SCHOOL OF ENGINEERING

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

Programme : Master of Computer Application (MCA) - 2 Year Course

PYTHON (MCA-2401)

Subject Code	Subject Name	L	T	P	Credits	Hrs/week
MCA-2401	PYTHON	3	1	0	4	4

Course Objectives:

1. To learn and understand Python programming basics and paradigm.
2. To learn and understand python looping, control statements and string manipulations.
3. Students should be made familiar with the concepts of GUI controls and designing GUI applications.
4. To learn and know the concepts of file handling, exception handling and database connectivity.

Outcomes:

Upon successful completion of this course, the student will be able to:

1. Define and demonstrate the use of built-in data structures “lists” and “dictionary”.
2. Design and implement a program to solve a real world problem.
3. Design and implement GUI application and how to handle exceptions and files.
4. Make database connectivity in python programming language.

UNIT1

Introduction to python language, Basic syntax, Literal Constants, Numbers, Variable and Basic Data Types, String, Escape Sequences, Operators and Expressions, Evaluation Order, Indentation, Input, Output, Functions, Comments.

UNIT 2

Data Structure: List, Tuples, Dictionary, Data Frame and Sets, Constructing, Indexing, slicing and content manipulation.

UNIT3

Control Flow: Conditional Statements - If, If-else, Nested If-else. Iterative Statement - For, While, Nested Loops. Control statements - Break, Continue, Pass.

UNIT4

Object Oriented Programming: Class and Object, Attributes, Methods, Scopes and Namespaces, Inheritance, Overloading, Overriding, Data Hiding, Exception: Exception Handling, Except clause, Try finally clause, User Defined Exceptions.

UNIT5

Modules and Packages: Standard Libraries: File I/0, Sys, logging, Regular expression, Date and Time, Network programming, multi-processing and multithreading.

References

1.Timothy A. Budd: Exploring python, McGraw-Hill Education.

2. R. Nageshwar Rao ,”Python Programming” ,Wiley India

3. Think Python: Allen B. Downey, O'Reilly Media, Inc.

List of Experiments:

1. To write a Python program to find GCD of two numbers.

2. To write a Python Program to find the square root of a number by Newton's Method.

3. To write a Python program to find the exponentiation of a number.

4. To write a Python Program to find the maximum from a list of number

5. To write a Python Program to perform Linear Search

6. To write a Python Program to perform binary search.

7. To write a Python Program to perform selection sort.

8. To write a Python Program to perform insertion sort.

9. To write a Python Program to perform Merge sort.

10. To write a Python program to find first n prime numbers.

11. To write a Python program to multiply matrices.

12. To write a Python program for command line arguments.

13. To write a Python program to find the most frequent words in a text read from a file.

14. To write a Python program to simulate elliptical orbits in Pygame.

15. To write a Python program to bouncing ball in Pygame.

SCHOOL OF ENGINEERING

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

Programme : Master of Computer Application (MCA) - 2 Year Course

Artificial Intelligence MCA-2402(A)

Subject Code	Subject Name	L	T	P	Credits	Hrs/week
MCA- 2402(A)	Artificial Intelligence	3	1	0	4	4

Objective:- It presents the concepts of Artificial Intelligence and the participants will get to work in the areas of Machine learning, Deep Learning, implement methods to solve problems using Artificial Intelligence and Natural Language Processing.
Outcome:- This course is designed in synchronization with the industry to provide the participants in-depth knowledge and skills required by AI fields around the globe. It provides comprehensive knowledge about the fundamental principles, methodologies and industry practices in AI.

1. Fundamentals of neural networks and fuzzy logic

2. Supervised learning and unsupervised learning.

3. Nero Dynamical Models

UNIT-I

Introduction: Overview of AI, AI technique and problems, Characteristics of AI, LISP Programming, input output and local variables, Numeric and Basic list manipulation functions, predicates and conditionals, Iteraction and recursion, property lists and arrays.

UNIT-II

Search and Control Strategies: overview of production systems, characteristics of production systems, control strategies, forward and backward chaining, study of depth first and breadth first search, Hill climbing Techniques, branch and bound technique, best first search & A* algorithm, AND / OR graphs, problem reduction & AO* algorithm, constraint satisfaction problems.

UNIT-III

Knowledge Representations: Problems in representing knowledge, knowledge representation using propositional and predicate logic, skolemization, resolution principle & unification, interface mechanisms, horn's clauses, semantic networks, frame systems and value inheritance, scripts, conceptual dependency.

UNIT-IV

Planning: Planning, various types of planning techniques like goal stack planning, hierarchical planning , nonlinear planning. Parsing techniques, context free grammar, recursive ransitions nets, augmented transition nets, case and logic grammars, semantic analysis. Introduction to game playing, game playing techniques like minimax procedure.

UNIT-V

Probabilistic Theory and Expert System: Introduction of Probability theory, bayes theorem and bayesian networks, certainty factor. Introduction to expert system and application of expert systems, various expert system shells, vidwan frame work, knowledge acquisition, case studies, MYCIN.

References:- 1.Rich E and Knight K, "Artificial Intelligence", TMH, New Delhi.
2.Nelsson N.J., "Principles of Artificial Intelligence", Springer Verlag, Berlin.

SCHOOL OF ENGINEERING

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

Programme : Master of Computer Application (MCA) - 2 Year Course

CLOUD COMPUTING MCA-2402(B)

Subject Code	Subject Name	L	T	P	Credits	Hrs/week
MCA-2402(B)	CLOUD COMPUTING	3	1	0	4	4

Objective:-

- The fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability; benefits, as well as current and future challenges.
- The basic ideas and principles in data center design; cloud management techniques and cloud software deployment considerations.
- Different CPU, memory and I/O virtualization techniques that serve in offering software, computation and storage services on the cloud; Software Defined Networks (SDN) and Software Defined Storage (SDS).
- Cloud storage technologies and relevant distributed file systems, no sql databases and object storage.
- The variety of programming models and develops working experience in several of them.

Outcome:-

1. Explain the core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.
2. Apply fundamental concepts in cloud infrastructures to understand the tradeoffs in power, efficiency and cost, and then study how to leverage and manage single and multiple datacenters to build and deploy cloud applications that are resilient, elastic and cost-efficient.
3. Discuss system, network and storage virtualization and outline their role in enabling the cloud computing system model.
4. Illustrate the fundamental concepts of cloud storage and demonstrate their use in storage systems such as Amazon S3 and HDFS.
5. Analyze various cloud programming models and apply them to solve problems on the cloud.

UNIT-I

Introduction, Cloud computing history, Cloud architecture, Characteristics of cloud computing as per NIST, Cloud services requirements, System Models for Distributed and Cloud Computing, NIST Cloud Computing Reference Architecture, Applications, ECG Analysis in the cloud, Protein structure prediction, Gene Expression Data Analysis, Satellite Image Processing, CRM and ERP, Social networking.

UNIT-II

Cloud Reference Model, Types of Clouds, Cloud Interoperability & Standards, Scalability and Fault Tolerance, Design Challenges, Inter Cloud Resource Management, Resource Provisioning and Platform Deployment, Global Exchange of Cloud Resources, Cloud services (Iaas, Paas & saas).

UNIT-III

Basics of Virtualization, Types of Virtualization, Implementation Levels of Virtualization, Virtualization Structures, Tools and Mechanisms - Virtualization of CPU, Memory, I/O Devices, Virtual Clusters and Resource management, Virtualization for Data-center Automation, Virtual LAN (VLAN) and Virtual SAN (VSAN) and their benefits.

UNIT-IV

Cloud Security:- Security Overview Infrastructure security, Data security and storage, Network security – I , Network security – II, Host security, Disaster recovery and management, Cloud Information security fundamentals, Cloud security services, Design principles, Secure Cloud Software Requirements, Policy Implementation, Cloud Computing Security Challenges, Virtualization security Management, Cloud Computing Security Architecture.

UNIT-V

Cloud Solutions: - Cloud Ecosystem, Cloud Business Process Management, Cloud Service Management Third Party Cloud Services, Market Based Management of Clouds.
Case study: - Amazon cloud services, Amazon EC2, Amazon S3, Google cloud services, Google Map reduce, GFS, Sales Force, Windows Azure- EMC cloud services, IBM cloud services, Apache Hadoop.

TEXT BOOKS:

1. George Reese – Cloud Application Architectures: Building Applications and Infrastructures in the cloud – O'Reilly Media Inc., 2009
2. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter – Cloud Computing A practical Approach – McGraw Hill, 2010

REFERENCES:

1. Kenneth Hess, Amy New Man – Practical Virtualization Solutions – Prentice Hall, 2010
2. Shahed Latif, Tim Mather, Subra Kumara swamy – Cloud Security and Privacy : An Enterprise perspective on risks and compliance – O'Reilly Media Inc., 2009
3. Gautam Shroff – Enterprise Cloud Computing: Technology, Architecture, Applications – Cambridge University Press, 2010

SCHOOL OF ENGINEERING

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

Programme : Master of Computer Application (MCA) - 2 Year Course

DATA WAREHOUSING & MINING MCA-402 (C)

Subject Code	Subject Name	L	T	P	Credits	Hrs/week
MCA- 2402(C)	DATA WAREHOUSING & MINING	3	1	0	4	4

Objectives:

The objective of this course is to familiar with mathematical foundations of data mining tools, Understand and implement classical models and algorithms in data warehouses and data mining, Characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.

Outcomes:

Students will be able to:

- Understand Data Warehouse fundamentals, Data Mining Principles
- Design data warehouse with dimensional modeling and apply OLAP operations.
- Identify appropriate data mining algorithms to solve real world problems
- Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining
- Describe complex data types with respect to spatial and web mining

UNIT–I

Introduction to Data warehouse, Need for data warehousing, Data warehousing Components, Data Mart, Data Warehouse Architecture, Data Extraction, Cleanup, and Transformation Tools –Metadata repository and management, Discretization and Concept Hierarchy Generation, Major Issues in Data Mining, Star ,Snowflake and Galaxy Schemas for Multidimensional databases

UNIT–II

Data Preprocessing, Data Integration and Transformation, Data Reduction, Fact and dimension data, Partitioning Strategy-Horizontal and Vertical Partitioning, Discretization and Concept Hierarchy Generation, Basics of data mining, Data mining techniques, KDP (Knowledge Discovery Process), Application and Challenges of Data Mining.

UNIT–III

Introduction of Web Structure Mining, Web Usage Mining, Spatial Mining, Text Mining, Security Issue, Privacy Issue, Ethical Issue, Reporting and Query tools and Applications, Tool Categories, The Need for Applications, Online Analytical Processing (OLAP) Need Multidimensional Data Model, OLAP Guidelines, Multidimensional versus Multi relational OLAP, Categories of Tools ,OLAP Tools and the Internet.

UNIT–IV

Data mining algorithms Association rules, Association Rule Mining, Single Dimensional Boolean Association Rules, Multi-Level Association Rule, Apriori Algorithm, Fp Growth Algorithm, Time series mining association rules, latest trends in association rules mining.

UNIT–V

Clustering, Basic issues in clustering, Types of Clustering, First conceptual clustering system, Partitioning methods: k-means, expectation maximization (EM), Decision Tree Induction, Bayesian Classification, Association Rule Based, Other Classification Methods, Prediction, Classifier Accuracy, Categorization of methods, Partitioning methods, Outlier Analysis.

REFERENCES:

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, “Introduction to Data Mining”, Person Education, 2007.
2. K.P. Soman, Shyam Diwakar and V. Ajay “, Insight into Data mining Theory and Practice”, Easter Economy Edition, Prentice Hall of India, 2006.
3. G. K. Gupta, “Introduction to Data Mining with Case Studies”, Easter Economy Edition, Prentice Hall of India, 2006.
4. Daniel T. Larose, “Data Mining Methods and Models”, Wile-Inter science, 2006

SCHOOL OF ENGINEERING

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

Programme : Master of Computer Application (MCA) - 2 Year Course

MACHINE LEARNING MCA-2403(A)

Subject Code	Subject Name	L	T	P	Credits	Hrs/week
MCA-2403(A)	MACHINE LEARNING	3	1	0	4	4

Course Objectives :

- To introduce students to the basic concepts and techniques of Machine Learning.
- To develop skills of using recent machine learning software for solving practical problems.
- To gain experience of doing independent study and research.
-

Course Outcomes : Students will be able to:

- machine learning algorithms as supervised, semi-supervised, and unsupervised.
- Effectively use machine learning toolboxes.
- Be able to use support vector machines.
- Be able to use Recognize the characteristics of machine learning that make it useful to real-world problems.
- Characterize regularized regression algorithms.
- Understand the concept behind neural networks for learning non-linear functions.
- Understand and apply unsupervised algorithms for clustering.

UNIT –I

Introduction to machine learning, scope and limitations, regression, probability, statistics and linear algebra for machine learning, convex optimization, data visualization, hypothesis function and testing, data distributions, data preprocessing, data augmentation, normalizing data sets, machine learning models, supervised and unsupervised learning.

UNIT –II

Linearity vs non linearity, activation functions like sigmoid, ReLU, etc., weights and bias, loss function, gradient descent, multilayer network, backpropagation, weight initialization, training, testing, unstable gradient problem, auto encoders, batch normalization, dropout, L1 and L2 regularization, momentum, tuning hyper parameters.

UNIT –III

Convolutional neural network, flattening, subsampling, padding, stride, convolution layer, pooling layer, loss layer, dance layer 1x1 convolution, inception network, input channels, transfer learning, one shot learning, dimension reductions, implementation of CNN like tensor flow, keras etc.

UNIT –IV

Recurrent neural network, Long short-term memory, gated recurrent unit, translation, beam search and width, Bleu score, attention model, Reinforcement Learning, RL-framework, MDP, Bellman equations, Value Iteration and Policy Iteration, , Actor-critic model, Q-learning, SARSA

UNIT –V

Support Vector Machines, Bayesian learning, application of machine learning in computer vision, speech processing, natural language processing etc, Case Study: ImageNet Competition

TEXT BOOKS RECOMMENDED:

1. Christopher M. Bishop, “Pattern Recognition and Machine Learning”, Springer-Verlag New York Inc., 2nd Edition, 2011.

2. Tom M. Mitchell, “Machine Learning”, McGraw Hill Education, First edition, 2017.

3. Ian Good fellow and Yoshua Bengio and Aaron Courville, “Deep Learning”, MIT Press,2016

REFERENCE BOOKS:

1. Aurelien Geon, “Hands-On Machine Learning with Scikit-Learn and Tensorflow:Concepts, Tools, and Techniques to Build Intelligent Systems”, Shroff/O'Reilly; Firstedition (2017).

2. Francois Chollet, "Deep Learning with Python", Manning Publications, 1 edition (10January 2018).

3. Andreas Muller, "Introduction to Machine Learning with Python: A Guide for DataScientists", Shroff/O'Reilly; First edition (2016).

4. Russell, S. and Norvig, N. “Artificial Intelligence: A Modern Approach”, Prentice HallSeries in Artificial Intelligence. 2003.

SCHOOL OF ENGINEERING

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

Programme : Master of Computer Application (MCA) - 2 Year Course

INTERNET OF THINGS MCA-2403(B)

Subject Code	Subject Name	L	T	P	Credits	Hrs/week
MCA-2403(B)	INTERNET OF THINGS	3	1	0	4	4

Course Objectives:

1. To learn physical design, logical design and enabling technologies of internet of things
2. To acquire knowledge about IoT platforms design methodology.
3. To learn about IoT physical servers and cloud offerings.
4. To study IoT case studies using python.

Course outcomes:

1. Understand principles, concepts, and technologies for internet of things.
2. Able to build physical and logical design of IoT systems.
3. Understand cloud platforms for IoT.

UNIT I

INTRODUCTION:-

Definitions and Functional Requirements –Motivation – Architecture- Web 3.0 View of IoT– Ubiquitous IoT Applications – Four Pillars of IoT – DNA of IoT - TheToolkit Approach for End-user Participation in the Internet of Things. Middleware for IoT:Overview – Communication middleware for IoT–IoT Information Security.

UNIT II

IOT PROTOCOLS

Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Issues with IoT Standardization – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus – KNX – Zigbee Architecture – Network layer – APS layer – Security .

UNIT III

WEB OF THINGS

Web of Things versus Internet of Things – Two Pillars of theWeb – Architecture Standardization for WoT– Platform Middleware for WoT – Unified MultitierWoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA andCloud Computing – Cloud Middleware – Cloud Standards – Cloud Providers and Systems –Mobile Cloud Computing – The Cloud of Things Architecture.

UNIT IV

INTEGRATED

Integrated Billing Solutions in the Internet of Things Business Models for the Internet of Things - Network Dynamics: Population Models – Information Cascades - Network Effects - Network Dynamics: Structural Models - Cascading Behavior in Networks - The Small-World Phenomenon.

UNIT V

APPLICATIONS

The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments - Resource Management in the Internet ofThings: Clustering, Synchronization and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging.

REFERENCES:

1. The Internet of Things in the Cloud: A Middleware Perspective - Honbo Zhou – CRC Press –2012
2. Architecting the Internet of Things - Dieter Uckelmann; Mark Harrison; Florian Michahelles- (Eds.) – Springer2011
3. Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press - 2010
4. The Internet of Things: Applications to the Smart Grid and Building Automation by - Olivier
5. Hersent, Omar Elloumi and David Boswarthick - Wiley -2012
6. Olivier Hersent, David Boswarthick, Omar Elloumi , “The Internet of Things – Key applications and Protocols”, Wiley, 2012

SCHOOL OF ENGINEERING

SRI SATYA SAI UNIVERSITY OF TECHNOLOGY AND MEDICAL SCIENCES

Programme : Master of Computer Application (MCA) - 2 Year Course

DATA SCIENCE AND BIG DATA MCA-2403(C)

Subject Code	Subject Name	L	T	P	Credits	Hrs/ week
MCA-2403(C)	DATA SCIENCE AND BIG DATA	3	1	0	4	4

COURSE OBJECTIVES:

- Using predictive analytics and machine learning to significantly increase the sales funnel
- Improve and enhance customer segmentation
- Reduce customer churn
- Understand good and bad suppliers and customers
- Improve geographic knowledge… and much more.

COURSE OUTCOMES:

After completing the course student should be able to:

1. Understand the concept and challenges of Big Data and Demonstrate knowledge of Big Data Analytics.
2. Explain Hadoop Eco System and develop Big Data Solutions using Hadoop EcoSystem.
3. Practice and gain hands on experience on large-scale analytics tools.
4. Understand social networks mining and analyze the social network graphs.

UNIT 1

Introduction to Big data, Big data characteristics, Types of big data, Traditional versus Big data, Evolution of Big data, challenges with Big Data, Technologies available for Big Data, Infrastructure for Big data, Use of Data Analytics, Desired properties of Big Data system.

UNIT 2

Introduction to Hadoop, Core Hadoop components, Hadoop Eco system, Hive Physical Architecture, Hadoop limitations, RDBMS Versus Hadoop, Hadoop Distributed Filesystem, Processing Data with Hadoop, Map reduce Programming, Managing Resources and Application with Hadoop YARN, Apache Spark.

UNIT 3

Introduction to Hive Hive Architecture, Hive Data types, Hive Hive Query Language,Introduction to Pig, Anatomy of Pig, Pig on Hadoop, Use Case for Pig, ETL Processing, Data types in Pig running Pig, Execution model of Pig, Operators, Evalfunction, Datatypes of Pig.

UNIT 4

Introduction to NoSQL, NoSQL Business Drivers, NoSQL Data architectural patterns, Variations of NOSQL architectural patterns using NoSQL to Manage Big Data.

UNIT 5

Mining social Network Graphs: Introduction Applications of social Network mining, Social Networks as a Graph, Types of social Networks, Clustering of social Graphs Direct Discovery of communities in a social graph.

TEXT BOOKS RECOMMENDED:

1. Radha Shankarmani, M. Vijaylakshmi, " Big Data Analytics", Wiley, Second edition

2. Seema Acharya, Subhashini Chellappan, " Big Data and Analytics", Wiley, First edition

REFERENCE BOOKS:

1. Kai Hwang, Geoffrey C., Fox. Jack, J. Dongarra, “Distributed and Cloud Computing”, Elsevier, First edition
2. Michael Minelli, Michele Chambers, Ambiga Dhiraj, “Big Data Big Analytics”, Wiley