discriminant Function for Discrete, Features, Parameter Estimation, and Maximum Likelihood Estimation.	12	
II	Dimensionality Problem: Dimension and accuracy, Computational Complexity, Dimensionality Reduction, Fisher Linear Discriminant, Multiple Discriminant Analysis. Nonparametric Pattern Classification: Density Estimation, Nearest Neighbour Rule, Fuzzy Classification.	10	
III	Linear Discriminant Functions: Separability, Two Category and Multi Category Classification, Linear Discriminators, Perceptron Criterion, Relaxation Procedure, Minimum Square Error Criterion, Widrow-Hoff Procedure, Ho-Kashyap Procedure, Kesler's Construction.	08	
IV	Introduction to Computer Vision, Image Formation and Representation, Transformation: Orthogonal, Euclidean, Affine, Projective, etc., Camera Models, Camera Calibration, Epipolar Geometry, Stereo & Multi-view Reconstruction.	06	
V	Basic image processing operations, Convolution and Filtering. Feature Extraction: Edges - Canny, LOG, DOG, Line detectors - Hough Transform, Corners - Harris and Hessian Affine, Orientation Histogram, SIFT, SURF, HOG, GLOH, Scale-Space Analysis- Image Pyramids and Gaussian derivative filters.	04	
Guest Lectures (if any)			
Total Hours		40	

Text Books-

1. Richard O. Duda, Peter E. Hart, David G. Strok, Pattern Classification, Second Edition, WileyInterscience, 2000.
2. Christopher M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006.
3. Richard Szeliski, Computer Vision: Algorithms and Applications, Springer-Verlag London Ltd, 2011. 2. D. A. Forsyth, J. Ponce, Computer Vision: A Modern Approach, Pearson Education, 2003

Reference Books-

1. S. Theodoridis, K. Koutroumbas, Pattern Recognition, Fourth edition, Academic Press, 2008. 2. 2. Tom M. Mitchell, Machine Learning, McGraw Hill Education, 1997.
2. V.S. Nalwa, A Guided Tour of Computer Vision, Addison-Wesley, 1993. 7. R.C.
3. Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, Second Edition, Cambridge University Press, March 2004. Gonzalez and R.E. Woods, Digital Image Processing, Third Edition, Pearson, 2012

Modes of Evaluation and Rubric

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M. TECH. COMPUTER SCIENCE & ENGINEERING

Semester II

Subject Category	DE	Subject Code:	MCSE-205	Subject Name:	Deep Learning

Maximum Marks Allotted						Contact Hours			Total Credits
Theory			Practical		Total Marks				
End Sem	Mid-Sem	Quiz	End Sem	Lab-Work		L	T	P	
60	20	20			100	3	1		4

Prerequisites:

Machine Learning and ML tools

Course Objective:

Course Outcomes:

UNITs	Descriptions	Hrs.	CO's
I	History of Deep Learning, Deep Learning Success Stories, review of Neuron model, activation functions, Perceptron Learning, Multilayer Perceptrons (MLPs), Feedforward Neural Networks,Backpropagation, weight initialization methods,Batch Normalization, Representation Learning,GPU implementation, Decomposition – PCA and SVD.		
II	Deep Feed forward Neural Networks, Gradient Descent (GD), Momentum Based GD, Nesterov Accelerated GD, Stochastic GD, AdaGrad,Adam,RMSProp,Autoencoder, Regularization in auto-encoders, Denoising auto-encoders, Sparse auto encoders, Contractive auto-encoders,Variational auto-encoder, Auto-encoders relationship with PCA, Dataset augmentation.		
III	Introduction to Convolutional neural Networks (CNN) and its architectures, CCN terminologies: ReLu activation function, Stride, padding, pooling, convolutions operations, Convolutional kernels, types of layers: Convolutional,pooling,fully connected,Visualizing CNN, CNN examples: LeNet, AlexNet, ZF-Net, VGGNet, GoogLeNet, ResNet, RCNNetc.Deep Dream, Deep Art. Regularization:Dropout, drop Connect, unit pruning, stochastic pooling, artificial data,injectingnoise in input,early stopping,Limit Number of parameters, Weight decay etc.		
IV	Introduction to Deep Recurrent Neural Networks and its architectures, Backpropagation Through Time (BPTT), Vanishing and Exploding Gradients, Truncated BPTT, Gated Recurrent Units (GRUs), Long Short Term Memory (LSTM), Solving the vanishing gradient problem with LSTMs, Encoding and decoding in RNN network, Attention Mechanism, Attention over images, Hierarchical Attention, Directed Graphical Models.		
V	Introduction to Deep Generative Models,Restricted Boltzmann Machines (RBMs), Gibbs Sampling for training RBMs, Deep belief networks, Markov Networks, Markov Chains,Autoregressive Models: NADE, MADE, PixelRNN, Generative Adversarial Networks (GANs), Applications of Deep Learning inObject detection, speech/ image recognition, video analysis, NLP, medical science etc.		
Guest Lectures (if any)			
Total Hours		40	

Reference Books-

1. IanGoodfellow, YoshuaBengio and Aaron Courville; Deep Learning, MIT Press, 2017.
2. Chris Bishop; Pattern Recognition and Machine Learning,Springer publication, 2006
3. Aurelien Geon, "Hands-On Machine Learning with Scikit-Learn and Tensorflow: Concepts, Tools, and Techniques to Build Intelligent Systems", First Edition, O'Reilly publication, 2017.
4. Francois Chollet, "Deep Learning with Python", First Edition, Manning Publications, 2018.
5. Andreas Muller, "Introduction to Machine Learning with Python: A Guide for Data Scientists", First edition,O'Reilly Edition, 2016.

Modes of Evaluation and Rubric

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