SRI VENKATESWARA UNIVERSITY COLLEGE OF ENGINEERING

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Sri Venkateswara University

M.Tech

R18 SCHEME AND SYBLLUS

About The Department

The Department of Computer Science and Engineering was established in 1986 offering B.Tech Program with initial intake of 20. Now the B.Tech (CSE) intake is increased to 40. The new programme 6 Year B.Tech & M.Tech Dual Degree course was introduced in 2015 . The Department offers the Self –Finance course B.Tech(CSE) and B.Tech (Artificial Intelligence) Programme was introduced in 2021.

The post graduate program i.e. M.Tech (CSE) was started in the year 2005 with initial intake of 18 and now it is increased to 25. The MTech students, qualified in GATE receive Rs 8000 fellowship per month from AICTE. The Ph.D admissions in CSE started in the year 2002 and there are nearly 34 scholars are working for their doctoral degree. The thrust areas of research of the department are Natural Language Processing, Distributed Systems, Grid Computing, Artificial Intelligence, Software Architecture, Data Mining, Wireless Networks and Speech Processing.

Department vision and mission

Vision

To become a centre of excellence in Computer Science and Engineering by imparting high quality teaching, training and research.

Mission

- The Department of Computer Science and Engineering is established to provide undergraduate and graduate education in the field of Computer Science and Engineering
- To Create Knowledge of advanced concepts, innovative technologies and develop research aptitude for contributing to the needs of industry and society.
- Develop professional and soft skills for improved knowledge and employability of students.
- Encourage students to engage in life-long learning to create awareness of the contemporary developments in Computer Science and Engineering to become outstanding professional.
- Develop attitude for ethical and social responsibilities in professional practice at regional, National and International levels.

Program Outcomes:

1. Gain advanced knowledge in theoretical computer science, algorithms, computer software, hardware and networking.
2. Analyze computer based software and hardware problems and identifying solutions.
3. Develop solutions to problems related to computer hardware and software systems to meet the needs of society and industry.
4. Develop skills for research, and innovation in the area of computer hardware and software
5. Ability to use modern software tools and technologies for designing simple to complex applications in real world.
6. Ability to work in multidisciplinary groups, for decision making and self-management
7. Apply knowledge of management principles to effectively contribute in project teams within social and economical constraints.
8. Develop effective professional and business communication.
9. Attitude for independent and continuous learning for improved knowledge and professional competence.
10. Follow ethical practices in professional career and societal contributions
11. Able to continuously self-reflect own actions for improvement.

PEOS

1. Graduates will undertake advanced research studies in the areas of Computer Networks, Database systems, Data Mining, software engineering and Multidisciplinary topics
2. Graduates will be proficient and successful in professional careers in academia, software development, and research organizations
3. Graduates will demonstrate effective communication and leadership skills in professional practice with ethical code, gain knowledge of contemporary and global issues and strive for continuous learning

Scheme of Instruction

CSCO 11 I/II M.Tech(CSE), I Semester(CBCS)

Course No.	Course Title	Instruction hours per week				No. of Credits		
		L	T	P	Total	L+T	P	Total
CSCOT 01C	Data Structures and Algorithms	2	1	-	3	3	-	3
CSCOT 02C	Advanced topics in Database Management Systems	2	1	-	3	3	-	3
CSCOT 03C	Cryptography & Network Security	3	1	-	4	4	-	4
CSCOT 07E	Machine Learning	3	1		4	4		4
CSCOT 08E	Research Methodology	3	1		4	4		4
CSCOT 09E	Internet of Things	3	1		4	4		4
CSCOTP 01	**Core –I Laboratory**	-	-	3	3	-	2	2
CSCOP 02	Elective-I Laboratory	-	-	3	3	-	2	2
CSCOS 01	Seminar-I			2	2	-	1	1
CSCOV o1	Comprehensive Viva-Voice-I			2	2	-	1	1
	TOTAL	16	6	10	32	22	6	28

C: Core L: Lecture P: Practical
E;Elective **T:**Tutorials S:Seminar
V: Viva

NOTE: For each Course:

Sectional Marks: Test 1 Test2
Max.40={0.8*max(T1,T2) + 0.2*min(T1,T2)} 40
End Semester Examination Marks: 60
Total Marks: 100

Core Laboratory -I
Internal 40
External(internal Two Examiners) 60
Total 100

Elective Laboratory-I
Internal 40
External (internal Two Examiners) 60
Total 100

Seminar-I (Internal with one Examiner) 100
Comprehensive Viva-voice-I (Internal with one Examiner) 100

Course No.	Course Title	Instruction hours per week				No. of Credits		
		L	T	P	Total	L+T	P	Total
CSCOT 04C	Advances in Artificial Intelligence	2	1	-	3	3	-	3
CSCOT 05C	Topics in Operating Systems	2	1	-	3	3	-	3
CSCOT 06C	Distributed and Cloud Computing	3	1	-	4	4	-	4
CSCOT 10E	Artificial Neural Networks (Open Elective, other Branches)							
CSCOT E11	Big Data Analytics	3	1		4	4		4
CSCOT 12E	Cyber Security	3	1		4	4		4
CSCOP 03	Core-II Laboratory	-	-	3	3	-	2	2
CSCOP 04	Elective –II Laboratory	-	-	3	3	-	2	2
CSCOS 02	Seminar-II			2	2	-	1	1
CSCOV 02	Comprehensive Viva-Voice-II			2	2	-	1	1
	TOTAL	16	6	10	32	22	6	28

C: Core L: Lecture P: Practical
EElective **T:**Tutorials S:Seminar
V: Viva

NOTE: For each Course:

Sectional Marks: Test 1 Test2

Max.40={0.8*max(T1,T2) + 0.2*min(T1,T2)} 40

End Semester Examination Marks: 60

Total Marks: 100

Core Laboratory -I

Internal 40

External(internal Two Examiners) 60

Total 100

Elective Laboratory-I

Internal 40

External (internal Two Examiners) 60

Total 100

Seminar-I (Internal with one Examiner) 100

Comprehensive Viva-voice-I (Internal with one Examiner) 100

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<tr><th rowspan="2">Course No.</th><th rowspan="2">Course Title</th><th colspan="4">Instruction hours per week</th><th colspan="3">No. of Credits</th></tr>
<tr><th>L</th><th>T</th><th>P</th><th>Total</th><th>L+T</th><th>P</th><th>Total</th></tr>
<tr><td>MCSE22P</td><td>Dissertation</td><td></td><td></td><td>24</td><td>24</td><td></td><td>24</td><td>24</td></tr>
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NOTE: Project Work :

Internal	40
Pre submission seminar	20
End Semester Examination (External)	40
Total Marks:	100

CSCOT 01C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

M Tech (CSE) I Semester (CBCS)

DATA STRUCTURES AND ALGORITHMS

Number of credits : 3 Instruction Hours / Week: 3

Course Objectives:

1. Develop design and analyze linear and nonlinear data structures.
2. Develop algorithms for manipulating linked lists, stacks, queues, trees and graphs.
3. Develop recursive algorithms as they apply to trees and graphs.
4. To get acquaintance with frequently used data structures in Software Engineering and Programming practices.
5. To Strengthen the ability to identify and apply the suitable data structure and algorithms for the given real world problem
6. To develop a base for advanced computer science study.

Syllabus

UNIT I

Basic Concepts: Variables, Data Types, Data Structures, Abstract Data Types (ADTs), Concept of an Algorithm, Analysis of Algorithms, Running Time Analysis, Comparing Algorithms, Rate of Growth, Types of Analysis, Asymptotic Notation - Big-O, Omega-Ω, Theta-θ; Principle of Divide and Conquer, Method of Guessing and Confirming, Amortized Analysis.

Recursion and Backtracking: Concept of Recursion, Recursion versus Iteration, Concept of Backtracking.

UNIT II

Linked Lists: Linked Lists ADT, Comparison of Linked Lists with Arrays and Dynamic Arrays, Different types of Linked Lists, Unrolled Linked Lists, Skip Lists.

Stacks: Concept of a Stack, Stack ADT, Applications, Implementation, Comparison of Implementations.

Queues: Concept of a Queue, Queue ADT, Exceptions, Applications, Implementation.

UNIT III

Trees: Concept of a tree, Types of trees, Notation, Binary Trees, Properties of Binary Trees, Binary Tree Traversals, Generic Trees (N-ary Trees), Threaded Binary Tree Traversals (Stack or Queue-less Traversals), Expression Trees, Binary Search Trees, Balancing Binary Search Trees, AVL Trees, Other Variations on Trees.

Priority Queues and Heaps: Priority Queue – ADT, Applications, Implementations; Heaps, Binary Heaps, Heapsort.

UNIT IV

Disjoint Sets: Equivalence Relations and Equivalence Classes, Disjoint Sets ADT, Applications, Implementing Disjoint Sets ADT, Fast UNION Implementation (Slow FIND), Fast UNION Implementations (Quick FIND).

Graph Algorithms: Concept of graph, Notation, Graph – Applications, Representation, Traversals; Topological Sort, Shortest Path Algorithms, Minimal Spanning Tree.

UNIT V
Sorting: Classification of Sorting Algorithms, Sorts – Bubble, Selection, Insertion, Shell, Merge, Heap, Quick, Tree; Comparison of Sorting Algorithms, Linear Sorting Algorithms, Counting Sort, Bucket Sort, Radix Sort, Topological Sort, External Sorting.
Searching: Types of Searching, Comparing Basic Searching Algorithms, Symbol Tables and Hashing, String Searching Algorithms.
Hashing: Concept of Hashing, HashTable ADT, Collisions, Collision Resolution Techniques, Separate Chaining, Open Addressing, Comparison of Collision Resolution Techniques, Order of complexity of Hashing.

TEXT BOOKS
1. Horowitz E, Sahni S, Mehta D, *Fundamentals of Data Structures in C++*, 2nd edition, Orient Blackswan, 2012.
2. Horowitz E, Sahni S, Rajasekaran S, *Fundamentals of Computer Algorithms*, 2nd edition, Universities Press, 2008.
3. Karumanchi N, *Data Structure and Algorithmic Thinking with Python*, Careermonk Publications, 2015.

REFERENCE BOOKS
1. Tamassia R, Goldwasser M H, Goodrich M T, *Data Structures and Algorithms in Python*, Wiley, 2016.
2. Julian D, *Python Data Structures and Algorithm*, Packt, 2017.
3. Necaise R D, *Data Structures and Algorithms Using Python*, Wiley, 2016.
4. Lee K D, Hubbard S, *Data Structures and Algorithms with Python*, Springer, 2015.
5. Miller B W, Ranum D L, *Problem Solving with Algorithms and Data Structures Using Python,* 2nd edition, Franklin, Beedle & Associates, 2011.

Course Outcomes:

1. Acquire knowledge of various Methods and Notations for comparing the performance of various Data Structures.
2. Acquire knowledge of developmentof linear data structures like stacks, Queues and their operations, Implementation using Arrays and Linked Lists.
3. Acquire knowledge of propertiesof Binary Search Trees and balanced binary search trees.
4. Acquire knowledge of Hashing, String Searching Algorithms and their implementation

CSCOT 02C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

M Tech (CSE) I Semester (CBCS)

ADVANCED TOPICS IN DATABASE MANAGEMENT SYSTEMS

Number of credits: 3 Instruction Hours / Week: 3

Course Objectives:

1. Develop skills to design and analyze of logical and Physical databases
2. Develop Parallel and Distributed Databases.
3. Develop Data Warehousing and Decision Support.
4. Develop Information Retrieval and XML Data.

Syllabus

UNIT I

Overview of Database Systems: Concept of database, The relational model, Advantages of DBMS, Queries, Transaction management.
Introduction to Database Design: Features of ER model, Normal forms, SQL.
Database Application Development: Accessing database from applications, JDBC, HTTP, XML, The three-tier application architecture.

UNIT II

Physical Database Design and Tuning: Introduction to Physical Database Design, Guidelines for Index Selection, Clustering and Indexing, Indexes that Enable Index-Only Plans, Tools to Assist in Index Selection, Overview of Database Tuning, Choices in Tuning the Conceptual Schema, Choices in Tuning Queries and Views, Impact of Concurrency, DBMS Benchmarking.
Security and Authorization: Introduction to Database Security, Access Control, Discretionary Access Control, Mandatory Access Control, Security for Internet Applications, Security in Statistical Databases.

UNIT III

Parallel and Distributed Databases: Introduction, Architectures for Parallel Databases, Parallel Query Evaluation, Parallelizing Individual Operations, Parallel Query Optimization, Introduction to Distributed Databases, Distributed DBMS Architectures, Storing Data in a Distributed DBMS, Distributed Catalog Management, Distributed Query Processing, Updating Distributed Data, Distributed Transactions, Distributed Concurrency Control, Distributed Recovery.
Object Database Systems: Introduction, Structured Data Types, Operations on Structured Data, Encapsulation and ADTs, Inheritance, Objects, OIDs, and Reference Types, Database Design for an ORDBMS, ORDBMS Implementation Challenges, OODBMS, Comparing RDBMS, OODBMS, and ORDBMS.

UNIT IV

Data Warehousing and Decision Support: Introduction to Decision Support, OLAP-Multidimensional Data Model, Multidimensional Aggregation Queries, Window Queries in SQL-1999, Finding Answers Quickly, Implementation Techniques for OLAP, Data Warehousing, Views and Decision Support, View Materialization, Maintaining Materialized Views.
Data Mining: Introduction, Counting Co-occurrences, Mining for Rules, Tree-Structured Rules, Clustering, Similarity Search over Sequences, Incremental Mining and Data Streams.

UNIT V

Information Retrieval and XML Data: Databases, IR, and XML, Introduction to Information Retrieval, Indexing for Text Search, Web Search Engines, Managing Text in a DBMS, A Data Model for XML, XQuery- Querying XML Data, Efficient Evaluation of XML Queries. Spatial Data Management: Types of Spatial Data and Queries, Applications Involving Spatial Data, Introduction to Spatial Indexes, Indexing Based on Space-Filling Curves, Grid Files, R Trees: Point and Region Data, Issues in High-Dimensional Indexing.

TEXT BOOK

Ramakrishnan R, Gehrke J, *Database Management Systems*, 3rd edition, McGraw Hill, 2014.

REFERENCE BOOKS

1. Dasgupta S, Shinde S K, Chakrabarti R, *Advanced Database Management System*, Dreamtech, 2014.
2. Silberschatz A, Korth H F, Sudarshan S, *Database System Concepts*, 6th edition, McGraw Hill, 2014.
3. Harrington J L, *Relational Database Design and Implementation*, 4th edition, O'Reilly, 2016.
4. Kroenke D, *Database Processing*, 13th edition, Pearson Education, 2015.
5. Elmasri R, Navathe S B, *Database Systems: Models, Languages, Design and Application Programming, 6th edition, Pearson Education,* 2013.
6. Prabhu C S R, *Object-Oriented Database Systems: Approaches and Architectures*, 3rd edition, PHI, 2011.
7. Rahimi S K, Haug F S, *Distributed Database Management Systems: A Practical Approach*, Wiley, 2011.

Course Outcomes:

1. Acquire knowledge to Develop skills to design and analyze of logical and Physical databases
2. Acquire knowledge to Parallel and Distributed Databases.
3. Acquire knowledge to Data Warehousing and Decision Support.
4. Acquire knowledge to Information Retrieval and XML Data

CSCOT 03C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

M Tech (CSE) I Semester (CBCS)

CRYPTOGRAPHY AND NETWORK SECURITY

Number of credits: 4 Instruction Hours / Week: 4

Course Objectives:

1. Develop Traditional Symmetric-Key Ciphers
2. Develop Modern Symmetric-Key Ciphers.
3. Develop Encipherment Using Modern Symmetric-Key Ciphers.
4. Develop Message Integrity, Random Oracle model, Message Authentication. Develop Cryptographic Hash Functions.
5. Develop Network Security.

Syllabus

UNIT I

Introduction to Security: Security goals – Confidentiality, Authentication, Integrity, Availability; Attacks – Passive, Active; Security services, Security mechanisms, Techniques – Cryptography, Steganography.

Traditional Symmetric-Key Ciphers: Introduction to Modular arithmetic, Shift, Affine, Substitution, Transposition ciphers, Stream and block ciphers.

Algebraic structures, GF(2n) fields.

UNIT II

Introduction to Modern Symmetric-Key Ciphers: Modern block ciphers – Components, S-box, Product ciphers, Attacks on block ciphers; Modern stream ciphers – Synchronous, Nonsynchronous.

Data Encryption Standard (DES): DES structure, DES analysis, Multiple DES, Security of DES.

Advanced Encryption Standard (AES): Transformations – Substitution, Permutation, Mixing, Key adding; Key expansion, Analysis of AES

UNIT III

Encipherment Using Modern Symmetric-Key Ciphers: Modern block ciphers – ECB, CBC, CFB, OFB, CTR; Stream ciphers – RC4, A5/1; Key generation and management.

Asymmetric-Key Encipherment: Mathematical background – Primes, Primality testing, Factorization, Chinese remainder theorem, Quadratic congruence, Discrete logarithm and exponentiation.

Asymmetric-Key Cryptography: Cryptosystems – RSA, Rabin, ElGamal, Security of asymmetric key cryptosystems.

UNIT IV

Message Integrity, Random Oracle model, Message Authentication.

Cryptographic Hash Functions: Basic principle, Security of hash functions, Iterated hash function, Compression functions, SHA-512, Whirlpool cipher.

Digital Signature: Difference between traditional signature and digital signature, Keyed hash functions, Principle of digital signature, Message authentication, Message integrity, Nonrepudiation, Confidentiality, Attacks on digital signature, Digital signature schemes – RSA, ElGamal, Schnorr, DSS.

Entity Authentication: Passwords, Challege-response, Zero-knowledge, Biometrics.
Key Management: Symmetric key distribution – KDC, Session keys; Kerberos – Servers, Operation; Symmetric key agreement – Diffie-Hellman, Station-to-Station; Public key distribution – Public announcement, Trusted center, Certification authority, X.509; PKI.

UNIT V
Network Security: Security at the Application Layer: PGP – E-mail security, Key rings, PGP certificates, Applications of PGP; S/MIME – MIME, Applications of S/MIME.
Security at the Transport Layer: SSL architecture, Protocols, Message formats and TLS; Security at the Network Layer: IPSec protocols, Security association, Security policy, Internet key exchange, ISAKMP.

TEXT BOOKS
1. Forouzan B A, *Cryptography and Network Security*, 3rd edition, McGraw Hill, 2015.
2. Stallings W, *Cryptography and Network Security: Principles and Practice*, 6th edition, Pearson Education, 2013.

REFERENCE BOOKS
1. Pachghare V K, *Cryptography and Information Security*, PHI, 2nd edition, 2015.
2. Menezes B, *Network Security and Cryptography*, Cengage, 2010.
3. Martin K M, *Everyday Cryptography*, Oxford University Press, 2016.
4. Kaufman C, Perlman R, Speciner M, *Network Security: Private Communication in a Public World*, Pearson Education, 2016.
5. Delfs H, Knebl H, *Introduction to Cryptography: Principles and Applications*, 3rd edition, Springer, 2015.
6. Schneier B, *Applied Cryptography: Protocols, Algorithms and Source Code in C*, John Wiley & Sons, 2015.
7. Collins M S, *Network Security through Data Analysis*, 2nd edition, O'Reilly, 2017.
8. Stinson D R, *Cryptography Theory and Practice*, 2nd edition, Hapman&Hall/CRC, 2002.

Course Outcomes:

1. Acquire the knowledge of develop Traditional Symmetric-Key Ciphers
2. Acquire the knowledge of develop Modern Symmetric-Key Ciphers.
3. Acquire the knowledge of develop Encipherment Using Modern Symmetric-Key Ciphers.
4. Acquire the knowledge of develop Message Integrity, Random Oracle model, Message Authentication. Cryptographic Hash Functions.
5. Acquire the knowledge of develop Network Security

CSCOT 07E

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

M Tech (CSE) I Semester Elective (CBCS)

MACHINE LEARNING

Number of credits:4 Instruction Hours / Week: 4

Course Objectives:

1. Develop Machine Learning Applications.
2. Develop Multivariate Methods.
3. Develop Nonparametric Methods.
4. Develop Kernel Machines.
5. Design and Analysis of Machine Learning Experiments.

Syllabus

UNIT I

Introduction: Machine Learning Applications, Learning Associations, Classification, Regression, Unsupervised Learning, Reinforcement Learning.

Supervised Learning: Learning a Class from Examples, Vapnik-Chervonenkis Dimension, Probably Approximately Correct Learning, Noise, Learning Multiple Classes, Regression, Model Selection and Generalization, Dimensions of a Supervised Machine Learning Algorithm.

Bayesian Decision Theory: Classification, Losses and Risks, Discriminant Functions, Association Rules.

Parametric Methods: Introduction, Maximum Likelihood Estimation, Bernoulli Density, Multinomial Density, Gaussian (Normal) Density, Evaluating an Estimator: Bias and Variance, The Bayes' Estimator, Parametric Classification, Regression, Tuning Model Complexity: Bias/Variance Dilemma, Model Selection Procedures.

UNIT II

Multivariate Methods: Multivariate Data, Parameter Estimation, Estimation of Missing Values, Multivariate Normal Distribution, Multivariate Classification, Tuning Complexity, Discrete Features, Multivariate Regression.

Dimensionality Reduction: Subset Selection, Principal Component Analysis, Feature Embedding, Factor Analysis, Singular Value Decomposition and Matrix Factorization, Multidimensional Scaling, Linear Discriminant Analysis, Canonical Correlation Analysis, Isomap, Locally Linear Embedding, Laplacian Eigenmaps.

Clustering: Mixture Densities, k-Means Clustering, Expectation-Maximization Algorithm, Mixtures of Latent Variable Models, Supervised Learning after Clustering, Spectral Clustering, Hierarchical Clustering, Choosing the Number of Clusters.

UNIT III

Nonparametric Methods: Nonparametric Density Estimation, Generalization to Multivariate Data, Nonparametric Classification, Condensed Nearest Neighbor, Distance-Based Classification, Outlier Detection, Nonparametric Regression: Smoothing Models, How to Choose the Smoothing Parameter.

Decision Trees: Univariate Trees, Classification Trees, Regression Trees, Pruning, Rule Extraction from Trees, Learning Rules from Data, Multivariate Trees.

Linear Discrimination: Generalizing the Linear Model, Geometry of the Linear Discriminant, Pairwise Separation, Parametric Discrimination, Gradient Descent, Logistic Discrimination, Discrimination by Regression, Learning to Rank.

UNIT IV

Kernel Machines: Optimal Separating Hyperplane, The Nonseparable Case: Soft Margin Hyperplane, ν-SVM, Kernel Trick, Vectorial Kernels, Defining Kernels, Multiple Kernel Learning, Multiclass Kernel Machines, Kernel Machines for Regression, Kernel Machines for Ranking, One-Class Kernel Machines, Large Margin Nearest Neighbor Classifier, Kernel Dimensionality Reduction.

Hidden Markov Models: Discrete Markov Processes, Hidden Markov Models, Three Basic Problems of HMMs, Evaluation Problem, Finding the State Sequence, Learning Model Parameters, Continuous Observations, The HMM as a Graphical Model, Model Selection in HMMs.

Bayesian Estimation: Bayesian Estimation of the Parameters of a Discrete Distribution, Bayesian Estimation of the Parameters of a Gaussian Distribution, Bayesian Estimation of the Parameters of a Function, Choosing a Prior, Bayesian Model Comparison, Bayesian Estimation of a Mixture Model, Nonparametric Bayesian Modeling, Gaussian Processes, Dirichlet Processes and Chinese Restaurants, Latent Dirichlet Allocation, Beta Processes and Indian Buffets.

UNIT V

Combining Multiple Learners: Rationale, Generating Diverse Learners, Model Combination Schemes, Voting, Error-Correcting Output Codes, Bagging, Boosting, The Mixture of Experts Revisited, Stacked Generalization, Fine-Tuning an Ensemble, Cascading.

Reinforcement Learning: Single State Case: K-Armed Bandit, Elements of Reinforcement Learning, Model-Based Learning, Temporal Difference Learning, Generalization, Partially Observable States.

Design and Analysis of Machine Learning Experiments: Factors, Response, and Strategy of Experimentation, Response Surface Design, Randomization, Replication, and Blocking, Guidelines for Machine Learning Experiments, Cross-Validation and Resampling Methods, Measuring Classifier Performance, Interval Estimation, Hypothesis Testing, Assessing a Classification Algorithm's Performance, Comparing Two Classification Algorithms, Comparing Multiple Algorithms: Analysis of Variance, Comparison over Multiple Datasets, Multivariate Tests.

TEXT BOOK

Alpaydin E, *Introduction to Machine Learning*, 3rd edition, PHI, 2015.

REFERENCE BOOKS

1. Mitchell T M, *Machine Learning*, McGraw Hill, 2013.
2. Rogers S, Girolami M, *A First Course in Machine Learning*, CRC Press, 2011.
3. Shwartz S S, David S B, *Understanding Machine Learning - From Theory to Algorithms*, Cambridge University Press, 2014.
4. Sugiyama M, *Introduction to Statistical Machine Learning*, Elsevier / Morgan Kaufmann, 2015.
5. Müller A C, Guido S, *Introduction to Machine Learning with Python - A Guide for Data Scientists*, O'Reilly, 2016.
6. Bali R, Sarkar D, *R Machine Learning By Example*, Packt, 2016.

Course Outcomes:

1. Acquire knowledge to develop Machine Learning Applications.
2. Acquire knowledge to develop Multivariate Methods.
3. Acquire knowledge to develop Nonparametric Methods.
4. Acquire knowledge to develop Kernel Machines.

5. Acquire knowledge to Design and Analysis of Machine Learning Experiments

CSCOT 08E **RESEARCH METHODOLOGY**

M Tech (CSE) I Semester Elective (CBCS)

Number of credits: 4 Instruction Hours / Week: 4

Course Objectives:

1. Develop Performance Evaluation of a Computer-based System.
2. Develop Probability Distributions.
3. Develop Statistical Inference.
4. Develop Optimization Problems.
5. Design and Analysis of simulation models.

Syllabus

UNIT I

Performance Evaluation of a Computer-based System - Performance analysis and Performance Measurement; Asymptotic Notation: Θ-notation, O-notation, θ-notation, Ω-notation, o-notation and ω-notation; Probabilistic Analysis and Amortized Analysis.

UNIT II

Probability Distributions – Concepts of random variable, cumulative distribution function and probability mass and density functions; Properties and applications of Discrete and Continuous Distributions: Binomial, Poisson, Geometric; Uniform, Normal, Gamma, Exponential, Weibull, Erlang, Triangular and Empirical distributions.
Correlation and Regression analysis – Concepts of correlation and regression; Karl Pearson's correlation coefficient; Regression lines and their uses; Multiple linear regression – concepts of 2 R , and 2 R , criteria for model selection- step-wise regression; Log linear estimation of multiple non-regression model.

UNIT III

Statistical Inference : Concepts and terminology in point and interval estimation methods; central limit theorem; Tests of Significance : Basic concepts; Large sample tests for proportions and means; Small sample tests : Applications of t, chi-square and F distributions; ANOVA for one-way and two-way classified data; Design of Experiments –Principles of experimental design; CRD,RBD,LSD; Concepts of factorial and fractional factorial designs, and Multiple range tests: Duncan's Test, l.s.d. test; Kruscal-valleys test, Friedman ANOVA.

UNIT IV

Classification of Optimization Problems, Concepts of single and multivariable classical optimization techniques, Concepts of direct and indirect search methods of optimization. Concepts of Stochastic process and Markov Models; Queuing Models – Basic elements of a queuing model, Kendall-Lee notation, Applications of (M/M/1):(FCFS/∞/∞), (M/M/c):(FCFS/∞/∞), (M/M/1):(FCFS/∞/N) and (M/M/c):(FCFS/∞/N); Concepts of queuing networks.

UNIT V

Types of simulation models – Discrete, Continuous and Discrete-continuous models; Discrete simulation approaches – Event-oriented, Activity scanning and process-oriented approaches; Random variate generation techniques – inverse transform, direct transformation, convolution and acceptance-rejection techniques. Model building, verification and validation of simulation models, output analysis for terminating and steady-state simulations.

TEXT BOOKS

1. Horowitz E, Sahni S, Rajasekaran S, *Fundamentals of Computer Algorithms*, 2nd edition, Universities Press, 2008.
2. Cormen T H, Leiserson C E, Rivest R L, Clifford Stein C, *Introduction to algorithms*, 3rd edition, MIT Press, 2015.
3. Gupta S C and Kapoor V K, *Fundamentals of Mathematical Statistics*, Sultan-Chand,2014.
4. Montgomery D C, *Design and Analysis of Experiments*, Wiley, 2013.
5. Draper N R, Smith H, *Applied Regression Analysis*, 3rd edition, Wiley, 2011.
6. Rao SS, *Engineering Optimization: Theory &Practice*, New Age International,3rd edition, 2013.
7. Banks J, Carson II J S, Nelson B L, Nicol D M, *Discrete-Event System Simulation*,Pearson Education, 2013.

Course Outcomes:

1. Acquire knowledge to Develop Performance Evaluation of a Computer-based System.
2. Acquire knowledge to Develop Probability Distributions.
3. Acquire knowledge to Develop Statistical Inference.
4. Acquire knowledge to Develop Optimization Problems.
5. Acquire knowledge to Design and Analysis of simulation models

CSCOT 09E

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

M Tech (CSE) I Semester Elective (CBCS)

INTERNET OF THINGS

Number of credits: 4 Instruction Hours / Week: 4

Course Objectives:

1. Develop Internet of Things.
2. Develop IoT System Management with NETCONF-YANG.
3. Develop IoT Physical Devices & Endpoints.
4. Develop IoT Design: Home Automation.
5. Design and Analysis of Data Analytics for IoT.

Syllabus

UNIT I

Introduction to Internet of Things: Definition & Characteristics of IoT, Physical Design of IoT – Components, Protocols; Logical Design of IoT - Functional Blocks, Communication Models, Communication APIs; IoT Enabling Technologies - Wireless Sensor Networks, Cloud Computing, Big Data Analytics, Communication Protocols, Embedded Systems; IoT Levels & Deployment Templates.

Domain Specific IoTs: Applications related to Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Lifestyle.

IoT and M2M: M2M, Difference between IoT and M2M, SDN and NFV for IoT - Software Defined Networking, Network Function Virtualization.

UNIT II

IoT System Management with NETCONF-YANG: Need for IoT Systems Management, Simple Network Management Protocol (SNMP), Network Operator Requirements,

NETCONF, YANG, IoT Systems Management with NETCONF-YANG, NETOPEER.
IoT Platforms Design Methodology: Purpose & Requirements Specification, Process Specification, Domain Model Specification, Information Model Specification, Service Specifications, IoT Level Specification, Functional View Specification, Operational View Specification, Device & Component Integration, Application Development; Case Study on IoT System for Weather Monitoring.
IoT Systems - Logical Design using Python: Python Data Types & Data Structures – Numbers, Strings, Lists, Tuples, Dictionaries, Type Conversions; Control Flow – if, for, while, range, break/continue, pass; Functions, Modules, Packages, File Handling, Date/Time Operations, Classes; Python Packages of Interest for IoT – JSON, XML, HTTPLib & URLLib, SMTPLib.

UNIT III
IoT Physical Devices & Endpoints: Basic building blocks of an IoT Device; Raspberry Pi architecture, Linux on Raspberry Pi, Raspberry Pi Interfaces; Programming Raspberry Pi with Python – Controlling and interfacing devices; Other IoT Devices – pcDuino, BeagleBone Black, Cubieboard.
IoT Physical Servers & Cloud Offerings: Introduction to Cloud Storage Models & Communication APIs; WAMP - AutoBahn for IoT; Xively Cloud for IoT; Python Web Application Framework – Django, Architecture and Development with Django; Designing a RESTful Web API; Amazon Web Services for IoT - Amazon EC2, Amazon AutoScaling, Amazon S3, Amazon RDS, Amazon DynamoDB, Amazon Kinesis, Amazon SQS, Amazon EMR; SkyNet IoT Messaging Platform.
UNIT IV
Case Studies Illustrating IoT Design: Home Automation - Smart Lighting, Intrusion Detection; Cities - Smart Parking; Environment - Weather Monitoring, Weather Reporting Bot, Air Pollution Monitoring, Forest Fire Detection; Agriculture - Smart Irrigation; Productivity Applications - IoT Printer.

UNIT V
Data Analytics for IoT: Apache Hadoop - MapReduce Programming Model, Hadoop MapReduce Job Execution, MapReduce Job Execution Workflow, Hadoop Cluster Setup; Using Hadoop MapReduce for Batch Data Analysis, Hadoop YARN; Apache Oozie - Workflows for IoT Data Analysis, Apache Spark, Apache Storm, Using Apache Storm for Real-time Data Analysis.
Tools for IoT: Chef - Multi-tier Application Deployment, Hadoop Cluster, Storm Cluster; Using NETCONF-YANG for IoT device Management, Managing Smart Irrigation IoT System, Managing Home Intrusion Detection IoT System; IoT Code Generator.

TEXT BOOK
Bahga A, Madisetti V, *Internet of Things: A Hands-On Approach*, Universities Press, 2015.

REFERENCE BOOKS
1. Miller M, *The Internet of Things*, Pearson Education, 2015.
2. Cassimally H, McEwen A, *Designing the Internet of Things*, Wiley, 2015.
3. Hersent O,Boswarthick D, Elloumi O, *The Internet of Things: Key Applications and Protocols*, Wiley, 2015.
4. Kurniawan A, *Smart Internet of Things Projects*, Packt Publishing, 2016.
5. Holler J, Tsiatsis V, Mulligan C, Avesand S, Karnouskos S, Boyle D, *From Machine-to-*

Machine to the Internet of Things: Introduction to a New Age of Intelligence, Academic Press, 2014.
6. Greengard S, *The Internet of Things (Essential Knowledge)*, MIT Press, 2015.
7. Buyya R, Dastjerdi, *Internet of Things*, Elsevier / Morgan Kaufmann, 2016.
8. Uckelmann D, Harrison M, Michahelles F, *Architecting the Internet of Things*, Springer, 2011.

Course Outcomes:

After completion of the course the student will have:

1. Acquire knowledge to Develop Internet of Things.
2. Acquire knowledge to Develop IoT System Management with NETCONF-YANG.
3. Acquire knowledge to Develop IoT Physical Devices & Endpoints.
4. Acquire knowledge to Develop IoT Design: Home Automation.
5. Design and Analysis of Data Analytics for IoT

CSCOP 01

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

M Tech (CSE) I Semester (CBCS)

CORE-I LABORATORY

Number of Credits: 2 Instruction Hours / Week: 3

Course Objectives:

5. Develop skills to design and analyze of logical and Physical databases
6. Develop Parallel and Distributed Databases.
7. Develop Data Warehousing and Decision Support.
8. Develop Information Retrieval and XML Data.
9. Develop Traditional Symmetric-Key Ciphers
10. Develop Modern Symmetric-Key Ciphers.
11. Develop Encipherment Using Modern Symmetric-Key Ciphers.
12. Develop Message Integrity, Random Oracle model, Message Authentication. Develop Cryptographic Hash Functions.
13. Develop Network Security.
14. Develop design and analyze linear and nonlinear data structures.
15. Develop algorithms for manipulating linked lists, stacks, queues, trees and graphs.
16. Develop recursive algorithms as they apply to trees and graphs.

Course Outcomes;

5. Acquire knowledge to Develop skills to design and analyze of logical and Physical databases
6. Acquire knowledge to Parallel and Distributed Databases.
7. Acquire knowledge to Data Warehousing and Decision Support.
8. Acquire knowledge to Information Retrieval and XML Data
9. Acquire the knowledge of develop Traditional Symmetric-Key Ciphers
10. Acquire the knowledge of develop Modern Symmetric-Key Ciphers.
11. Acquire the knowledge of develop Encipherment Using Modern Symmetric-Key Ciphers.

12. Acquire the knowledge of develop Message Integrity, Random Oracle model, Message Authentication. Cryptographic Hash Functions.
13. Acquire the knowledge of develop Network Security
14. Acquire the knowledge of design and analyze linear and nonlinear data structures.
15. Acquire the knowledge of algorithms for manipulating linked lists, stacks, queues, trees and graphs.
16. Acquire the knowledge of recursive algorithms as they apply to trees and graphs.

CSCOP 02

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

M Tech (CSE) I Semester (CBCS)

ELECTIVE-I LABORATORY

Number of Credits: 2 Instruction Hours / Week: 3

Course Objectives:

6. Develop Machine Learning Applications.
7. Develop Multivariate Methods.
8. Develop Nonparametric Methods.
9. Develop Kernel Machines.
10. Develop Design and Analysis of Machine Learning Experiments.
11. Develop Probability Distributions.
12. Develop Statistical Inference.
13. Develop Optimization Problems.
14. Design and Analysis of simulation models
15. Develop IoT Physical Devices & Endpoints.
16. Develop IoT Design: Home Automation.
17. Design and Analysis of Data Analytics for IoT.

Course Outcomes;

6. Acquire knowledge to develop Machine Learning Applications.
7. Acquire knowledge to develop Multivariate Methods.
8. Acquire knowledge to develop Nonparametric Methods.
9. Acquire knowledge to develop Kernel Machines.
10. Acquire knowledge to Design and Analysis of Machine Learning Experiments
11. Acquire knowledge to Develop Probability Distributions.
12. Acquire knowledge to Develop Statistical Inference.
13. Acquire knowledge to Develop Optimization Problems.
14. Acquire knowledge to Design and Analysis of simulation models
15. Acquire knowledge to Develop IoT Physical Devices & Endpoints.
16. Acquire knowledge to Develop IoT Design: Home Automation.
17. Design and Analysis of Data Analytics for IoT

II SEMESTER

CSCOT 04C

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

M Tech (CSE) II Semester (CBCS)

ADVANCES IN ARTIFICIAL INTELLIGENCE

Number of Credits: 3 Instruction Hours / Week: 3

Course Objectives:

1. Develop State-Space Search.
2. Develop Game playing algorithms.
3. Develop Genetic Algorithms and Neural networks.
4. Develop Robotic Control Systems.
5. Develop Deep learning -Convolution networks.

UNIT I

Introduction to Artificial Intelligence: Concept of intelligence, Historical perspective.
Search: State-Space Search - Depth first, Breadth first, Depth bounded DFS (DBDFS), Depth first iterative deepening (DFID); Heuristic Search - Best first, Hill climbing, Beam search; Finding Optimal paths - Branch and bound, A*, Recursive best first ;

UNIT II

Game Playing: Board games, Game playing algorithms - Alpha-beta search.
Knowledge Representation: Types of Knowledge, The Role of Knowledge, Semantic Nets, Frames, Propositional Logic, Predicate Logic, Semantic Web, Computational Knowledge Discovery, Ontology, Communication of Knowledge, Common Sense.

UNIT III

Evolutionary Computation: Introduction, Genetic Algorithms, Genetic Programming, Evolutionary Strategies, Differential Evolution, Particle Swarm Optimization.
Artificial Neural Nets: Motivation, Model of a neural network, The perceptron, LMS learning, Backpropagation, Probabilistic neural networks, Hebbian learning, Adaptive resonance theory, Hopfield auto-associative model.

UNIT IV

Robotics: Robotics: Introduction, Taxonomy of Robotics, Natural Sensing and Control, Perception with Sensors, Actuation with Effectors, Robotic Control Systems, Simple Control Architectures, Movement Planning, Distributed Robotics, Robot Programming Languages, Robot Simulators.
Intelligent Agents: Concept of an Agent, Agent Properties, Agent Environments, Agent Taxonomies, Agent Architectures, Agent Languages, Agent Communication.
Biologically Inspired and Hybrid Models: Cellular Automata, Artificial Immune Systems, Artificial Life, Fuzzy Logic, Evolutionary Neural Networks, Ant Colony Optimization, Affective Computing.

UNIT V

Deep Learning: Performance improvement of neural nets, Deep neural nets, Deep learning - Convolutional networks.
Introduction to - Microsoft Computational Network Toolkit, Intel Deep Learning SDK.

TEXT BOOKS

1. Jones M T, *Artificial Intelligence - A Systems Approach*, Infinity Science Press, 2008.
2. Khemani D, *A First Course in Artificial Intelligence*, McGraw Hill, 2013.

REFERENCE BOOKS

1. Russell S J, Norvig P, *Artificial Intelligence - A Modern Approach*, 3rd edition, Pearson Education, 2015.
2. Frankish K, Ramsey W M, *The Cambridge Handbook of Artificial Intelligence*, Cambridge University Press, 2014.
3. Nilsson N J, *Artificial Intelligence: A New Synthesis*, Elsevier, 2015.
4. Nielsen M A, *Neural Networks and Deep Learning*, Determination Press, 2015.
5. Graupe D, *Deep Learning Neural Networks: Design and Case Studies*, World Scientific, 2016.
6. Sugomori Y, *Java Deep Learning Essentials*, Packt, 2016.
7. Shi Z, *Advanced Artificial Intelligence*, World Scientific Publishing, 2011.

WEB RESOURCES:

1. www.neuralnetworksanddeeplearning.com
2. https://software.intel.com/en-us/deep-learning-sdk/
3. www.microsoft.com/en-us/research/product/cognitive-toolkit/

Course Outcomes:

1. Acquire knowledge of State-Space Search.
2. Acquire knowledge of Game playing algorithms.
3. Acquire knowledge of Genetic Algorithms and Neural networks.
4. Acquire knowledge of Robotic Control Systems.
5. Acquire knowledge of Deep learning -Convolution networks

CSCOT 05C **TOPICS IN OPERATING SYSTEMS**

Number of Credits: 3 Instruction Hours / Week: 3

Course Objectives:

1. Develop CPU scheduling algorithms.
2. Develop , File system implementation.
3. Develop Distributed Systems .
4. Develop internals of - Linux Operating System.
5. Develop Internals of - MAC Operating System.

UNIT I

Introduction to Operating System: Goals, Functions, Block diagram.
Process Management: Processes, Threads, Process synchronization, CPU scheduling, Deadlocks.
Memory Management: Main memory, Virtual memory.

UNIT II

Storage Management: Mass storage structure, File system internals, File system implementation, I/O system.
Hardening Operating System: Protection, Security.

UNIT III

Virtual Machines: Overview, Benefits and features, Building blocks, Types of virtual machines and Their implementations, Virtualization and operating-System Components.
Distributed Systems: Advantages of distributed systems, Types of network based operating systems, Network structure, Communication structure, Communication protocols, Distributed file systems

UNIT IV

Case Studies - I: Internals of - Linux Operating System, Microsoft Windows.

UNIT V

Case Studies - II: Internals of - MAC Operating System, Chrome Operating System, Android Operating System.

TEXT BOOK

Silberschatz A, Galvin P B, Gagne G, *Operating System Concepts*, 9th edition, Wiley, 2015.

REFERENCE BOOKS

1. Stallings W, *Operating Systems: Internals&Design Principles*, 8th edition, Pearson Education, 2014.
2. Tanenbaum A S, *Modern Operating Systems*, 4th edition, Pearson Education, 2016.
3. Yang L, *The Art of Linux Kernel Design: Illustrating the Operating System Design Principle and Implementation*, Auerbach Publications, 2014.
4. Russinovich M, Solomon D A, Lonescu A, *Windows Internals - Part 2*, 6th edition, Microsoft Press / Dreamtech, 2012.
5. Smith J, *Virtual Machines: Versatile Platforms for Systems and Processes*, Elsevier India,2005.
6. Matthews S, *The Android (Operating System) Handbook - Everything You Need to Know about Android (Operating System)*, Emereo Publishing, 2016.
7. Minute Help Guides, *A Newbies Guide to Chromebook: A Beginners Guide to Chrome OS and Cloud Computing*, Minute Help Press, 2013.
9. Levin J, *Mac OS X and iOS Internals:* To The Apple's Core, Wiley/Wrox, 2013.

Course Outcomes:

1. Acquire knowledge of CPU scheduling algorithms.
2. Acquire knowledge of , File system implementation.
3. Acquire knowledge of Distributed Systems .
4. Acquire knowledge of internals of - Linux Operating System.
5. Acquire knowledge of Internals of - MAC Operating System.

CSCOT06

SRI VENKATESWARA UNIVERSITY :: TIRUPATI

M Tech (CSE) II Semester (CBCS)

DISTRIBUTED AND CLOUD COMPUTING

Number of Credits: 4 Instruction Hours / Week: 4

Course Objectives:

1. Develop Distributed System Models.
2. Develop Virtual Machines and Virtualization of Clusters.
3. Develop Service-Oriented Architectures.
4. Develop Cloud Programming.
5. Develop Peer-to-Peer Computing Systems.

UNIT I

Distributed System Models and Enabling Technologies: Scalable Computing Over the Internet, Technologies for Network-Based Systems, System Models for Distributed and Cloud Computing, Software Environments for Distributed Systems and Clouds, Performance, Security, and Energy Efficiency.
Computer Clusters for Scalable Computing: Clustering for Massive Parallelism, Computer Clusters and MPP Architectures, Design Principles of Computer Clusters, Cluster Job and Resource Management, Case Studies of Top Supercomputer Systems,

UNIT II

Virtual Machines and Virtualization of Clusters and Data Centers: Implementation Levels of Virtualization, Virtualization Structures/Tools and Mechanisms, Virtualization of CPU, Memory, and I/O Devices, Virtual Clusters and Resource Management, Virtualization for Data-Center Automation.
Cloud Platform Architecture - I: Cloud Computing and Service Models, Data-Center Design and Interconnection Networks, Architectural Design of Compute and Storage Clouds.

UNIT III

Cloud Platform Architecture - II: Public Cloud Platforms: GAE, AWS, and Azure, Intercloud Resource Management, Cloud Security and Trust Management.
Service-Oriented Architectures: Services and Service-Oriented Architecture, Message-Oriented Middleware, Portals and Science Gateways, Discovery, Registries, Metadata, and Databases, Workflow in Service-Oriented Architectures.

UNIT IV

Cloud Programming and Software Environments: Features of Cloud and Grid Platforms, Parallel and Distributed Programming Paradigms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.
Grid Computing Systems and Resource Management: Grid Architecture and Service Modeling, Grid Projects and Grid Systems Built, Grid Resource Management and Brokering, Software and Middleware for Grid Computing, Grid Application Trends and Security Measures.

UNIT V
P2P Computing with Overlay Networks: Peer-to-Peer Computing Systems, P2P Overlay Networks and Properties, Routing, Proximity, and Fault Tolerance, Trust, Reputation, and Security Management, P2P File Sharing and Copyright Protection.
Ubiquitous Clouds and the Internet of Things: Cloud Trends in Supporting Ubiquitous Computing, Performance of Distributed Systems and the Cloud, Enabling Technologies for the Internet of Things, Innovative Applications of the Internet of Things, Online Social and Professional Networking.

TEXT BOOK
Hwang K, Dongarra J, Fox G C, *Distributed and Cloud Computing: From Parallel Processing to the Internet of Things*, Morgan Kaufmann, 2013.

REFERENCE BOOKS
1. Buyya R, Vecchiola C, Selvi S T, *Mastering Cloud Computing*, McGraw Hill, 2013.
2. Erl T, Puttini R, Mahmood Z, *Cloud Computing: Concepts, Technology & Architecture*, Pearson Education, 2014.
3. Bahga A, Madisetti V, *Cloud Computing: A Hands-on Approach*, Universities Press, 2014.
4. Ghosh S, *Distributed Systems: An Algorithmic Approach*, 2nd edition, CRC Press, 2014.
5. Kallakurchi J, Houde D J, et.al., Cloud Computing Black Bo*ok*, Dreamtech Press, 2014.
6. Marinescu D C, *Cloud Computing - Theory and Practice*, Elsevier, 2013.
7. Janakiram D, *Grid and Cloud Computing*, McGraw-Hill, 2016.
8. Aguilar J, *Distributed Cloud Applications with Azure Service Fabric: Design and Develop a New Class of Distributed Cloud Applications*, O'Reilly, 2016.
9. Gupta P K D, Nayak M, Pattnaik S, *Cloud Computing: Based Projects Using Distributed Architecture*, PHI, 2012.
10. Krutz R L, Vines R D, *Cloud Security: A Comprehensive Guide to Secure Cloud Computing*, Wiley, 2010.

Course Outcomes:

1. Acquire knowledge of Distributed System Models.
2. Acquire knowledge of Virtual Machines and Virtualization of Clusters.
3. Acquire knowledge of Service-Oriented Architectures.
4. Acquire knowledge of Cloud Programming.
5. Acquire knowledge of Peer-to-Peer Computing Systems.

CSCOT 10E **ARTIFICIAL NERAL NETWORKS**

(offered to Other Branches)

Number of Credits: 4 Instruction Hours / Week: 4

Course Objectives:

1. Develop Pattern recognition methods.
2. Develop Functional Units of ANNs for Pattern Recognition Tasks.
3. Develop Feed-back Neural Networks.
4. Develop Competitive Learning Neural Networks.
5. Develop Applications of ANNs.

UNIT I

Introduction - Trends in computing, Pattern and data, Pattern recognition methods.
Basics of Artificial Neural Networks - Characteristics of neural networks, Historical development, Terminology, Models of neuron, Topology, Basic learning laws.
Activation and Synaptic Dynamics - Activation dynamics models, Synaptic dynamics models, Learning methods, Stability and Convergence, Recall in neural networks.

UNIT II

Functional Units of ANNs for Pattern Recognition Tasks - Pattern recognition problem, Basic types of ANNs, Various pattern recognition tasks performed by ANNs.

Feed-forward Neural Networks - Analysis of - Pattern associative networks, Pattern classification networks, Pattern mapping networks.

UNIT III

Feed-back Neural Networks - Linear auto associative FF networks, Pattern storage networks, Stochastic networks, and Simulated annealing; Boltzmann machine.

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UNIT IV

Competitive Learning Neural Networks - Components of a competitive learning neural network, Analysis of feedback layer for different output functions, Analysis of pattern clustering networks, Analysis of feature mapping networks.

Architecture for Complex Pattern Recognition Tasks - Associative memory, Pattern mapping, Stability-Plasticity dilemma, Adaptive resonance theory, Temporal patterns, Pattern variability – Neocognitron.

UNIT V

Applications of ANNs - Pattern classification – character recognition, Associative memories – content addressable memory, Information retrieval; Optimization – Linear programming problem, Traveling salesman problem, Smoothing images with discontinuities; Vector quantization, Control applications, Applications in speech, image processing and decision making.

TEXT BOOK

1. Yegnanarayana B, *Artificial Neural Networks*, Prentice-Hall of India Pvt. Ltd., 2009.
2. Satish Kumar, *Neural Networks: A Class Room Approach*, Tata McGraw-Hill Publishing Company Ltd., 2004.

REFERENCE BOOKS

1. Haykin S, *Neural Networks: A Comprehensive Foundation*, 2nd edition, Pearson Education Asia, 1999.
2. Bishop C M, *Neural Networks for Pattern Recognition*, Oxford University Press, 1995.
3. Hagan M T, Demuth H B, and Beale M, Neural Network Design, Thomson Learning, 1996.

Course Outcomes:

1. Acquire knowledge of Pattern recognition methods.
2. Acquire knowledge of Functional Units of ANNs for Pattern Recognition Tasks.
3. Acquire knowledge of Feed-back Neural Networks.
4. Acquire knowledge of Competitive Learning Neural Networks.
5. Acquire knowledge of Applications of ANNs.

CSCOT 11E

BIG DATA ANALYTICS

Number of Credits: 4 Instruction Hours / Week: 4

Course Objectives:

1. Develop Statistical Limits on Data Mining.
2. Develop Applications of Near-Neighbor Search.
3. Develop A-Priori Algorithm.
4. Develop On-Line Algorithms.
5. Develop Mining Social-Network Graphs.

UNIT I

Data Mining: Introduction, Statistical Limits on Data Mining, Some Preliminaries – word tokens, Hash Functions, Indexes, Power Laws.

MapReduce and the New Software Stack: Distributed File Systems, MapReduce, Algorithms Using MapReduce, Extensions to MapReduce, The Communication Cost Model.

UNIT II

Finding Similar Items: Applications of Near-Neighbor Search, Shingling of Documents, Similarity-Preserving Summaries of Sets, Locality-Sensitive Hashing for Documents, Distance Measures, The Theory of Locality-Sensitive Functions, LSH Families for Other Distance Measures, Applications of Locality-Sensitive Hashing, Methods for High Degrees of Similarity.

Mining Data Streams: The Stream Data Model, Sampling Data in a Stream, Filtering Streams, Counting Distinct Elements in a Stream, Estimating Moments, Counting Ones in a Window.

UNIT III

Link Analysis: PageRank, Efficient Computation of PageRank, Topic-Sensitive PageRank, Link Spam, Hubs and Authorities.

Frequent Itemsets: The Market-Basket Model, Market Baskets and the A-Priori Algorithm, Handling Larger Datasets in Main Memory, Limited-Pass Algorithms, Counting Frequent Items in a Stream.

UNIT IV

Advertising on the Web: Issues in On-Line Advertising, On-Line Algorithms, The Matching Problem, The Adwords Problem, Adwords Implementation.

Recommendation Systems: A Model for Recommendation Systems, Content-Based Recommendations, Collaborative Filtering, Dimensionality Reduction.

UNIT V

Mining Social-Network Graphs: Social Networks as Graphs, Clustering of Social-Network Graphs, Direct Discovery of Communities, Partitioning of Graphs, Finding Overlapping Communities.
Large-Scale Machine Learning: The Machine-Learning Model, Perceptions, Support-Vector Machines, Learning from Nearest Neighbors, Comprision of Learning Methods.

TEXT BOOK

Lescovec J, Rajaraman A, Ullman J D, Mining of Massive Datasets, 2^{nd} edition, Cambridge University Press, 2016.

REFERENCE BOOKS

1. Mohanthy S, Jagadeesh M, Srivatsa H, Big Data Imperatives: Enterprise Big Data Warehouse, BI Implementations and Analytics, Apress/Springer (India), 2013.
2. Baker P, Gourley B, Big Data Stratagies, Cengage Learning, 2015.
3. Maheshwari A, Data Analytics, McGraw Hill, 2017.
4. Berman J J, Principles of Big Data: Preparing, Sharing, and Analyzing Complex Information, Morgan Kaufmann, 2013
5. Kulkarni P, Johsi S, Brown M S, Big Data Analytics, PHI, 2016.
6. Erl T, Big Data Fundamentals, Pearson Education, 2016.

Course Outcomes:

1. Acquire knowledge of Statistical Limits on Data Mining.
2. Acquire knowledge of Applications of Near-Neighbor Search.
3. Acquire knowledge of A-Priori Algorithm.
4. Acquire knowledge of On-Line Algorithms.
5. Acquire knowledge of Mining Social-Network Graphs.

CSCOT 12E

CYBER SECURITY

Number of Credits: 4 Instruction Hours / Week: 4

Course Objectives:

1. Develop Building a Secure Organization, Preventing System Intrusions.
2. Develop Wireless Network Security.
3. Develop Intrusion Prevention and Detection Systems.
4. Develop Virtual Private Networks.
5. Develop Biometrics.

UNIT I

Building a Secure Organization, Preventing System Intrusions, Guarding Against Network Intrusions, Internet Security, The Botnet Problem, Intranet Security, Local Area Network Security.

UNIT II

Wireless Network Security, Cellular Network Security, RFID Security, Protecting Mission-Critical Systems, Security Management Systems, Information Technology Security Management, Identity Management.

UNIT III

Intrusion Prevention and Detection Systems, Computer Forensics, Network Forensics, Firewalls, Penetration Testing, Vulnerability Assessment.

UNIT IV

NET Privacy, Personal Privacy Policies, Virtual Private Networks, Identity Theft, VoIP Security, SAN Security, SAN Devices Security.

UNIT V

Risk Management, Physical Security Essentials, Biometrics, Information Warfare, Security Through Diversity, Reputation Management, Content Filtering, Data Loss Protection.

TEXT BOOKS

1. Vacca J R, *Computer and Information Security Handbook*, 2nd edition, Elsevier / Morgan Kaufmann, 2013.
2. Belapure S, Godbole N, *Cyber Security*, Wiley, 2011.

REFERENCE BOOKS

1. Gogolin G, *Digital Forensics Explained*, CRC / Auerbach, 2013.
2. Godbole N, *Information Systems Security*, Wiley, 2015.
3. Wu C H, Irwin J D, *Introduction to Computer Networks and Cyber security*, CRC Press,2013
4. Singer P W, Friedman A, *Cybersecurity and Cyberwar: What Everyone Needs to Know*,Oxford University Press, 2014.
5. Boddington R, *Practical Digital Forensics*, Packt, 2016.
6. Drake J J, Lanier Z, et al., *Android Hacker's Handbook*, Wiley, 2014.
7. Shema M, *Anti-Hacker Tool Kit*, McGraw Hill, 2011.
8. Graham J, Howard R, Olson R, *Cyber Security Essentials*, CRC Press, 2010.
9. Hadnagy C, Wilson P, *Social Engineering: The Art of Human Hacking*, Wiley, 2010.

Course Outcomes:

1. Acquire knowledge of Building a Secure Organization, Preventing System Intrusions.
2. Acquire knowledge of Wireless Network Security.
3. Acquire knowledge of Intrusion Prevention and Detection Systems.
4. Acquire knowledge of Virtual Private Networks.
5. Acquire knowledge of Biometrics.

CSCOP 03 **CORE-II LABORATORY**

Number of Credits: 2 Instruction Hours / Week: 3

Course Objectives:

1. Develop State-Space Search.
2. Develop Game playing algorithms.
3. Develop Genetic Algorithms and Neural networks.
4. Develop Deep learning -Convolution networks.
5. Develop CPU scheduling algorithms.
6. Develop , File system implementation.
7. Develop Distributed Systems .
8. Develop internals of - Linux Operating System.
9. Develop Internals of - MAC Operating System
10. Develop Distributed System Models.
11. Develop Cloud Programming.
12. Develop Peer-to-Peer Computing Systems.

Course Outcomes;

1. Acquire knowledge of State-Space Search.
2. Acquire knowledge of Game playing algorithms.
3. Acquire knowledge of Genetic Algorithms and Neural networks.
4. Acquire knowledge of Deep learning -Convolution networks
5. Acquire knowledge of CPU scheduling algorithms.
6. Acquire knowledge of , File system implementation.
7. Acquire knowledge of Distributed Systems .
8. Acquire knowledge of internals of - Linux Operating System.
9. Acquire knowledge of Internals of - MAC Operating System.
10. Acquire knowledge of Distributed System Models.
11. Acquire knowledge of Cloud Programming.
12. Acquire knowledge of Peer-to-Peer Computing Systems.

CSCOP 04 **ELECTIVE-II LABORATORY**

Number of Credits: 2 Instruction Hours / Week: 3

Course Objectives:

1. Develop Statistical Limits on Data Mining.
2, Develop Applications of Near-Neighbor Search.
2. Develop A-Priori Algorithm.
3. Develop On-Line Algorithms.
4. Develop Mining Social-Network Graphs.
5. Develop Building a Secure Organization, Preventing System Intrusions.
6. Develop Wireless Network Security.
7. Develop Intrusion Prevention and Detection Systems.
8. Develop Virtual Private Networks.
9. Develop Biometrics.

Develop Experiments from Elective From other branch

Course Outcomes;

1. Acquire knowledge of Statistical Limits on Data Mining.
2. Acquire knowledge of Applications of Near-Neighbor Search.
3. Acquire knowledge of A-Priori Algorithm.
4. Acquire knowledge of On-Line Algorithms.
5. Acquire knowledge of Mining Social-Network Graphs
6. Acquire knowledge of Building a Secure Organization, Preventing System Intrusions.
7. Acquire knowledge of Wireless Network Security.
8. Acquire knowledge of Intrusion Prevention and Detection Systems.
9. Acquire knowledge of Virtual Private Networks.
10. Acquire knowledge of Biometrics.

Acquire knowledge of Experiments from Elective From other branch

SRI VENKATESWARA UNIVERSITY: TIRUPATI – 517 502

CSCO 2 II/II M.Tech(CSE),III& IV Semester(CBCS)

Course No.	Course Title	Instruction hours per week				No. of Credits		
		L	T	P	Total	L+T	P	Total
MCSE22P	Dissertation			24	24		24	24
	TOTAL			24	24		24	24

NOTE: Project Work :

Internal	40
Pre submission seminar	20
End Semester Examination (External)	40
Total Marks:	100

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