CYBER SECURITY AND DIGITAL FORENSIC (CSE 413)

Cyber Security:

Introduction to Security, Foundations of Cyber Security, Managing Cyber Security, Risk Assessment, Identification and Authentication, Access Control, Security models, Cyber Security, Key Management, Security Evaluation, Application: Operating Systems Security (UNIX and Windows), Database Security, Software Security, Communication Security, Network Security, Web Security, and Mobile Devices Security.

Digital Forensic:

Types of computer crime, Computer misuse, Data protection, Criminal damage, Software piracy, Forgery, Pornography, Unsuitable material, Cybercrime methodologies, Computer forensics investigative theory, Computer forensics processing techniques, File system forensics, Forensics network investigations, Linux for forensics analysis, Linux forensics tools, Forensics investigation on mobile devices.

Credits: 3.00, **Prerequisite:** CSE 319 (Computer Networks)

MACHINE LEARNING (CSE 465)

Introduction to machine learning, unsupervised learning algorithms; Attribute based and Relational supervised learning algorithms; neural network based learning algorithms; Genetic algorithm and genetic programming; Reinforcement learning algorithms; Computational learning theory.

Credits: 3.00, **Prerequisite:** CSE 351 (Artificial Intelligence and Expert System)

NEURAL NETWORK AND FUZZY SYSTEMS (CSE 477)

Overview of artificial neural networks, applications of neural network; Neuro-Models and neural network architecture, activation function, classification, Feed forward and Recurrent topologies; Multilayer Perceptron's (MLP), Backpropagation Networks: Architecture of a Backpropagation Network, Backpropagation learning, Parameters in BPN, Adaptive Backpropagation, Genetic algorithm based backpropagation; Radial Basis Function networks: Topology, learning algorithm; Overview of set theory, fuzzy systems, Crisp sets to fuzzy sets; Operations on fuzzy sets, fuzzy arithmetic, fuzzy relations, applications of fuzzy system; Hybrid Systems: Integration of neural networks, fuzzy logic, and genetic algorithm.

Credits: 3.00, **Prerequisite:** CSE 351 (Artificial Intelligence and Expert System)

PATTERN RECOGNITION (CSE 467)

Introduction to pattern recognition, sensing, preprocessing, segmentation and grouping, feature extraction, classification, and post processing, **Bayesian decision**

theory: Bayesian Classifiers, Discriminant functions, Decision surfaces, Normal density and discriminant functions, discrete features, **Parameter estimation**

methods: Maximum-Likelihood estimation, Gaussian mixture models, Expectation-maximization method, Bayesian estimation, **Hidden Markov models for sequential**

pattern classification: Discrete hidden Markov models, Continuous density hidden Markov models, Viterbi algorithm, Baum-Welch algorithm, **Dimension reduction methods:** Principal component, Fisher discriminant analysis, **Non-parametric**

techniques for density estimation: Parzen-window method, K-Nearest Neighbor method, **Linear/non-linear discriminant function based classifiers:** Multi-layer Perceptron's, Support vector machines, **Non-metric methods for pattern**

classification: Non-numeric data or nominal data, Decision trees, syntactic Pattern recognition, **Unsupervised learning and clustering:** Criterion functions for clustering, Algorithms for clustering: K-means, Hierarchical and other methods, Cluster validation.

Credits: 3.00, **Prerequisite**: CSE 351 (Artificial Intelligence and Expert System)

DATA MINING (CSE 475)

Introduction to data mining; Data mining Vs Query tools; Knowledge Discovery Process; Data Preprocessing; Data Warehousing; Data Cube and OLAP technology; Mining Frequent Patterns, Associations, and Correlations: Frequent Item set Mining Methods; Classification: Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Bayesian Belief Networks, Support Vector Machines, Model Evaluation and Selection, Estimating Classifier Accuracy, Combining Multiple Models; Cluster Analysis: Partitioning Methods, Hierarchical Methods; Outlier Detection: Outlier Detection Methods; Data Mining Tools and Applications, Mining Real Data.

Credits: 3.00, **Prerequisite:** CSE 351 (Artificial Intelligence and Expert System)