M.Sc. COMPUTER SCIENCE
CHOICE BASED CREDIT SYSTEM (CBCS)

Curriculum and Syllabus
Regular (2019 – 2020)

Enable | Enlighten | Enrich
KARPAGAM
ACADEMY OF HIGHER EDUCATION
(Deemed to be University)
(Established Under Section 3 of UGC Act, 1956)

DEPARTMENT OF COMPUTER SCIENCE

FACULTY OF ARTS, SCIENCE AND HUMANITIES

KARPAGAM ACADEMY OF HIGHER EDUCATION
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Semester-I

19CSP101 **PYTHON PROGRAMMING** **4H – 4C**

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To Master the principles of object-oriented programming and the interplay of algorithms and data structures in well-written modular code;
- To Solve problems requiring the writing of well-documented programs in the Python language, including use of the logical constructs of that language;
- To Understand the basic logic statements in Python
- To Handle Strings in Python.
- To Understand Lists, Dictionaries in Python.
- To Build GUI applications

Course Outcomes(COs)

1. Master an understanding of scripting and the contributions of scripting languages.
2. Master an understanding of Python especially the object oriented concepts
3. Master an understanding of the built in objects of Python
4. Represent compound data using Python lists, tuples, dictionaries.
5. Read and write data from/to files in Python Programs.
6. Be exposed to advanced applications such as TCP/IP network programming, multithreaded programming, Web applications.

Unit I - PYTHON BASICS

Introduction-features-Syntax and Statements- Variables and Assignments-Identifier-Operators .**Conditional and looping statement. Functions:** calling function-creating functions-Function arguments.

Unit II – NUMBERS

Introduction- Integer-Floating Point-Complex numbers-Operators-Other numeric type. **Strings**-Strings and Operator-String only operator- Built-in-Functions-Built-in-Methods-String Features. **List :** Operators-Built-in-Functions-Built-in-Methods-Features of List

Unit III - TUPLE

Introduction- Operators and Built-in-Functions-Features. **Mapping and set type Dictionaries**-Operators-Built-in and Factory Functions-Built-in- Methods. **Set type:** Introduction- Operators-Built-in Function-Built-in Methods-

Unit IV - PYTHON OBJECTS

Introduction-Standard Type- Built-in-type-Built-in functions. **Class:** Introduction- Class and Instance- Method calls. **File:** Objects- Built in Functions-Methods-Attributes-Command line Argument-File System-File Execution.

Unit V -EXCEPTION AND TOOLS

Why use it?- Exception roles-Exception in python-Try/finally statement. Regular Expression: Introduction-Special Symbols and characters-Regexes and Python- Examples of Regexes. Network Programming: Architecture- Socket- networking programming in python.

SUGGESTED READINGS

1 Chun, J Wesley. (2010). Core Python Programming. 2nd edition.: Pearson, New Delhi.
2 Wesley J Chun.(2011). Core python Application Programming. 3rd edition.
3 Budd, T. (2011). Exploring Python.1st edition. New Delhi: TMH.
4 Python Tutorial/Documentation www.python.org 2015.
5 Allen Downey., Jeffrey Elkner, & Chris Meyers. (2012). How to think like a computer scientist: learning with Python. Freely available online.

WEB SITES

1. http://docs.python.org/3/tutorial/index.html.
2. http://interactivepython.org/courselib/static/pythonds.
3. http://www.ibiblio.org/g2swap/byteofpython/read/.

Semester-I

19CSP102 BIG DATA ANALYTICS 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- It provides grounding in basic and advanced methods to big data technology and tools like MapReduce and Hadoop and its ecosystem.
- Understand the Big Data Platform and web analytics
- Provide an overview of Apache Hadoop and Design of HDFS
- Understand Map Reduce features
- Provide hands on Hbase, Pig and HiveQL queries
- Introduction to NoSQL and Data Model
- Exposure to Graph databases Neo4J, Connecting your data and Dashboard

Course Outcomes(COs)

On successful completion of the course the student should be able to:

1. Apply Hadoop ecosystem components.
2. Access and Process Data on Hbase, Pig and HiveQL queries
3. Manage Job Execution in Hadoop Environment
4. Analyze Map Reduce Types
5. Apply Data Model and Connect your data and Dashboard
6. Participate data science and big data analytics projects

Unit I – INTRODUCTION to BIG DATA

What is big data – why big data – convergence of key trends – unstructured data – industry examples of big data – web analytics – big data and marketing – fraud and big data – risk and big data – credit risk management – big data and algorithmic trading – big data and healthcare – big data in medicine – advertising and big data – big data technologies - open source technologies – cloud and big data – mobile business intelligence – Crowd sourcing analytics – inter and trans firewall analytics

Unit II - HISTORY OF HADOOP

- The Hadoop Distributed File System – Components of Hadoop- Analyzing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features

Unit III - HBASE

data model and implementations – Hbase clients – Hbase examples – praxis. Cassandra – cassandra data model – cassandra examples – cassandra clients – Hadoop integration. Pig – Grunt – pig data model – Pig Latin – developing and testing Pig Latin scripts. Hive – data types and file formats – HiveQL data definition – HiveQL data manipulation – HiveQL queries.

Unit IV - Introduction to NoSQL

Aggregate data models – aggregates – key-value and document data models – relationships– schemaless databases – materialized views – distribution models -peer-peer replication –consistency – relaxing consistency – version stamps – partitioning and combining – composing map-reduce calculations -Document based Database – MongoDB- Introduction- Data Model- Working with data- Replication &Sharding- Development

Unit V - Graph databases Neo4J

Key concept and characteristics-Modelling data for neo4j- Importing data into neo4j- Visualizations neo4j-Cypher Query Language-Data visualization- Creating Visual analytics with Tableau-Connecting your data-Creating Calculation-Using maps-Dashboard-Stories

SUGGESTED READINGS

1. Tom White. (2012). Hadoop: The Definitive Guide. 2nd Edition. OReilly.
2. Tom White. (2014). The Definitive Guide to Mongodb. 4th Edition. OReilly.
3. Rik Van Bruggen. (2014). Learning Neo4j. 1st Edition. Packt Publishing Ltd. UK.
4. Daniel G.Murray. (2016). Tableau Your Data!: Fast and Easy Visual Analysis with Tableau Software. 2nd Edition. Wiley.
5. Dirk deRoos, Paul Zikopoulos, Bruce Brown, Roman B. Melnyk,RafaelCoss.(2012). Hadoop For Dummies.
6. GauravVaish. (2013). Getting Started with NoSQL. Packt Publishing Ltd. UK.
7. Pramod J. Sadalage, Martin Fowler. (2013). NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence. Pearson Education.
8. Joshua N. Milligan. (2016). Learning Tableau. Packt Publishing Ltd. UK.

WEB SITES

1. https://www.tutorialspoint.com/big_data_analytics/
2. hadoop.apache.org/
3. https://www.mongodb.com/nosql-explained
4. https://neo4j.com/

Semester-I

19CSP103 CRYPTOGRAPHY AND NETWORK SECURITY 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

This course will provide students with a theoretical knowledge to understand the fundamental principles of access control models and techniques and,

- To understand theory of fundamental cryptography, encryption and decryption algorithms
- To know about various encryption techniques.
- To understand various Block Ciphers, DES and AES algorithms
- To understand the concept of Public key cryptography.
- To study about message authentication and hash functions
- To impart knowledge on web security, electronic mail security, firewalls

Course Outcomes (COs)

On successful completion of the course the student should be able to:

1. Classify the symmetric encryption techniques
2. Illustrate various Public key cryptographic techniques
3. Evaluate the authentication and hash algorithms.
4. Summarize the intrusion detection and its solutions to overcome the attacks.
5. Understand basic concepts of system level security
6. Build secure authentication systems by use of message authentication techniques.

Unit I - INTRODUCTION

Security Trends - The OSI Security Architecture – Security Attacks – Security Services – Security Mechanisms – A Model for Network Security. Classical Encryption Techniques – Symmetric Cipher Model – Substitution Techniques - Transposition Techniques – Rotor Machines - Steganography.

Unit II -BLOCK CIPHERS AND DATA ENCRYPTION STANDARD

Block Cipher Principles – The Data Encryption Standard - The Strength of DES – Advanced Encryption Standard (AES) – Evaluation Criteria for AES – The AES Cipher – Multiple Encryption and Triple DES – Block Cipher Modes of Operation – Stream Ciphers and RC4- modular Arithmetic and Euclidean Algorithm.

Unit III - CONFIDENTIALITY USING SYMMETRIC ENCRYPTION

Placement of Encryption Function – Traffic Confidentiality – Key Distribution – Public key Cryptography and RSA – Principles of Public Key Cryptosystems – The RSA Algorithm- Basic prime numbers and Discrete Logarithms -Key Management – Diffie Hellman Key Exchange.

Unit IV - MESSAGE AUTHENTICATION AND HASH FUNCTIONS

Authentication Functions – Message Authentication Codes (MAC's) Functions – Security of Hash Functions and MAC's Digital Signatures and Authentication Protocols – Digital Signatures – Digital Signature Standard

Unit V - NETWORK SECURITY APPLICATIONS

Authentication Applications – KERBEROS – X.509 Authentication Service – Public Key Infrastructure – Electronic Mail Security – Pretty Good Privacy – S/MIME – IP Security.

SUGGESTED READINGS

1. William Stallings. (2006). Cryptography and Network Security Principles and Practices. 4th edition. Pearson Education. New Delhi.
   (Page Nos. : 6-35 62-75 80-135 199-220 289-298 317-340 377-390 400-436 436-457 483-506)
2. Atul Kahate. (2003). Cryptography and Network Security. 2nd edition.Tata McGraw Hill. New Delhi.
3. Ankit Fadia. (1998). Network Security. 1st edition. McMillan Publications. New Delhi.
4. Bruce Schneir. (1998). Applied Cryptography. 1st edition. CRC Press. New Delhi:
5. Charlie Kaufman, Radia Perlman, & Mike Speciner. (2003). Network Security Private Communication in a Public World. 2nd edition. Prentice-Hall of India. New Delhi
6. Menezes, A. Van Oorschot, & Vanstone, S. (1997). Hand Book of Applied Cryptography .1st edition. CRC Press. New Delhi (Free Downloadable)

WEB SITES

1. williamstallings.com/Crypto3e.html
2. u.cs.biu.ac.il/~herzbea/book.html
3. cryptofundamentals.com/algorithms

Semester-I

19CSP104 **CLOUD COMPUTING** **4H – 4C**

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To Provide a good understanding of the concepts, standards in Cloud computing
- To make the student understand about the cloud service providers and their usage.
- To learn how to secure the data in cloud depending.
- To understand the various service level agreements.
- To understand the cloud using various case studies.
- To portray the recent trends in the field of cloud computing and providing exposures to some open source and commercial clouds.

Course Outcomes (COs)

Upon completion of this course the students will be able to:

1. Portray the recent trends in the field of cloud computing and providing exposures to some open source and commercial clouds.
2. Know the architecture of the cloud and the usage of clouds.
3. Secure their data from the security issues.
4. Make the students to work based on the various service level agreements.
5. Work with the traditional cloud and Microsoft azure, etc.
6. Provide a good understanding of the concepts, standards and protocols in Cloud computing

Unit I - INTRODUCTION TO CLOUD COMPUTING

Characteristics of Cloud Computing -Paradigm shift - Benefits of cloud computing - Disadvantages of cloud computing- Role of Open Standards-Cloud Computing Architecture: Cloud computing stack-Public cloud -Private cloud -Hybrid cloud - Community cloud

Unit II – SERVICE MODELS

Infrastructure as a Service (IaaS) -Platform as a Service (PaaS) -Software as a Service (SaaS) -Identity as a Service (IDaaS) -Compliance as a Service (CaaS)- Cloud storage.

Unit III - VIRTUALIZATION TECHNOLOGIES

Load Balancing and Virtualization -Advanced load balancing -The Google cloud - Hypervisors -Virtual machine types -VMware vSphere - Machine Imaging -Porting Applications -The Simple Cloud API - AppZero Virtual Application Appliance

Unit IV - CLOUD INFORMATION SECURITY OBJECTIVES

Confidentiality Integrity and Availability -Cloud Security Services - Relevant Cloud Security Design Principles -Cloud Computing Risk Issues -The CIA Triad
Privacy and Compliance Risks -Threats to Infrastructure Data and Access Control -Cloud Access Control Issues -Database Integrity Issues -Cloud Service Provider Risks Architectural Considerations
General Issues- Trusted Cloud Computing -Identity Management and Access Control

Unit V – CASE STUDIES

Case Study on Open Source and Commercial Clouds: Microsoft Azure- Amazon EC2- Google Web services – Open Nebula.

SUGGESTED READINGS

1. Barrie Sosinsky .(2010). Cloud Computing Bible .Wiley- India. New Delhi:
2. Rajkumar Buyya, James Broberg, & Andrzej, M. Goscinski. (2011). New Delhi: Tata Mc-Graw Hill.
3. Ronald, L. Krutz, Russell Dean Vines. (2010). Cloud Security: A Comprehensive Guide to Secure Cloud Computing. New Delhi: Wiley –India
4. Dr Kumar Saurabh.(2012). Cloud Computing (2nd ed.). New Delhi: Wiley India.
5. Anthony T.Velte Toby J.Velte Robert Elsenpeter. (2010). Cloud Computing Practical Approach (1st ed.). New Delhi:Tata McGraw Hill.
6. Nikos Antonopoulos, Lee Gillam. (2012). Cloud Computing: Principles Systems and Applications . Springer.
7. Giovanni Toraldo. (2012). Open Nebula 3 Cloud Computing.

WEB SITES

1. en.wikipedia.org/wiki/Cloud_computing
2. www.ibm.com/cloud-computing/in/en/
3. www.oracle.com/CloudComputing
4. www.microsoft.com/en-us/cloud/default.aspx

Semester-I

19CSP105A WIRELESS AND MOBILE COMPUTING 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To learn about the concepts and principles of mobile computing;
- To explore both theoretical and practical issues of mobile computing;
- To develop skills of finding solutions and building software for mobile computing applications.
- To identify the use of mobile wireless technologies
- To know the types of mobile wireless technologies that are currently being used
- To understand the working of mobile wireless technologies access to network resources.

Course Outcomes (COs)

1. Grasp the concepts and features of mobile computing technologies and applications
2. Have a good understanding of how the underlying wireless and mobile communication networks work, their technical features, and what kinds of applications they can support
3. Identify the important issues of developing mobile computing systems and applications
4. Organize the functionalities and components of mobile computing systems into different layers and apply various techniques for realizing the functionalities;
5. Develop mobile computing applications by analyzing their characteristics and requirements, selecting the appropriate computing models and software architectures, and applying standard programming languages and tools;
6. Organize and manage software built for deployment and demonstration.

Unit I - Mobile computing applications and Platforms

Introduction – Strengths and Weakness of Wireless – Applications – Platforms to support Mobile Computing Applications –Wireless Networks – Wireless Architecture Security and Management – Wireless Business

Unit II - Mobile Computing Applications

Key Characteristics of Mobile Applications – Messaging for users – Mobile Portals – Special Applications – Mobile agent applications

Unit III - Wireless Internet Mobile IP and Wireless Web

Internet and Web – How it works – Mobile IP – WWW for wireless – Mobile Web Services - **Mobile Computing Platforms** - Introduction – Wireless Middleware –

Wireless Gateways and Mobile Application Servers – WAP – I-MODE Wireless JAVA MMIT and BREW – Voice communication

Unit IV - WIRELESS LANS

IEEE 802.11 – MANET – HiperLAN2 - **Wireless Personal Area Networks** - IEEE 802.15 – Home Networks – Blue tooth LANs – Sensor Networks - **Cellular Networks** - Principles – First Generation(1G) Cellular – Paging networks – Second Generation(2G) Cellular – Data over Cellular Networks – Third Generation Cellular (3G) Networks – Beyond 3G

Unit –V – WML

Formatting Output – Variables – Input Operations – WML Script – WML Libraries.

SUGGESTED READINGS

1. Eldad Perahia & Robert Stacey (2013) Next Generation Wireless LANs 802.11n and 802.11 a, 2nd Edition, Cambridge University Press.
2. Clint Smith and Daniel Collins (2014), Wireless Networks, 3rd edition, Tata McGraw Hill .
3. Michael Miller (2013), Wireless Networking Absolute Beginner's Guide, Pearson Education.
4. Amjad Umar. (2004). Mobile Computing and Wireless Communication – Applications Networks Platforms Architecture and Security. NGE Solutions INC. New York: (Page Nos: 1.1- 1.52 2.3 – 2.51 3.2 – 3.37 4.3-4.51 6.16-6.36 7.3-7.33 8.4-8.39)
5. Kris Jamsa. (2001). WML & WML Script. New Delhi: Tata McGraw Hill Publishing. (Page Nos: 61-198 225-336)
6. Ashok, K.Talukder,& Roopa, R. Yavagal. (2008). Mobile Computing. Tata Mc-Graw Hill Publishing Company Pvt Ltd .New Delhi.
7. Jack, M. Holtzman, & David, J. Goodman. (1994). Wireless and Mobile Communications. Kluwer Academic Publishers.
8. Mischa Schwartz. (2005). Mobile Wireless Communications. Cambridge University Press.

WEB SITES

1. http://www.networkcomputing.com/netdesign/wireless1.html
2. http://www.homeandlearn.co.uk/bc/beginnerscomputing.html
3. http://compnetworking.about.com/
4. http://www.compinfo.co.uk/computer_books.htm#tele

Semester-I

19CSP105B GEOGRAPHICAL INFORMATION SYSTEM 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To gain a basic, practical understanding of GIS concepts, techniques.
- To analyse the basic components of GIS
- To classify the maps, coordinate systems and projections
- To process spatial and attribute data and prepare thematic maps
- To identify and rectify mapping inaccuracies
- To formulate and solve geospatial problems

Course Outcomes(COs)

At the completion of the course, students will:

1. Have a basic, practical understanding of GIS concepts, techniques and real world applications.
2. Have an understanding of the technical language of GIS.
3. Know how GIS is utilized in the larger context of business needs and IT strategies. Understand the basic concepts of geography necessary to efficiently and accurately use GIS technology.
4. Understand basic GIS data concepts.
5. Have an ability to perform basic GIS analysis of concepts. .
6. Have an understanding of GIS and its relationship to mapping software development. Have an appreciation of GIS career options and how to pursue

Unit I – INTRODUCTION

What is a Geographical Information Systems (GIS) – Geographically referenced data – GIS operations – Geographic Coordinate systems – Map Projections – Commonly used Map Projections – Projected Coordinate Systems – Working with Coordinate systems in GIS.

Unit II - GEORELATIONAL VECTOR DATA MODEL

Georelational data model – Representation of simple features – Topology – Nontopological Vector data – Data models for composite features.

Object based vector data model – Object based data model – The geodatabase data model – Interface – Topology rules – Advantages of Geodatabase model.

Unit III - RASTER DATA MODEL

Elements of Raster Data Model - Raster Data Structure – Data Compression – Data Conversion – Integration of Raster and Vector Data.

Data Input – Existing GIS data – Meta Data – Conversion of Existing Data – Creating New Data.

Unit IV - GEOMETRIC TRANSFORMATION

Root Mean Square (RMS) Error – Interpretation of RMS errors Digitized Maps – Re sampling of Pixel Values.

Spatial Data Editing – Location Errors – Spatial Data Accuracy Standards – Topological Errors – Topological Editing – Nontopological Editing – Other Editing operations

Unit V - DATA DISPLAY AND CRYPTOGRAPHY

Cartographic Symbolization – Types of Maps – Typography – Map Design – Map Production.
Data Exploration – Attribute and Data Query – Spatial Data Query – Raster Data Query – GIS Applications.

SUGGESTED READINGS

1. Wilpen L. Gorr and Kristen S. Kurland (2013), GIS Tutorial 1: Basic Workbook, 6th edition., Esri Press
2. Paul Bolstad (2016), GIS Fundamentals: A First Text on Geographic Information Systems, Fifth Edition
3. Kang-tsung Chang. (2006). Introduction to Geographic Information Systems . 3rd edition. Tata McGraw-Hill. New Delhi.
4. Ian Heywood., Sarah Cornelius., Steve Carver.,& Srinivasa Raju. (2006). An introduction to Geographical Information Systems. 2nd edition. Pearson Education. New Delhi

WEB SITES

1. https://gisgeography.com
2. https://www.satimagingcorp.com/services/geographic-information-systems
3. https://www.caliper.com/maptitude/gis_software

Semester-I

19CSP105C **SOFT COMPUTING** **4H – 4C**

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To understand the scope and evolution of soft computing
- To learn the various soft computing frame works
- To be familiar with design of various neural networks
- To be exposed to fuzzy sets and fuzzy logic
- To understand fuzzy measures and reasoning
- To learn genetic programming.

Course Outcomes(COs)

1. Understand the scope and evolution of soft computing
2. Learn the various soft computing frame works
3. Be familiar with design of various neural networks
4. Be exposed to fuzzy sets and fuzzy logic
5. Understand fuzzy measures and reasoning
6. Learn genetic programming.

Unit I - INTRODUCTION

Evolution of Computing - Soft Computing Constituents – From Conventional AI to Computational Intelligence – Neural Networks - Scope and Evolution– Models of Neural Networks – Feed forward Networks – Supervised Learning Neural Networks – Associative memory networks – Unsupervised learning networks – Special Networks.

Unit II - FUZZY SETS AND FUZZY LOGIC

Fuzzy Sets – Operations on Fuzzy Sets – Fuzzy Relations - Fuzzy Rules Non – interactive fuzzy sets – Fuzzification– Intuition inference Rank ordering – Defuzzification – Max-membership principle centroid method center of sums center of largest area.

Unit III - FUZZY MEASURES AND REASONING

Fuzzy arithmetic and measures – Fuzzy reasoning – approximate reasoning – categorical qualitative syllogistic dispositional – Fuzzy inference systems – fuzzy decision making – individual multiperson multi objective Bayesian – fuzzy logic control system – architecture model and application.

Unit IV - MACHINE LEARNING AND GENETIC ALGORITHM

Machine Learning Techniques – Machine Learning Using Neural Nets – Genetic Algorithms (GA) – Simple and General GA – Classification of Genetic Algorithm – Messy Adaptive Hybrid Parallel – Holland Classifier System.

Unit V - APPLICATION AND IMPLEMENTATION SOFT COMPUTING

Genetic algorithms -. Traveling Salesperson Problem Internet Search Techniques – Fuzzy Controllers – Bayesian Belief networks for Rocket Engine Control – Neural Network Genetic algorithm and Fuzzy logic implementation in C++ and Matlab.

SUGGESTED READINGS

1. Samir Roy (2013), Introduction to Soft Computing: Neuro-Fuzzy and Genetic Algorithms,1st Edition, Pearson Education

2. Shai Shalev-Shwartz and Shai Ben-David (2014), Understanding Machine Learning: From Theory to Algorithms, Cambridge Universtiy Press.
3. Sivanandam , S.N.,& Deepa, S.N. (2007). Principles of Soft Computing. 1st edition. Wiley India Ltd. New Delhi
4. 1.Jyh-Shing, Roger Jang, Chuen-Tsai, & Sun Eiji Mizutani. (2003). Neuro-Fuzzy and Soft Computing. Prentice-Hall of India , New Delhi
5. James, A. Freeman & David, M. Skapura. (2003).Neural Networks Algorithms Applications and Programming Techniques. Pearson Education. New Delhi:
6. George, J. Klir, & Bo Yuan. (1995). Fuzzy Sets and Fuzzy Logic-Theory and Applications.Prentice Hall. New Delhi:
7. Amit Konar. (2000). Artificial Intelligence and Soft Computing. 1st edition. New Delhi: CRC Press.
8. Simon Haykin. (1999). Neural Networks: A Comprehensive Foundation. 2nd edition. New Delhi: Prentice Hall.
9. Mitchell Melanie. (1998). An Introduction to Genetic Algorithm.Prentice Hall. New Delhi
10. David, E. Goldberg. (1997). Genetic Algorithms in Search Optimization and Machine Learning. Addison Wesley.

WEB SITES

1. www.amazon.in/soft+computing
2. www.soft-computing.de/def.html
3. en.wikipedia.org/wiki/Soft_computing
4. endnote.com/downloads/style/applied-soft-computing
5. www.allbookez.com/soft-computing-lecture-notes/

Semester-I

19CSP111 PYTHON PROGRAMMING – PRACTICAL 4H – 2C

Instruction Hours / week: L: 0 T: 0 P: 4 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To Master the principles of object-oriented programming and the interplay of algorithms and data structures in well-written modular code;
- To Solve problems requiring the writing of well-documented programs in the Python language, including use of the logical constructs of that language;
- To Understand the basic logic statements in Python
- To Handle Strings in Python.
- To Understand Lists, Dictionaries in Python.
- To Build GUI applications

Course Outcomes(COs)

1. Master an understanding of scripting and the contributions of scripting languages.
2. Master an understanding of Python especially the object oriented concepts
3. Master an understanding of the built in objects of Python
4. Represent compound data using Python lists, tuples, dictionaries.
5. Read and write data from/to files in Python Programs.
6. Be exposed to advanced applications such as TCP/IP network programming, multithreaded programming, Web applications.

List of Programs

1. Write a Python program to compute the GCD of two numbers.
2. Write a Python program to Find the square root of a number (Newton's method)
3. Write a Python program to find the sum of odd and even from a set of numbers?
4. Write a Python program to generate prime numbers between 1 and 50?
5. Write a Python program to reverse the given number and check it is palindrome or not?
6. Write a python program for matrix Multiplication.
7. Write a Python program

- to Compare two strings
- Find the length of the string

8. Write a Python program to generate Linear search OR Binary search
9. Write a Python program to generate Selection sort OR Insertion sort
10. Write a Python programs that take command line arguments (word count)
11. Write a Python program to Find the most frequent words in a text read from a file
12. Write a Python program to generate Simulate elliptical orbits in Pygame
13. Write a Python program to generate Simulate bouncing ball in Pygame

SUGGESTED READINGS

1 Chun, J Wesley. (2010). Core Python Programming. 2nd edition.: Pearson, New Delhi.

2 Wesley J Chun.(2011). Core python Application Programming. 3rd edition.
3 Budd, T. (2011). Exploring Python.1st edition. New Delhi: TMH.
4 Python Tutorial/Documentation www.python.org 2015.
5 Allen Downey., Jeffrey Elkner, & Chris Meyers. (2012). How to think like a computer scientist: learning with Python. Freely available online.

WEB SITES

http://docs.python.org/3/tutorial/index.html.
http://interactivepython.org/courselib/static/pythonds.
http://www.ibiblio.org/g2swap/byteofpython/read/.

Semester-I

19CSP112 HADOOP – PRACTICAL 4H – 2C

Instruction Hours / week: L: 0 T: 0 P: 4 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- It provides grounding in basic and advanced methods to big data technology and tools like MapReduce and Hadoop and its ecosystem.
- Understand the Big Data Platform and web analytics
- Provide an overview of Apache Hadoop and Design of HDFS
- Understand Map Reduce features
- Provide hands on Hbase, Pig and HiveQL queries
- Introduction to NoSQL and Data Model
- Exposure to Graph databases Neo4J, Connecting your data and Dashboard

Course Outcomes(COs)

On successful completion of the course the student should be able to:

1. Apply Hadoop ecosystem components.
2. Access and Process Data on Hbase, Pig and HiveQL queries
3. Manage Job Execution in Hadoop Environment
4. Analyze Map Reduce Types
5. Apply Data Model and Connect your data and Dashboard
6. Participate data science and big data analytics projects

List of Programs

1. Perform setting up and Installing Hadoop in its three operating modes: Standalone, Pseudo distributed, Fully distributed.
2. Implement the following file management tasks in Hadoop: Adding files and directories• Retrieving files• Deleting files•
   Hint: A typical Hadoop workflow creates data files (such as log files) elsewhere and copies them into HDFS using one of the above command line utilities.
3. Run a basic Word Count Map Reduce program to understand Map Reduce Paradigm.
4. Write a Map Reduce program that mines weather data. Weather sensors collecting data every hour at many locations across the globe gather a large volume of log data, which is a good candidate for analysis with MapReduce, since it is semi structured and record-oriented.
5. Implement Matrix Multiplication with Hadoop Map Reduce
6. Write a Map Reduce program to implement Join operations on RDBMS.
7. Write a Map Reduce program to determine statistical measures a) Variance b) Max c) Min d) Range of a large data collection.
8. K-means clustering using map reduce
9. Page Rank Computation

SUGGESTED READINGS

1 Tom White. (2012). Hadoop: The Definitive Guide. 2nd Edition. OReilly.
2 Tom White. (2014). The Definitive Guide to Mongodb. 4th Edition. OReilly.

3 Rik Van Bruggen. (2014). Learning Neo4j. 1st Edition. Packt Publishing Ltd. UK.
4 Daniel G.Murray. (2016). Tableau Your Data!: Fast and Easy Visual Analysis with Tableau Software. 2nd Edition. Wiley.
5 Dirk deRoos, Paul Zikopoulos, Bruce Brown, Roman B. Melnyk,RafaelCoss.(2012). Hadoop For Dummies.
6 GauravVaish. (2013). Getting Started with NoSQL. Packt Publishing Ltd. UK.
7 Pramod J. Sadalage, Martin Fowler. (2013). NoSQL Distilled: A Brief Guide to the Emerging World of Polyglot Persistence. Pearson Education.
8 Joshua N. Milligan. (2016). Learning Tableau. Packt Publishing Ltd. UK.

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hadoop.apache.org/
https://www.mongodb.com/nosql-explained
https://neo4j.com/

Semester-II

19CSP201 INTERNETWORKING WITH TCP/IP 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To understand about subnets using IP classes
- To understand the key features and functions of TCP
- To understand how basic routing works including the use of routing protocols.
- To understand about DNS and its applications
- To understand the concepts of Remote Login and VPN
- To compare and contrast IP routing protocols

Course Outcomes(COs)

At the completion of the course, students will:

1. Have the ability to analyze and differentiate networking protocols used in TCP/IP protocol suite.
2. Understand IP Addressing Fundamentals
3. Understand IPv4 forwarding and routing.
4. Learn about host name resolution and the Domain Name System (DNS).
5. Learn about services and operations of DHCP Servers and Domain Name Servers
6. Create major applications using the key TCP/IP protocols

Unit I – INTRODUCTION

WAN WAN technologies - Protocols and Standards - TCP/IP protocol suite - Internetworking Devices - Classful IP Addressing – Subnetting – Supernetting – Classless Addressing

Unit II - ARP & RARP

Proxy ARP – ARP over ATM – ARP and RARP Protocol Format. IP Datagram – Fragmentation – Options – IP Datagram Format – Routing IP Datagrams – Checksum. ICMP – Types of Messages - Message Format – Error Reporting – Query – Checksum.

Unit III - ROUTING PROTOCOL

Unicast Routing Protocol: Intra Domain and Inter Domain Routing – Distance Vector Routing – RIP – Link State Routing – OSPF – Path Vector Routing – BGP – Multicast Routing – Multicast Routing Protocols. Group Management – IGMP Message – IGMP Operation – Process to Process Communication – UDP Operation – TCP Services - Flow Control.

Unit IV – BOOTP, DHCP

Address Discovery and Binding. DNS – Name Space – DNS in Internet – Resolution – Resource Records

Unit V - REMOTE LOGIN

FTP – SMTP – SNMP. IP over ATM Wan – Cells – Routing the Cells – ATMARP – Logical IP Subnets. VPN

SUGGESTED READINGS

1. Jason Edelman, Scott Lowe (2018), Network Programmability and Automation, O'Reilly
2. Jeff Doyle, Jennifer DeHaven Carroll (2012), Routing TCP/IP, Volume 1. 2nd Edition, Cisco Press
3. Behrouz, A. Forouzan. (2009). TCP/IP Protocol Suite. 3rd edition. Tata McGraw Hill Publication. New Delhi:
   (Page Nos: 2-5 6-38 69-74 84-95 102-121 160-188 191-1-201 221-232 238-241 256-279 299-304 386-430 441-444 457-464 471-488 519-542 561-566 575-576 621-632 637-644 680-682)
4. Andrews, S. Tanenbaum. (2003). Computer Networks. 4th edition.:Prentice Hall of India Private Ltd. New Delhi.
5. Buck Graham. (2007). TCP/IP Addressing. 2nd edition. Harcount India Private Limited. New Delhi
6. Douglas, E. Comer. (2000). Computer Networks and Internets. 4th edition. Pearson Education. New Delhi.
7. William Stallings. (2007). Data and Communication Network. 8th edition. Tata McGraw Hill. New Delhi

WEB SITES

- en.wikipedia.org/wiki/Internet_protocol_suite
- http://docwiki.cisco.com/wiki/Introduction_to_WAN_Technologies
- www.yale.edu/pclt/COMM/TCPIP.HTM
- www.w3schools.com/tcpip/default.asp

Semester-II

19CSP202 **CYBER SECURITY** **4H – 4C**

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To state the basic concepts in information security, including security policies, security models, and security mechanisms.
- To provide an exposure to the spectrum of security activities methods methodologies and procedures with emphasis on practical aspects of Information Security.
- To understand principles of web security.
- To gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks.
- To understand key terms and concepts in cyber law, intellectual property and cybercrimes, trademarks and domain theft.
- To provide the learner will be able to examine secure software development practices.

Course Outcomes (COs)

A student who successfully completes this course should at a minimum be able to:

1. State the basic concepts in information security, including security policies, security models, and security mechanisms.
2. Explain concepts related to applied cryptography including the four techniques for crypto-analysis symmetric and asymmetric cryptography, digital signature, message authentication code, hash functions and modes of encryption operations.
3. Explain common vulnerabilities in computer programs including buffer overflow Vulnerabilities time-of-check to time-of-use flaws incomplete mediation.
4. The learner will gain knowledge about securing both clean and corrupted systems, protect personal data, and secure computer networks.
5. The learner will understand key terms and concepts in cyber law, intellectual property and cybercrimes, trademarks and domain theft.
6. The learner will be able to examine secure software development practices.

Unit I - INTRODUCTION TO CYBERCRIME

Definition and Information Security-who are cybercriminals? - Classification of cybercrimes. Cybercrime: The legal perspectives- cybercrimes: An Indian Perspective - cybercrime and the Indian ITA2000: Hacking and the Indian law(s) - A Global Perspective on cybercrimes: cybercrime and the Extended Enterprise - cybercrime Era: Survival Mantra for the Netizens - Concluding Remarks and Way Forward to Further Chapters.

Unit II - CYBER OFFENSES

How Criminals Plan Them: Introduction: categories of Cybercrime -How criminals Plan the Attacks: Reconnaissance Passive Attacks Active Attacks Scanning and Scrutinizing

Gathered Information Attack(Gaining and Maintaining the system Access) -social Engineering: Classification of Social Engineering – Cyber talking: Types of stalkers Cases Reported on Cyber stalking How stalking Works? real-life incident of Cyber stalking -Cybercafe and Cybercrimes - Botnets: The Fuel for cybercrime: Botnet - Attack Vector-Cloud Computing: Why cloud computing? Types of Services Cybercrime and Cloud Computing.

Unit III – CYBERCRIME

Mobile and wireless Devices-Introduction - Proliferation of Mobile and Wireless Devices - Trends in Mobility-Credit Card Frauds in Mobile and Wireless Computing Era: Types and Techniques of Credit Card Frauds - Security challenges Posed by Mobile Devices - Registry Settings for Mobile Devices - Authentication Service security: cryptographic security LDAP Security RAS Security Media Player Control Security Networking API Security - Attacks on Mobile/Cell Phones: Mobile Phone Theft Mobile Viruses Mishing Vishing Smishing Hacking Bluetooth.

Unit IV - MOBILE DEVICES

Security Implication for Organizations – Managing Diversity and Proliferation of Hand-Held Devices Unconventional/ Stealth Storage Devices Threats through Lost and Stolen Devices Protecting Data on lost devices Educating the Laptop Users - Organizational Measures for Handling Mobile devices - Related Security Issues: Encrypting Organization Databases Including Mobile Devices in Security Strategy -Organizational Security Policies and Measures in mobile Computing Era: Importance of Security polices relating to mobile Computing Devices Operating Guidelines for Implementing Mobile Devices Security Polices Organizational Policies for the Use of Mobile Hand - Held Devices - Laptops: Physical Security Countermeasures.

Unit V - TOOLS AND METHODS USED IN CYBERCRIME

Introduction - Proxy Servers and Anonymizers - Phishing: How Phishing Works? - Password Cracking: Online Attacks Offline Attacks Strong Weak and Random Passwords Random passwords - Keyloggers and Spywares: Software Keyloggers Hardware Keyloggers Anti Keylogger Spywares - Virus and Worms: Types of Virus - Trojan Horses and Backdoors: backdoor How to protect from Trojan Horses and Backdoors - Steganography: Steganalysis - DoS and DDoS Attacks: DoS AttacksClassification of DoS Attacks Types or Levels of DoS Attacks Tools Used to Launch DoS Attacks DDoS Attacks How to Protect from DoS/DDoS Attacks – SQL Injection: Steps for SQL Injection Attacks How to Prevent SQL Injection Attacks - Buffer Overflow: Types of Buffer Overflow How to Minimize Buffer Overflow - Attacks on Wireless Networks: Traditional Techniques of Attacks on Wireless Networks Theft of Internet Hours and Wi-fi-based Frauds and Misuses How to Secure the Wireless Networks.

SUGGESTED READINGS

1.Nina Godbole & SUNIT Belapure. (2013). CYBER SECURITY. Wiley India Pvt. Ltd. New Delhi
2.Charles ,P. Pfleeger ,& Shari, L. Pfleeger. (2003).
3.Dieter Gollmann . (2006). Computer Security. 2nd edition. John Wiley & Sons.
4. Godbole, N. (2009). Information Systems Security: Metrics Frameworks and Best Practices. Wiley India. New Delhi
5.Marther, T., Kumaraswamy, S.,& Latif, S. (2009). Cloud Security and Privacy: An Enterprise Perceptive on Risk and Complaince. O'Reilly.

WEB SITES

1. http://www.csc.ncsu.edu/faculty/ning
2. csrc.nist.gov/publications/nistpubs/800-12/handbook.pdf
3. www2.warwick.ac.uk/fac/sci/dcs/teaching/modules/cs134/

Semester-II

19CSP203 MONGODB 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To provide students the knowledge and skills to master the NoSQL database mongoDB.
- To Write MongoDB programs from JavaScript shell.
- To define, compare and use of MongoDB with other RDBMS
- To explain the detailed architecture, define objects, load data, query data and performance tune of MongoDB
- To perform query optimization in MongoDB
- To understand replication and sharding in MongoDB

Course Outcomes(COs)

1. To provide students the right skills and knowledge needed to develop Applications on mongoDB
2. To provide students the right skills and knowledge needed to run Applications on mongoDB
3. Writing MongoDB programs from JavaScript shell.
4. Explain the detailed architecture, define objects, load data, query data and performance tune of MongoDB
5. Perform query optimization in MongoDB
6. Understand replication and sharding in MongoDB

Unit I - GETTING STARTED

A database for the modern web – MongoDB through the JavaScript shell – Writing programs using MongoDB.

Unit II - APPLICATION DEVELOPMENT

Document-oriented data – Principles of schema design – Designing an e-commerce data model – Nuts and bolts on databases, collections, and documents. Queries and aggregation – E-commerce queries – MongoDB"s query language – Aggregating orders – Aggregation in detail.

Unit III - UPDATES, ATOMIC OPERATIONS, AND DELETES

A brief tour of document updates – E-commerce updates – Atomic document processing – MongoDB updates and deletes. Indexing and query optimization: Indexing theory – Indexing in practice – Query optimization.

Unit IV – REPLICATION

Overview – Replica sets – Master-slave replication – Drivers and replication. Shading: Overview – A sample shard cluster – Querying and indexing a shard cluster – Choosing a shard key – sharding in production.

Unit V - DEPLOYMENT AND ADMINISTRATION

Deployment – Monitoring and diagnostics – Maintenance – Performance troubleshooting

SUGGESTED READINGS

1. Kyle Banker. (2012). MongoDB in Action. Manning Publications Co.
2. Rick Copeland. (2013). MongoDB Applied Design Patterns, 1st Edition, O"Reilly Media Inc.
3. Gautam Rege, (2012). Ruby and MongoDB Web Development Beginner's Guide. Packt Publishing Ltd
4. Mike Wilson.. (2013). Building Node Applications with MongoDB and Backbone, O"Reilly Media Inc.
5. David Hows. (2009). The definitive guide to MongoDB, 2nd edition, Apress Publication, 8132230485
6. Shakuntala Gupta Edward. 2016. Practical Mongo DB , 2nd edition, Apress Publications, 2016, ISBN 1484206487

WEBSITES

1. http://www.mongodb.org/about/production-deployments/
2. http://docs.mongodb.org/ecosystem/drivers/
3. http://www.mongodb.org/about/applications/
4. http://www.mongodb.org/

Semester-II

19CSP204 INTERNET OF THINGS 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To Understand the Introduction to IoT and Architectural Overview of IoT
- To Understand the various IoT Protocols (Datalink, Network, Transport, Session, Service)
- To understand the standardization of IoT
- To Understand the communication technologies in IoT Know the IoT protocols and web of things
- To integrate IoT with billing and networks
- To Know the various applications of IoT

Course Outcomes(COs)

A student who successfully completes this course should at a minimum be able to:

1. Understand building blocks of Internet of Things and characteristics.
2. Understand IoT protocols, Web of Things and Integrating IOT.
3. Understand the application areas of IOT ·
4. Realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
5. Learn about communication technologies used in IoT
6. Learn about Web of Things, Structural models and applications of IoT.

Unit I – INTRODUCTION

Internet Layers - Protocols - Packets - Services - Performance parameters - Peer-to-peer networks - Sensor networks - Multimedia - IOT Definitions and Functional Requirements –Motivation – Architecture - Web 3.0 View of IoT– Ubiquitous IoT Applications – Four Pillars of IoT – DNA of IoT - The Toolkit 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 – point-to-point protocols - Ethernet protocals - cellular Internet access protocal - Machine-to-machine 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 the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and

Cloud Computing – Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture.

Unit IV - INTEGRATING IoT

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 of Things: Clustering, Synchronization and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging - Case studies: Sensor body-area-network and Control of a smart home.

SUGGESTED READINGS

1. Honbo Zhou . (2012). The Internet of Things in the Cloud:A Middleware Perspective-–CRC Press .
2. - Dieter Uckelmann; Mark Harrison; Florian Michahelles- (Eds.).(2011). Architecting the Internet of Things– Springer.
3. David Easley and Jon Kleinberg . (2010). Networks, Crowds, and Markets: Reasoning About a Highly Connected World , Cambridge University Press.
4. Olivier Hersent, Omar Elloumi and David Boswarthick . (2012). The Internet of Things: Applications to the Smart Grid and Building Automation . Wiley.
5. Olivier Hersent, David Boswarthick, Omar Elloumi. (2012). The Internet of Things – Key applications and Protocols. Wiley.

WEB SITES

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2. https://www.i-scoop.eu/internet-of-things-guide
3. https://iot-analytics.com

Semester-II

19CSP205A ARTIFICIAL INTELLIGENCE 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To gain a historical perspective of AI and its foundations.
- To become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
- To investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
- To experience AI development tools such as an 'AI language', expert system shell, and/or data mining tool.
- To experiment with a machine learning model for simulation and analysis.
- To explore the current scope, potential, limitations, and implications of intelligent systems.

Course Outcomes (COs)

1. Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.
2. Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.
3. Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.
4. Demonstrate proficiency developing applications in an 'AI language', expert system shell, or data mining tool.
5. Demonstrate proficiency in applying scientific method to models of machine learning.
6. Demonstrate an ability to share in discussions of AI, its current scope and limitations, and societal implications.

Unit I - PROBLEM SOLVING AND AI

Puzzles and Games – Problem States and operators – Heuristic programming – state space representations – state descriptions – graph notations – non- deterministic programs

Unit II - STATE SPACE SEARCH METHODS

Breadth first and depth first search – heuristic – admissibility – optimality of algorithms – performance measures – problem reduction representations – AND/OR graphs and higher level state space

Unit III - PROBLEM REDUCTION SEARCH METHODS

cost of solution trees – ordered search – alpha beta and minimum procedure – theorem proving in predicate calculus – syntax, semantics, Herbrand universe: variables, qualifiers, unification, resolvents

Unit IV - PREDICATE CALCULUS IN PROBLEM SOLVING

Answer extraction process – resolution – Automatic program writing – predicate calculus – proof finding methods

Unit V - EXPERT SYSTEMS

Expert systems and conventional programs – expert system organization – Knowledge engineering: knowledge representation techniques – knowledge acquisition – acquiring knowledge from experts – automating knowledge acquisition –Building an expert system – difficulties in developing an expert system

SUGGESTED READINGS

1.Chandra .S.S.V. (2014). Artificial Intelligence and Machine Learning. Kindle Edition.

2. Dr.R.P.Das. (2012). Neural Networks and Fuzzy Logic. 1st Edition, Tata Mcgraw Hill, Delhi

3. Flasiński, Mariusz. (2016). Introduction to Artificial Intelligence. Tata Mcgraw Hill, Delhi.

4. E Charnail, CK Reiesbeck and D V Medermett. (1980). Artificial Intelligence Programming, Lawrence Erlbaum Associates, N J.

1. N J Nilson. (1980). Principles of Artificial Intelligence , Tiega Press, Polo Alto.
2. Elain Rich and Kevin Knight. (1991). Artificial Intelligence. McGraw Hill.
3. Donald A Waterman. (1986). A Guide to Expert Systems, Tech knowledge series in knowledge engineering.

WEB SITES

1. https://www.tutorialspoint.com › Artificial Intelligence
2. www-formal.stanford.edu/jmc/whatisai/node3.html

Semester-II

19CSP205B MACHINE LEARNING 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

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**.**
- To recognize the characteristics of machine learning that make it useful to real-world problems.
- To characterize machine learning algorithms as supervised, semi-supervised, and unsupervised.
- To effectively use machine learning toolboxes.

Course Outcomes(COs)

On successful completion of the course the student should be

1. Remember the basic concepts and techniques of Machine Learning.
2. Develop skills of using recent machine learning software for solving practical problems.
3. of doing independent study and research**.**
4. To recognize the characteristics of machine learning that make it useful to real-world problems.
5. To characterize machine learning algorithms as supervised, semi-supervised, and unsupervised.
6. To effectively use machine learning toolboxes.

Unit I - FOUNDATIONS OF LEARNING

Components of learning – learning models – geometric models – probabilistic models – logic models – grouping and grading – learning versus design – types of learning – supervised – unsupervised – reinforcement – theory of learning – feasibility of learning – error and noise – training versus testing – theory of generalization – generalization bound –bias and variance – learning curve

Unit II - LINEAR MODELS

Linear classification – univariate linear regression – multivariate linear regression – regularized regression – Logistic regression – perceptrons – multilayer neural networks – learning neural networks structures – support vector machines – soft margin SVM – generalization and over fitting – regularization – validation

Unit III - DISTANCE-BASED MODELS

Nearest neighbor models – K-means – clustering around medoids – silhouttes – hierarchical clustering – k- d trees – locality sensitive hashing – non - parametric regression – ensemble learning – bagging and random forests – boosting – meta silhouttes – hierarchical clustering – k- d trees – locality sensitive hashing – non - parametric regression – ensemble learning – bagging and random forests – boosting – meta learning

Unit IV - TREE AND RULE MODELS

Decision trees – learning decision trees – ranking and probability estimation trees – Regression trees – clustering trees – learning ordered rule lists – learning unordered rule lists – descriptive rule learning – association rule mining – first -order rule learning

Unit V - REINFORCEMENT LEARNING

Passive reinforcement learning – direct utility estimation – adaptive dynamic programming – temporal - difference learning – active reinforcement learning – exploration – learning an action utility function – Generalization in reinforcement learning – policy search – applications in game playing – applications in robot control

SUGGESTED READINGS

1. Y. S. Abu - Mostafa, M. Magdon-Ismail, and H.-T. Lin. (2012).Learning from Data, AMLBook Publishers.
2. P. Flach. (2012). "Machine Learning: The art and science of algorithms that make sense of data", Cambridge University Press.
3. K. P. Murphy. (2012). Machine Learning: A probabilistic perspective, MIT Press,
4. C. M. Bishop. (2007). Pattern Recognition and Machine Learning. Springer.
5. D. Barber. (2012). Bayesian Reasoning and Machine Learning, Cambridge University Press.

WEB SITES

1. https://machinelearningmastery.com/linear-regression-for-machine-learning/
2. https://www.cambridge.org/core/books/machine-learning/distancebased-models/
3. https://dzone.com/articles/machine-learning-with-decision-trees
4. http://reinforcementlearning.ai-depot.com/

Semester-II

19CSP205C NEURAL NETWORKS & FUZZY LOGIC 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To understand the fundamentals of neural networks
- To learn about the working principles of back propagation networks
- To learn about introduction and different architectures of neural network
- To understand the selection of various Parameters in BPN.
- To explore the ideas of Adaptive Resonance Theory.
- To discuss the concept of fuzzy logic systems.

Course Outcomes(COs)

A student who successfully completes this course should at a minimum be able to:

1. Have adequate knowledge about basic Concepts of Neural Networks.
2. Understand the concept of fuzziness involved in various systems.
3. Understand comprehensive knowledge of fuzzy sets, Crisp sets, Fuzzy relations and Crisp relations.
4. Learn the concepts of Fuzzy Rule Based System and Defuzzification Methods.
5. Learn about the working principles of back propagation networks
6. Explore the ideas of Adaptive Resonance Theory

Unit I - FUNDAMENTALS OF NEURAL NETWORKS

Basic Concepts of Neural Networks – Human Brain – Model of an Artificial Neuron – Neural Network Architectures – Characteristics of Neural Networks – Learning Methods – Taxonomy of Neural Network Architectures – History of Neural Network Research – Easy Neural Network Architectures – Some Application Domains.

Unit II - BACK PROPAGATION NETWORKS

Architecture of a Back Propagation Network – Back Propagation Learning – Illustration – Applications – Effects of Tuning Parameters of the Back Propagation Neural Network – Selection of Various Parameters in BPN – Variations of Standard Back Propagation Algorithm.

Unit III - ADAPTIVE RESONANCE THEORY

Introduction – ART1 – AR T2 – Applications.

Unit IV - FUZZY SET THEORY

Fuzzy versus Crisp – Crisp Sets – Fuzzy Sets – Crisp Relations – Fuzzy Relations.

Unit V - FUZZY SYSTEMS

Crisp Logic – Predicate Logic – Fuzz y Logic – Fuzzy Rule Based System – Defuzzification Methods.

SUGGESTED READINGS

1. S. Rajasekaran, G. A. VijayalakshmiPai. (2003). Neural Networks, Fuzzy Logic and Genetic Algorithms Synthesis and Applications, Prentice Hall of India.
2. James A. Freeman, David M. Skapura, (2004). Neural Networks – Algorithms, Applications and Programming Techniques, Pearson Education.
3. Fredric M. Ham, Ivica Kostunica. (1991).Principles of Neuro Computing for Science of Engineering , Tata McGraw Hill.
4. Simon Haykin. (2001).Neural Networks – A Comprehensive Foundation , Prentice Hall of India.
5. Dr.R.P.Das. (2012). Neural Networks and Fuzzy Logic. 1st Edition, Tata Mcgraw Hill, Delhi
6. Flasiński, Mariusz. (2016). Introduction to Artificial Intelligence. Tata Mcgraw Hill, Delhi.
7. Dr.R.P.Das. (2012). Neural Networks and Fuzzy Logic. 1st Edition, Tata Mcgraw Hill, Delhi.

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2. https://www.tutorialspoint.com/fuzzy_logic/fuzziness_in_neural_networks.htm
3. https://www.philadelphia.edu.jo/academics/kaubaidy/uploads/Syria-FN-2002.pdf
4. https://www.cse.unr.edu/~looney/cs773b/FNNtutorial.pdf

Semester-II

19CSP211 ROUTER CONFIGURATION – PRACTICAL 4H – 2C

Instruction Hours / week: L: 0 T: 0 P: 4 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To get an architectural overview of the TCP/IP Protocol Suite
- To understand about subnets using IP classes
- To understand the key features and functions of ARP Protocol.
- To understand how basic routing protocol works.
- To understand about DNS and its applications
- To understand the concepts of Remote Login and VPN

Course Outcomes (COs)

At the completion of the course, students will:

1. Have the ability to analyze and differentiate networking protocols used in TCP/IP protocol suite.
2. Understand the routing IP datagrams and checksum.
3. Exposed to unicast and multicast routing.
4. Learn about host name resolution and the Domain Name System (DNS).
5. Learn about services and operations of DHCP Servers and Domain Name Servers
6. Understand about SMTP and SNMP.

List of Programs

1. Simple router configuration.
2. Access and utilize the router to set basic parameters.
3. Connect configure and verify operation status of a device interface.
4. Implement static and dynamic addressing services for hosts in a LAN environment.
5. Identify and correct common problems associated with IP addressing and host configurations.
6. Configure verify and troubleshoot RIPv2.
7. Perform and verify routing configuration tasks for a static or default route given.
8. Configure verify and troubleshoot NAT operation on a router.
9. Configure and verify a PPP connection between routers.

SUGGESTED READINGS

1. Jason Edelman, Scott Lowe (2018), Network Programmability and Automation, O'Reilly
2. Jeff Doyle, Jennifer DeHaven Carroll (2012), Routing TCP/IP, Volume 1 (2nd Edition), Cisco Press
3. Behrouz, A. Forouzan. (2009). TCP/IP Protocol Suite. 3rd edition. Tata McGraw Hill Publication. New Delhi:

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4. Andrews, S. Tanenbaum. (2003). Computer Networks. 4th edition.:Prentice Hall of India Private Ltd. New Delhi.
5. Buck Graham. (2007). TCP/IP Addressing. 2nd edition. Harcount India Private Limited. New Delhi
6. Douglas, E. Comer. (2000). Computer Networks and Internets. 4th edition. Pearson Education. New Delhi.
7. William Stallings. (2007). Data and Communication Network. 8th edition. Tata McGraw Hill. New Delhi

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- http://docwiki.cisco.com/wiki/Introduction_to_WAN_Technologies
- www.yale.edu/pclt/COMM/TCPIP.HTM
- www.w3schools.com/tcpip/default.asp

Semester-II

19CSP212 MONGODB - PRACTICAL – PRACTICAL 4H – 2C

Instruction Hours / week: L: 0 T: 0 P: 4 **Marks:** Internal:**40** External:**60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To provide students the knowledge and skills to master the NoSQL database mongoDB.
- To Write MongoDB programs from JavaScript shell.
- To define, compare and use of MongoDB with other RDBMS
- To explain the detailed architecture, define objects, load data, query data and performance tune of MongoDB
- To perform query optimization in MongoDB
- To understand replication and sharding in MongoDB

Course Outcomes(COs)

1. To provide students the right skills and knowledge needed to develop Applications on mongoDB
2. To provide students the right skills and knowledge needed to run Applications on mongoDB
3. Writing MongoDB programs from JavaScript shell.
4. Explain the detailed architecture, define objects, load data, query data and performance tune of MongoDB
5. Perform query optimization in MongoDB
6. Understand replication and sharding in MongoDB

List of Programs

Structure of 'restaurants' collection :

{ "address": { "building": "1007", "coord": [-73.856077, 40.848447], "street": "Morris Park Ave", "zipcode": "10462" }, "borough": "Bronx", "cuisine": "Bakery", "grades": [{ "date": { "$date": 1393804800000 }, "grade": "A", "score": 2 }, { "date": { "$date": 1378857600000 }, "grade": "A", "score": 6 }, { "date": { "$date": 1358985600000 }, "grade": "A", "score": 10 }, { "date": { "$date": 1322006400000 }, "grade": "A", "score": 9 }, { "date": { "$date": 1299715200000 }, "grade": "B", "score": 14 }, "name": "Morris Park Bake Shop", "restaurant_id": "30075445" }

1. Write a MongoDB query
    a. to display all the documents in the collection restaurants.
    b. to display the fields restaurant_id, name, borough and cuisine for all the documents in the collection restaurant.
    c. to display the fields restaurant_id, name, borough and cuisine, but exclude the field _id for all the documents in the collection restaurant
    d. to display the fields restaurant_id, name, borough and zip code, but exclude the field _id for all the documents in the collection restaurant.
    e. to display all the restaurant which is in the borough Bronx

f. to display the first 5 restaurant which is in the borough Bronx.
g. to display the next 5 restaurants after skipping first 5 which are in the borough Bronx.
h. to find the restaurants who achieved a score more than 90.
i. to find the restaurants that achieved a score, more than 80 but less than 100.

2. Write a MongoDB query
   a. to find the restaurants which locate in latitude value less than -95.754168.
   b. to find the restaurants that do not prepare any cuisine of 'American' and their grade score more than 70 and latitude less than -65.754168.
   c. to find the restaurants which do not prepare any cuisine of 'American' and achieved a score more than 70 and not located in the longitude less than -65.754168. Note : Do this query without using $and operator. Go to the editor
   d. to find the restaurants which do not prepare any cuisine of 'American ' and achieved a grade point 'A' not belongs to the borough Brooklyn. The document must be displayed according to the cuisine in descending order.
3. Write a MongoDB query
   a. to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'Wil' as first three letters for its name. Go to the editor
   b. to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'ces' as last three letters for its name.
   c. to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'Reg' as three letters somewhere in its name.
4. Write a MongoDB query
   a. to find the restaurants which belong to the borough Bronx and prepared either American or Chinese dish.
   b. to find the restaurant Id, name, borough and cuisine for those restaurants which belong to the borough Staten Island or Queens or Bronxor Brooklyn.
   c. to find the restaurant Id, name, borough and cuisine for those restaurants which are not belonging to the borough Staten Island or Queens or Bronxor Brooklyn.
   d. to find the restaurant Id, name, borough and cuisine for those restaurants which achieved a score which is not more than 10.
   e. to find the restaurant Id, name, borough and cuisine for those restaurants which prepared dish except 'American' and 'Chinees' or restaurant's name begins with letter 'Wil'.
   f. to find the restaurant Id, name, and grades for those restaurants which achieved a grade of "A" and scored 11 on an ISODate "2014-08-11T00:00:00Z" among many of survey dates
   g. to find the restaurant Id, name and grades for those restaurants where the 2nd element of grades array contains a grade of "A" and score 9 on an ISODate "2014-08-11T00:00:00Z".
5. Write a MongoDB query to find the restaurant Id, name, address and geographical location for those restaurants where 2nd element of coord array contains a value which is more than 42 and upto 52
6. Write a MongoDB query

a. to arrange the name of the restaurants in descending along with all the columns.
b. to arranged the name of the cuisine in ascending order and for that same cuisine borough should be in descending order.

7. Write a MongoDB query to know whether all the addresses contains the street or not.
8. Write a MongoDB query which will select all documents in the restaurants collection where the coord field value is Double.
9. Write a MongoDB query which will select the restaurant Id, name and grades for those restaurants which returns 0 as a remainder after dividing the score by 7.
10. Write a MongoDB query to find the restaurant name, borough, longitude and attitude and cuisine for those restaurants which contains 'mon' as three letters somewhere in its name.

SUGGESTED READINGS

1. Kyle Banker. (2012). MongoDB in Action. Manning Publications Co.
2. Rick Copeland. (2013). MongoDB Applied Design Patterns, 1st Edition, O"Reilly Media Inc.
3. Gautam Rege, (2012). Ruby and MongoDB Web Development Beginner's Guide. Packt Publishing Ltd
4. Mike Wilson.. (2013). Building Node Applications with MongoDB and Backbone, O"Reilly Media Inc.
5. David Hows. (2009). The definitive guide to MongoDB, 2nd edition, Apress Publication, 8132230485
6. Shakuntala Gupta Edward. 2016. Practical Mongo DB , 2nd edition, Apress Publications, 2016, ISBN 1484206487

WEBSITES

1. http://www.mongodb.org/about/production-deployments/
2. http://docs.mongodb.org/ecosystem/drivers/
3. http://www.mongodb.org/about/applications/
4. http://www.mongodb.org/

Semester-III

19CSP301 **J2EE** **4H – 4C**

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Int : **40** Ext : **60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To Understand the In-depth concepts of JEE
- To Understand the in-depth Life cycle of servlets and JSP.
- To Learn how to communicate with databases using Java.
- To Handle Errors and Exceptions in Web Applications
- To Use NetBeans IDE for creating J2EE Applications
- To impart expertise in Web Application Development using J2EE.

Course Outcomes(COs)

1. Understand the In-depth concepts of JEE
2. Understand the in-depth Life cycle of servlets and JSP.
3. Learn how to communicate with databases using Java.
4. Handle Errors and Exceptions in Web Applications
5. Use NetBeans IDE for creating J2EE Applications
6. Understand J2EE as an architecture and platform for building and deploying web-based, n-tier, transactional, component-based enterprise applications

Unit I - J2EE OVERVIEW

Beginning of Java – Java Byte code – Advantages of Java –J2EE and J2SE. J2EE Multi Tier Architecture – Distributive Systems – The Tier – Multi Tier Architecture – Client Tier Web Tier Enterprise Java Beans Tier Enterprise Information Systems Tier Implementation.

Unit II - J2EE DATABASE CONCEPTS

Data – Database – Database Schema. **JDBC Objects**: Driver Types – Packages – JDBC Process – Database Connection – Statement Objects – Result Set – Meta Data.

Unit III - JAVA SERVLETS

Benefits – Anatomy – Reading Data from Client –Reading HTTP Request Headers – Sending Data to client – Working with Cookies.

Unit IV - ENTERPRISE JAVA BEANS

Deployment Descriptors – Session Java Bean –Entity Java Bean Message Driven Bean.

Unit V – JSP

What is Java Server Pages? - Evolution of Dynamic Content Technologies – JSP & Java 2 Enterprise ed.).; **JSP Fundamentals**: Writing your first JSP- Tag conversions- Running

JSP. **Programming JSP Scripts**: Scripting Languages – JSP tags- JSP directives – Scripting elements – Flow of Control – comments;
Java Remote Method Invocation.

SUGGESTED READINGS

1. Jim Keogh. (2014). The Complete Reference J2EE (1st ed.). New Delhi: Tata McGraw Hill.
   (PAGE NOS. : 3 - 61 23 - 35 98 – 116124 – 151 157 – 159 350 – 369 406 – 443 380 – 395 486- 490)
2. Duane, K. Fields., & Mark, A. Kolb. (2012). Web Development with Java Server Pages (1st ed.). Pune: Manning Publications.
   (PAGE NOS. : 2 – 15 46 - 64 65 – 99)

3. Joseph, J. Bambara et al. (2006). J2EE Unleashed (1st ed.). New Delhi:Tech Media.
4. Paul, J. Perrone., Venkata, S. R. Chaganti., Venkata S. R. Krishna., & Tom Schwenk. (2009). J2EE Developer's Handbook. New Delhi: Sams Publications.
5. Rod Johnson. (2012). J2EE Development without EJB (1st ed.). New Delhi:Wiley Dream Tech.
6. Rod Johnson., & Rod Johnson, P.H. (2012). Expert One-On-One J2ee Design and Development. New Delhi: John Wiley & Sons.

WEB SITES

1. java.sun.com/javaee/
2. java.sun.com/j2ee/1.4/docs/tutorial/doc/
3. www.j2eebrain.com/

Semester-III

19CSP302 OPEN SOURCE TECHNOLOGIES 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Int : **40** Ext : **60** Total: **100**
End Semester Exam : 3 Hours

Course Objectives

- To understand the concepts and principles that underlies modern operating systems
- To practice component to relate theoretical principles with operating system implementation.
- To learn about processes and processor management
- To learn about concurrency and synchronization
- To understand memory management schemes, file system and secondary storage management security and protection etc.
- To use different IPC ways in their programs like Message Queues, Semaphores, and Shared Memories.

Course Outcomes(COs)

At the end of the course the student will be in a position to –

1. Use basic fundamental utilities which are required again and again on daily basis to work on a modern operating system.
2. Write useful shell scripts which greatly and effectively enhance the usefulness of computers, from the point of view of programmers and application developers.
3. Understand basics of various OS related concepts, from programmer's point of view, like files, directories, kernel, inodes, APIs, system calls, processes, signals, etc.
4. Develop applications where several processes need to communicate with each other to complete a task.
5. Use different IPC ways in their programs like Message Queues, Semaphores, and Shared Memories.
6. Write programs which employs advanced concepts like multithreading.

Unit I - HISTORY AND OVERVIEW OF GNU/LINUX AND FOSS 3

Definition of FOSS & GNU History of GNU/Linux and the Free Software Movement-Advantages of Free Software and GNU/Linux FOSS usage trends and potential—global and Indian.

Unit II - SYSTEM ADMINISTRATION

GNU/Linux OS installation--detect hardware configure disk partitions & file systems and install a GNU/Linux distribution ; Basic shell commands -logging in listing files editing files copying/moving files viewing file contents changing file modes and permissions process management ; User and group management file ownerships and permissions PAM authentication ; Introduction to common system configuration files & log files ;

Configuring networking basics of TCP/IP networking and routing connecting to the Internet (through dialup DSL Ethernet leased line) ; Configuring additional hardware - sound cards displays & display cards network cards modems USB drives CD writers ; Understanding the OS boot up process ; Performing every day tasks using gnu/Linux -- accessing the Internet playing music editing documents and spreadsheets sending and receiving email copy files from disks and over the network playing games writing CDs ; X Window system configuration and utilities--configure X windows detect display devices ; Installing software from source code as well as using binary packages.

Unit III - SERVER SETUP AND CONFIGURATION

Setting up email servers--using postfix (SMTP services) courier (IMAP & POP3 services) squirrel mail (web mail services) ; Setting up web servers --using apache (HTTP services) php (server-side scripting) perl (CGI support) ; Setting up file services -- using samba (file and authentication services for windows networks) using NFS (file services for gnu/Linux / Unix networks) ; Setting up proxy services --using squid (http / ftp / https proxy services) ; Setting up printer services -using CUPS (print spooler) foomatic (printer database) ; Setting up a firewall -Using netfilter and iptables.

Unit IV - PROGRAMMING TOOLS

Using the GNU Compiler Collection --GNU compiler tools ; the C preprocessor (cpp) the C compiler (gcc) and the C++ compiler (g++) assembler (gas) ; Understanding build systems --constructing make files and using make using autoconf and autogen to automatically generate make files tailored for different development environments ; Using source code versioning and management tools --using cvs to manage source code revisions patch & diff ; Understanding the GNU Libc libraries and linker –linking against object archives (.a libraries) and dynamic shared object libraries (.so libraries) generating statically linked binaries and libraries generating dynamically linked libraries.
Using the GNU debugging tools --gdb to debug programs graphical debuggers like ddd memory debugging / profiling libraries mpatrol and valgrind ; Review of common programming practicies and guidelines for GNU/Linux and FOSS ; Introduction to Bash sed & awk scripting.

Unit V - APPLICATION PROGRAMMING

Basics of the X Windows server architecture ; Qt Programming ; Gtk+ Programming ; Python Programming ; Programming GUI applications with localisation support.

SUGGESTED READINGS

1. Venkateshwarlu, N. B. (2013) Introduction to Linux: Installation and Programming. New Delhi: BPS Publishers.

2. Matt Welsh., Matthias Kalle Dalheimer., Terry Dawson.,& Lar Kaufman. (2012). Running Linux (4th ed.). O'Reilly Publishers.

3. Carla Schroder.(2014). Linux Cookbook(1st ed.). O'Reilly Cookbooks Series.

WEB SITES

1. http://www.oreilly.com/catalog/ open sources/book/toc.html
2. http://dsl.org/cookbook/cookbook_toc.html
3. http://www.tldp.org/guides.html
4. http://www.gnu.org/doc/using.html
5. http://www.networktheory.co.uk/docs/gccintro/
6. http://sources.redhat.com/autobook/
7. http://cvsbook.red-bean.com/
8. http://www.tldp.org/guides.html
9. http://developer.gnome.org/doc/GGAD
10. http://www.python.org/doc/current/tut/tut.html

Semester-III

19CSP303 DIGITAL IMAGE PROCESSING 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Int : **40** Ext : **60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To make the students learn the fundamental theories and techniques of digital image processing.
- To study the mathematical transforms necessary for image processing, image manipulation and a preliminary understanding of Computer Vision.
- To make students to understand the image degradation and enhancement.
- To understand the basic relationships between pixels in an image
- To know various segmentation techniques, and object descriptors.
- To implement pattern recognition to enhance an image.

Course Outcomes(COs)

1. Perform image manipulations and analysis in many different fields.
2. Apply knowledge of computing mathematics science and engineering to solve problems in multidisciplinary research.
3. Implement the understanding in sharpening the image.
4. Perform the image segmentation using the compression method.
5. Understand the image to represent in an region.
6. Analyze the basic algorithms used for image processing &image compression with morphological image processing.

Unit I – INTRODUCTION

Digital image processing – Origins of digital image processing- Examples of fields that use digital image processing-Fundamental steps in digital image processing- Components of an image processing system-Representing digital image.

Unit II - BASIC RELATIONSHIPS BETWEEN PIXELS

Basic gray level transformations- Histogram processing - Basic spatial filtering- Smoothing special filtering- Image Degradation/ Restoration process- Noise Models.

Unit III - IMAGE SEGMENTATION

Thresholding - Edge Based Segmentation – Region Based Segmentation – Matching. Image Compression: Error Criterion - Lossy Compression - Lossless Compression.

Unit IV - SHAPE REPRESENTATION AND DESCRIPTION

Region Identification - Contour Based Representation And Description – Region Based Shape Representation And Description

Unit V - IMAGE RECOGNITION

Introduction – Statistical Pattern Recognition - Neural Net- Syntactic Pattern Recognition - Graph Matching - Clustering

SUGGESTED READINGS

1. Rafael, C. Gonzalez ., & Richard, E. Woods. (2012). Digital Image Processing (3rd ed.). New Delhi:Pearson Education.

2. Chanda, B., & Dutta Majumder, D. (2010). Digital Image Processing and Analysis (1st ed.). New Delhi: Prentice Hall of India.
3. Milan Sonka., Vaclav Hlavac.,& Roger Boyle. (2012). Image Processing Analysis and Machine Vision (2nd ed.). New Delhi: Vikas Publishing House.
4. Nick Efford. (2009). Digital Image Processing – A Practical introduction using JAVA (1st ed.). New Delhi: Pearson Education Limited.

WEB SITES

1. http://www.cs.dartmouth.edu/farid/tutorials/fip.pdf
2. http://www.imageprocessingbasics.com/
3. http://www.astropix.com/HTML/J_DIGIT/TOC_DIG.HTM

Semester-III

19CSP304 GREEN COMPUTING 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Int : **40** Ext : **60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To provide a comprehensive coverage of topics related to green computing.
- To provide an insight into Fundamentals of Green IT, Green Assets and Modeling
- To understand IT use in relation to environmental perspectives.
- To discuss Green Compliance and Green Mobile
- To relate green IT to sustainable development
- To provide deep understanding about Green Computing by discussing Case studies.

Course Outcomes(COs)

1. Give an account of the concept green IT,
2. Give an account of Green Assets and Modeling,
3. Describe green IT in grid framework in relation to technology,
4. Relate green IT to sustainable development,
5. Evaluate IT use in relation to environmental perspectives,
6. Analyze case studies based on green IT

Unit I - FUNDAMENTALS OF GREEN IT

Business, IT, and the Environment – Green computing: carbon foot print, scoop on power – Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics - Approaches to green computing - Middleware Support - Compiler Optimization - Product longevity – Software induced energy consumption - its measurement and rating.

Unit II - GREEN ASSETS AND MODELING

Green Assets: Buildings, Data Centers, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture – Environmental Intelligence – Green Supply Chains – Green Information Systems: Design and Development Models.

Unit III - GRID FRAMEWORK

Virtualizing of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting – Materials recycling – Best ways for Green PC – Green Data center – Green Grid framework.

Unit IV - GREEN COMPLIANCE AND GREEN MOBILE

Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, and Audits – Emergent Carbon Issues: Technologies

and Future - Green mobile - optimizing for minimizing battery consumption - Web, Temporal and Spatial Data Mining Materials recycling.

Unit V - CASE STUDIES

The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.

SUGGESTED READINGS

1. Bhuvan Unhelkar. (2011). Green IT Strategies and Applications-Using Environmental Intelligence. CRC Press.
2. Woody Leonhard, Katherrine Murray. (2009). Green Home computing for dummies.
3. Alin Gales, Michael Schaefer, Mike Ebbers. (2011). Green Data enter: steps for the Journey. Shoff/IBM rebook.
4. John Lamb. (2009). "The Greening of IT". Pearson Education.
5. Jason Harris. (2008). "Green Computing and Green IT- Best Practices on regulations & industry", Lulu.com.
6. Wu Chun Feng. (2012). "Green computing: Large Scale energy efficiency". CRC Press.

WEB SITES

1. https://www.researchgate.net/post/What_is_Green_Computing
2. https://www.kbmanage.com/concept/green-computing
3. https://www.computer.org/csdl/proceedings/hicss/2010/3869/00/02-03-06.pdf

Semester-III

19CSP305A WEB ENGINEERING 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Int : **40** Ext : **60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To understand the concepts, principles, strategies, and methodologies of web applications development.
- To Understand the characteristics of web applications
- To Learn to Model web applications
- To be aware of Systematic methods
- To be familiar with the testing techniques for web applications
- To design and develop a web application

Course Outcomes(COs)

1. Apply the characteristics of web applications.
2. Model web applications.
3. Learn to create requirement engineering for web applications
4. Understand the various architecture of web applications
5. Design web applications.
6. Test and develop web applications.

Unit I - INTRODUCTION

Motivation – categories & characteristics of web applications – product related, usage related and development related – evolution of WE.

Unit II - REQUIREMENTS ENGINEERING (RE) FOR WEB APPLICATIONS

Introduction – fundamentals –sources of requirements – RE activities – RE specifications in WE - RE principles for web applications – adapting RE methods for web applications development – requirement types, notations, tools.

Unit III - WEB APPLICATION ARCHITECTURE

Introduction – fundamentals – definition of architecture – developing and characterising architectures – components of a generic web application architecture – layered architecture – database centric architecture - architecture for web document management – architecture for multimedia data.

Unit IV -MODELING WEB APPLICATIONS

Introduction – modeling specifics in WE – levels – aspects – phases of customizations – modeling requirements – hypertext modeling - hypertext structure modeling concepts – access modeling concepts. Web application design – web design from an evolutionary perspective – information design – software design – merging information design & software design – problems and restrictions in integrated web design – a proposed structural approach – presentation design – presentation of nodes and meshes – device independent development – approaches – interaction design – user interaction – user interface organization – navigation design – deigning a link representation – designing link internals – navigation and orientation – structural dialog for complex activities – interplay with technology and architecture – functional design.

Unit V - TESTING WEB APPLICATIONS

Introduction – fundamentals – terminology – quality characteristics – test objectives – test levels – role of tester – test specifics in we – test approaches – conventional, agile - test schemes – three test dimensions – applying the scheme to web applications – test methods and techniques – link testing – browser testing – usability testing – load, stress and continues testing – testing security – test-driven development. Web project development – scope – refining frame work activities – building an WebE team - risk management – making schedule – managing quality, change – project tracking.

SUGGESTED READINGS

1. Gerti Kappel, Birgit Proll, Siegried Reich and Werner Retschitzegger. (2011). Web Engineering: The Discipline of Systematic Development of Web Applications, John Wiley and Sons Ltd, ISBN: 9780470064894.
2. Roger S Pressman and David Lowe. (2009). Web Engineering: A Practitioner's Approach. 1 st Edition. Tata Macgraw Hill Publications, ISBN: 9780073523293.
3. Leon Shklar and Rich Rosen. (2010). Web Application Architecture: Principles, Protocols and Practices. 2nd Edition. Wiley, ISBN: 047051860X.
4. Guy W Leeky-Thompson. (2011). Just Enough Web Programming with XHTML, PHP, and MySQL. 1st Edition, Cenagage Learning, ISBN: 159863481X.
5. Anders Moller and Michael Schwartzbach. (2009). An Introduction to XML and Web Technologies. 1st Edition. Pearson Education, New Delhi.
6. Chrits Bates. (2012). Web Programming: Building Internet Applications, 3rd Edition,Wiley India Edition, ISBN: 8126512903.

WEB SITES

1. http://www.csun.edu/~twang/595WEB/Slides/Week1.pdf
2. https://www.quora.com/What-is-web-engineering
3. https://www.scribd.com/document/324899044/Web-Engineering-Models

Semester-III

19CSP305B WIRELESS APPLICATION PROTOCOL 4H – 4C

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Int : **40** Ext : **60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To learn the concept of Wireless Application Protocols.
- To learn Development tools, Language and built Wireless Application
- To learn wireless concepts, Technologies and gateways.
- To learn the different application area of WAP.
- To understand the environment of WAP.
- To know about WTA Architecture and its security

Course Outcomes(COs)

1. Pursue research in the area of wireless communication.
2. Develop applications that are mobile-device specific and demonstrate current practice in mobile communication contexts.
3. Understand Components of the WAP Standards and Wireless Telephony Applications
4. Appreciate the contribution of Wireless Communication networks to overall technological growth.
5. Compare and contrast multiple division techniques, mobile communication systems, and existing wireless networks.
6. Design and Develop a wireless application using WML

Unit I - MOBILE DATA INTRODUCTION

The Rise of Mobile Data-Key Services for the Mobile Internet- Overview of the WAP-The origins of the WAP- WAP architecture-WAP Internal Structure-Components of the WAP Standards- WAP Gateways-Network Infrastructure Services Supporting WAP Clients-WAP Architecture Design Principles –Relationship with other standards.

Unit II - THE WIRELESS MARKUP LANGUAGE

Overview-The WML Document Model-WML Authoring-URLS Identity Content-Mark Up Basics- WML Basics-Basic Content-Events Tasks and Binding.

Unit III - VARIABLES

Other Content you can include-Controls-Miscellaneous Markup- Sending Information-Application Security-Other Data**;** The Meta element- Document Type Declarations-Errors and browsers Limitations-Content generation- WML Version Negotiation.

Unit IV - USER INTERFACE DESIGN

Making Wireless Applications Easy to Use- Website Design- Computer Terminals Vs Mobile Terminals-Designing a usable WAP site-structured usability method-user interface design guidelines- Design guidelines for selected WML Elements.

Unit V - WIRELESS TELEPHONY APPLICATIONS

Overview of the WTA Architecture- WTA Client Frame Work –WTA Server and Security- Design Considerations- Application Creation Tool Box- Future of WTA Enhancements.
The Mobile Internet Future**:** Better Content- Easier Access-Beyond Browsing – Beyond Cellular- Mobile Data Unleashed.

SUGGESTED READINGS

1. Sandeep Singhal. (2009).The Wireless Application Protocol (1st ed.). New Delhi: Pearson Education.
2. Charles Arehart., & Nirmal Chidambarametal. (2012). Professional WAP.New Delhi: Shroff Publishers & Distributers Pvt Ltd.

3. Dale BulBrook. (2010). WAP –A Beginner's Guide (1st ed.). New Delhi: TMH Publication
4. Ruseyev, S. (2013). WAP Technology &Applications(1st ed.). New Delhi: Eswar Publications.

WEB SITES

1. www.en.wikipedia.org/wiki/Wireless_Application_Protocol
2. www.wap.com
3. www.w3schools.com/wap/

Semester-III

19CSP305C SOFTWARE PROJECT MANAGEMENT 4H – 4C

Instruction Hours / week: L: 0 T: 0 P: 4 **Marks:** Int : **40** Ext : **60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To introduce the concepts and methods required for the construction of large software intensive systems.
- To develop a broad understanding of the discipline of software engineering and management of software systems.
- To provide an understanding of both theoretical and methodological issues involve in modern software engineering project management and focuses strongly on Practical techniques.
- To apply proper theoretical, technical, and practical knowledge of software requirements, analysis, design, implementation, verification and validation, and documentation
- To develop appropriate design solutions to a given problem using software engineering approaches that integrates ethical, social, legal, and economic concerns.
- To express and understand the importance of negotiation, effective work habits, leadership, and good communication with stakeholders, in written and oral forms, in a typical software development environment

Course Outcomes (COs)

Upon the completion of the course students will be able to :-

1. Apply the process to be followed in the software development life-cycle models.
2. Implement communication, modeling, construction & deployment practices in software development.
3. Analyze & design the software models using unified modeling language (UML).
4. Explain the concepts of various software testing methods & be able to apply appropriate testing approaches for development of software.
5. Explain the quality management & different types of metrics used in software development.
6. Apply the concepts of project management & planning

Unit I – INTRODUCTION

Software Project Management -Project evaluation and programme Management- An overview of Project planning- Stepwise planning-Selection of an appropriate project Approach.

Unit II - SOFTWARE EFFORT ESTIMATION

Problems with over- and underestimates-Software effort estimation Techniques - Estimating by analogy -Albrecht function point analysis -Function points Mark II –

COSMIC full function points - COCOMO 13: a parametric productivity model. Activity planning: The objectives of activity Planning-Project schedules - Projects and activities - Sequencing and scheduling activities - Network planning models - Formulating a network model - Adding the time dimension - The forward pass - The backward pass - Identifying the critical path.

Unit III - RISK MANAGEMENT

Introduction to Risk - Categories of risk - A framework for dealing with risk -Risk identification - Risk assessment - Risk planning - Risk management - Evaluating risks to the schedule - Applying the PERT technique - Monte Carlo simulation - Critical chain concepts. Resource allocation :-Introduction -The nature of resources - Identifying resource requirements -Scheduling resources -Creating critical paths -Counting the cost - Being specific -Publishing the resource schedule - Cost schedules -The scheduling sequence.

Unit IV - MONITORING AND CONTROL

Creating the framework-Collecting the data- Visualizing progress- Cost monitoring - Earned value analysis-Prioritizing monitoring - Getting the project back to target - Change control. Managing people in software environments: Understanding behavior - Organization behavior: a background - Selecting the right person for the job - Instruction in the best methods - Motivation - Stress -Health and safety -Some ethical and professional concern

Unit V- WORKING IN TEAMS

Becoming a team - Decision making - Organizational structures - Coordination dependencies - Dispersed and virtual teams - Communication genres -Communication plans - Leadership. Software quality: Introduction -The place of software quality in project planning - The importance of software quality - Defining software quality - ISO 9126 -Product versus process quality management -Quality management systems - Process capability models -Techniques to help enhance software quality -Testing -Quality plans

SUGGESTED READINGS

1. Bob Hughes and Mike Cotterell . (2011). Software Project Management, 5th Edition, New Delhi: Tata McGraw Hill
2. Royce. (2012). Software Project Management, 1st Edition, New Delhi: Addisions Wesley.
3. Kelkar. (2013). "Software Project Management", 3rd edition, Prentice Hall India.

WEB SITES

1. http://en.wikipedia.org/wiki/Software_project_management
2. http://www.onesmartclick.com/engineering/software-engineering.html
3. http://www.cc.gatech.edu/classes/AY2000/cs3802_fall/

Semester-III

19CSP311 **J2EE – PRACTICAL** **4H – 2C**

Instruction Hours / week: L: 0 T: 0 P: 4 **Marks:** Int : **40** Ext : **60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To Understand the In-depth concepts of JEE
- To Understand the in-depth Life cycle of servlets and JSP.
- To Learn how to communicate with databases using Java.
- To Handle Errors and Exceptions in Web Applications
- To Use NetBeans IDE for creating J2EE Applications
- To impart expertise in Web Application Development using J2EE.

Course Outcomes(COs)

1. Understand the In-depth concepts of JEE
2. Understand the in-depth Life cycle of servlets and JSP.
3. Learn how to communicate with databases using Java.
4. Handle Errors and Exceptions in Web Applications
5. Use NetBeans IDE for creating J2EE Applications
6. Understand J2EE as an architecture and platform for building and deploying web-based, n-tier, transactional, component-based enterprise applications

List of Programs

1. Create a sign in form in servlets.
2. Write a servlet Program to lock a server.
3. Write a servlet program that returns list of information in table format.
4. Design a counter that counts number of times user has visited the site in current browsing session.
5. Write a program to retrieve cookies information
6. Build a JAVA Bean for opening an applet from JAR file.
7. Write a program to add controls in BEAN.
8. Design a counter in JAVA BEAN.
9. Write a program to stream contents of a file using JSP.
10. Write a program to insert an applet into JSP page.

SUGGESTED READINGS

1. Jim Keogh. (2014). The Complete Reference J2EE (1st ed.). New Delhi: Tata McGraw Hill.
   (PAGE NOS. : 3 - 61 23 - 35 98 – 116124 – 151 157 – 159 350 – 369 406 – 443 380 – 395 486- 490)
2. Duane, K. Fields., & Mark, A. Kolb. (2012). Web Development with Java Server Pages (1st ed.). Pune: Manning Publications.
   (PAGE NOS. : 2 – 15 46 - 64 65 – 99)

3. Joseph, J. Bambara et al. (2006). J2EE Unleashed (1st ed.). New Delhi:Tech Media.

4. Paul, J. Perrone., Venkata, S. R. Chaganti., Venkata S. R. Krishna., & Tom Schwenk. (2009). J2EE Developer's Handbook. New Delhi: Sams Publications.
5. Rod Johnson. (2012). J2EE Development without EJB (1st ed.). New Delhi:Wiley Dream Tech.
6. Rod Johnson., & Rod Johnson, P.H. (2012). Expert One-On-One J2ee Design and Development. New Delhi: John Wiley & Sons.

WEB SITES

1. java.sun.com/javaee/
2. java.sun.com/j2ee/1.4/docs/tutorial/doc/
3. www.j2eebrain.com/

Semester-III

19CSP312 **LINUX – PRACTICAL** **4H – 2C**

Instruction Hours / week: L: 0 T: 0 P: 4 **Marks:** Int : **40** Ext : **60** Total: **100**

End Semester Exam : 3 Hours

Course Objectives

- To understand the concepts and principles that underlies modern operating systems
- To practice component to relate theoretical principles with operating system implementation.
- To learn about processes and processor management
- To learn about concurrency and synchronization
- To understand memory management schemes, file system and secondary storage management security and protection etc.
- To use different IPC ways in their programs like Message Queues, Semaphores, and Shared Memories.

Course Outcomes(COs)

At the end of the course the student will be in a position to –

1. Use basic fundamental utilities which are required again and again on daily basis to work on a modern operating system.
2. Write useful shell scripts which greatly and effectively enhance the usefulness of computers, from the point of view of programmers and application developers.
3. Understand basics of various OS related concepts, from programmer's point of view, like files, directories, kernel, inodes, APIs, system calls, processes, signals, etc.
4. Develop applications where several processes need to communicate with each other to complete a task.
5. Use different IPC ways in their programs like Message Queues, Semaphores, and Shared Memories.
6. Write programs which employs advanced concepts like multithreading.

List of Programs

1. To write a Linux program to display process deadlock state.
2. To write a program to display the allocated memory.
3. To write a program to simulate the DOS Command-Copy.
4. To write a program to implement signal handling.
5. To write a simple Linux program using thread.
6. To write a program to display the date & time using TCP Sockets.
7. To write a program to display the date & time using UDP Sockets.
8. To write a program to display the cpu scheduling
9. To write a Linux program to create a lock file.
10. To write a program to display the user information

SUGGESTED READINGS

1. Venkateshwarlu, N. B. (2013) Introduction to Linux: Installation and Programming. New Delhi: BPS Publishers.

2. Matt Welsh., Matthias Kalle Dalheimer., Terry Dawson.,& Lar Kaufman. (2012). Running Linux (4th ed.). O'Reilly Publishers.
3. Carla Schroder.(2014). Linux Cookbook(1st ed.). O'Reilly Cookbooks Series.

WEB SITES

1. http://www.oreilly.com/catalog/ open sources/book/toc.html
2. http://dsl.org/cookbook/cookbook_toc.html
3. http://www.tldp.org/guides.html
4. http://www.gnu.org/doc/using.html
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6. http://sources.redhat.com/autobook/
7. http://cvsbook.red-bean.com/
8. http://www.tldp.org/guides.html
9. http://developer.gnome.org/doc/GGAD
10. http://www.python.org/doc/current/tut/tut.html