ShriVaishnavVidyapeethVishwavidyalaya, Indore

Shri Vaishnav Institute of Information Technology

B.Tech. (CSE- Artificial Intelligence-IBM)
Choice Based Credit System (CBCS) 2020-21
SEMESTER V

| SUBJECT CODE | Category | SUBJECT NAME | TEACHING & EVALUATION SCHEME | | | | | Th | T | P | CREDITS |
| | | | THEORY | | | PRACTICAL | | | | | |
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS504	**DCC**	**Software Engineering and Project Management**	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;

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Course Educational Objectives (CEOs):

The student will have ability to:
1. Get the knowledge of basic software engineering methods and practices.
2. Define software requirements and requirement engineering.
3. Apply approaches for various design and their principle.
4. Explore testing in various domain.
5. Development of significant teamwork and project based experience.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes.

The students will be able to
1. Compare various software process models and identify where these models are applicable.
2. Define and analyze software project management, the framework and the dimensions of software project management.
3. Comprehend System modeling using UML.
4. Identify software testing strategies by using testing tools.
5. Analyze software risks and risk management strategies.

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Syllabus

Unit I   10HRS

Nature of Software: Software Engineering, Software Process, A Generic Process Model, Process Assessment and Improvement, Prescriptive Process Models- Waterfall Model, Incremental Models, Evolutionary Models, Concurrent Models, Specialized Process Model, Unified Process, Personal and Team process Models, Process technology, Agile development.

Unit II   9HRS

Functional and Non-functional Requirements: Requirement Sources and Elicitation Techniques, Analysis Modeling for Function-oriented and Object-oriented Software Development, Use case Modeling, System and Software Requirement Specifications, Requirement Validation, Traceability.

Unit-III   8HRS

The Software Design Process: Design Concepts and Principles, Software Modeling and UML, Architectural Design, Architectural Views and Styles, User Interface Design, Function-oriented Design, SA/SD Component Based Design, Design Metrics.

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Unit-IV   7HRS
Software Testing Strategies-Approach: Issues, Validation Testing and Their Criteria, System Testing, Alpha-Beta Testing, Debugging, Testing Conventional Applications, Testing Object Oriented Applications ,Testing Web Applications.

Unit-V   8HRS

Need and Types of Maintenance: Software Configuration Management (SCM), Software Change Management, Version Control, Change control and Reporting, Program Comprehension Techniques, Re-engineering, Reverse Engineering, Tool Support. Project Management Concepts, Feasilibility Analysis, Project and Process Planning, Resources Allocations, Software efforts, Schedule, and Cost estimations, Project Scheduling and Tracking, Risk Assessment and Mitigation, Software Quality Assurance(SQA). Project Metrics.

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*__Teacher Assessment__ shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Text Books:

1. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Tata McGraw-Hill, Seventh edition, 2009.
2. Richard Fairley, "Software Engineering Concepts" –, Tata Mcgraw Hill, 2008.
3. Pankaj Jalote ,"An Integrated Approach to Software Engineering", Narosa Pub, 2005**.**
4. Richard H.Thayer,"Software Enginerring & Project Managements",Willey India

References:

1. Bernd Bruegge, Allen H. Dutoit," Object-Oriented Software Engineering" Using UML, Patterns, and Java, PEARSON Third Edition, 2017.
2. Waman S.Jawadekar,"Software Enginerring", TMH
3. Ian Sommerville, "Software Engineering", Seventh Edition, Pearson Education Asia, 2007.
4. Rajib Mall, "Fundamentals of Software Engineering" Second Edition, PHI Learning.

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List of Experiments:

Select a topic of the project, then make the report on following points
1. System Analysis
    1.1. Identification of Need
    1.2. Preliminary Investigation
2. Feasibility Study
    2.1. Technical Feasibility
    2.2. Economical Feasibility
    2.3. Operational Feasibility
3. Literature Survey
    3.1. Work done by other

    3.2. Benefits
    3.3. Proposed Solution
    3.4. Technology used
4. Software Engineering Approach
    4.1. Software Engineering paradigm Applied
        4.1.1. Description
        4.1.2. Advantage & Disadvantages
        4.1.3. Reasons for use

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4.2 Requirement Analysis
   4.2.1 Software Requirement Specification
       4.2.1.1 Glossary
       4.2.1.2 Supplementary Specifications
       4.2.1.3 Use Case Model
       4.2.1.4 Comparative analysis documents
   4.2.2 Conceptual Level Activity Diagram
4.3 Planning Managerial Issues
   4.3.1 Planning Scope
   4.3.2 Project Resources
   4.3.3 Team Organization
   4.3.4 Project Scheduling
   4.3.5 Estimation

   4.3.6 Risk Analysis
   4.3.7 Security Plan
4.4 Design
      4.4.1. Design Concept
      4.4.2. Design Technique
      4.4.3. Modeling

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   4.4.3.1. ER Model
   4.4.3.2. DFD Model
     4.4.3.2.1. DFD Model Level-0 and 1
     4.4.3.2.2. DFD Model Level 2 and 3
   4.4.3.3. Data Dictionary
   4.4.3.4. Activity Diagram
   4.4.3.5. Software Architecture
4.5 Implementation Phase
   4.5.1. Language Used Characteristics
   4.5.2. Coding
4.6 Testing
   4.6.1. Testing Objectives
4.6.2. Testing Methods & Strategies used along with test data and the error listed for each test case for each function provided by the system.

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BTCS503	DCC	**Computer Graphics and Multimedia**	60	20	20	30	20	3	0	2	4

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Course Educational Objectives (CEOs):

The student will have ability to:

1. Understood basic concepts of computer graphics.
2. Acquire knowledge about drawing basic shapes such as lines, circle ellipse, polygon.
3. Shall be able to perform processing of basic shapes by various processing algorithms /techniques.
4. Acquire knowledge about two and three dimensional transformations.
5. Shall be able to apply the transformation algorithms to the basic shapes.
6. Shall be able to perform Multimedia Operation.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes.

The students will be able to

1. Understood basic concepts of computer graphics
2. Acquire knowledge about drawing basic shapes such as lines, circle ellipse, polygon and shall be able to perform processing of basic shapes by various processing algorithms /techniques.
3. Acquire knowledge about two and three dimensional transformations and shall be able to apply the transformation algorithms to the basic shapes.

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4. Shall have the basic knowledge of windowing and clipping and shall be able to apply various algorithms of clipping.
5. Acquire knowledge about Visible Surface Detection methods, Illumination Models and Surface Rendering
6. Acquire knowledge to apply advanced techniques such as fractals, introduction to open GL and Multimedia Systems.

Syllabus

Unit I   **10HRS**
Introduction to Computer Graphics:- What is Computer Graphics?, Where Computer Generated pictures are used, Elements of Pictures created in Computer Graphics Graphics display devices,Graphics input primitives and Devices.**Introduction to openGL:-** Getting started Making pictures, Drawing basic primitivesSimple interaction with mouse and keyboard

Unit II   **9HRS**
Points and Lines, Antialiasing**Line Drawing Algorithm:-**DDA line drawing algorithm, parallel drawing algorithmBresenham's drawing algorithm with example.

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Circle and Ellipse generating algorithms:-Mid-point Circle algorithm with example
Mid-point Ellipse algorithmMid-point Ellipse algorithm with example **Parametric Cubic Curves:-**Bezier curvesB-Spline curves
Filled Area Primitives:-Scan line polygon fill algorithm, Pattern fill algorithm
Inside-Outside Tests, Boundary fill algorithms, Flood fill algorithms

Unit-III   **8HRS**
2D Geometric Transformations
Basic transformation, Matrix representation and Homogeneous Coordinates Composite transformationOthertransformations.Transformation between coordinated systems.Window to Viewport coordinate transformation,
Clipping operations – Point clipping, Line clipping:-Cohen – Sutherland line clippingLiang – Barsky line clippingMidpoint subdivision
Polygon Clipping-Sutherland – Hodgeman polygon clippingWeiler – Atherton polygon clipping.3D object representation methods B-REP , sweep representations , CSG
Basic transformations-Translation,Rotation, Scaling
Other transformations-Reflection,Rotation about an arbitrary axis Composite transformations
Projections – Parallel and Perspective 3D clipping

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Unit-IV   **7HRS**

3D Geometric Transformations and 3D Viewing Classification of Visible Surface Detection algorithm:-Translation,Rotation, Scaling

Other transformations:-Reflection,Rotation about an arbitrary axis Composite transformations Projections,Back Surface detection method Depth Buffer method Scan line method BSP tree method, Area Subdivision method.

Unit-V   **8HRS**

Multimedia System: An Introduction, Multimedia hardware, Multimedia System Architecture. Data & File Format standards.i.e RTF, TIFF, MIDI, JPEG, DIB, MPEG,Audio: digital audio, MIDI, processing sound, sampling, compression. Video: Avi, 3GP,MOV, MPEG , compression standards, compression through spatial and temporal redundancy. Multimedia Authoring .

Text Books:
1. Sinha and Udai , "Computer Graphics", Tata McGraw Hill
2. Parekh "Principles of Multimedia" Tata McGraw Hill
3. Prabhat k Andleigh, KiranThakral , "Multimedia System Design " PHI Pub.
4. Donald Hearn and M.P. Becker "Computer Graphics" Pearson Pub.

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References:
1. Computer Graphics, C Version, 2e Paperback – 2002
2. Foley, Vandam, Feiner, Huges, "Computer Graphics: Principles & Practice", Pearson Education, second edition 2003.
3. Judith Jeffcoate, "Multimedia in practice technology and Applications", PHI, 1998.
4. David F Rogers, "Procedural elements for Computer Graphics", Tata McGraw Hill, Second Edition.
5. Foley, VanDam, Feiner and Hughes, "Computer Graphics Principles & Practice in C", Second edition, Pearson Education.
6. David Hillmaa, "Multimedia Technology & Applications, Delmar, 1998.

List of Experiments:
1. Implement DDA Line Drawing algorithm
2. Implement Bresenham's line drawing algorithm.
3. Implement Mid-Point circle drawing algorithm.
4. Implement Mid-Point ellipse drawing algorithm.
5. Implement cubic Bezier curve.
6. Implement a menu-driven program for 2D transformations.
7. Implement Line clipping algorithm using Cohen-Sutherland.
8. Implement Polygon Clipping using Sutherland Hodgeman.

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9. Implement Scan line fill algorithm.
10. Study of Multimedia and Program for Flash.

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BTIT603	**DCC**	**Cyber and Network Security**	60	20	20	30	20	3	0	2	4

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Course Educational Objectives (CEOs):

The student will have ability:

1. To gain a fundamental knowledge of Cyber crime and Network Security.
2. To gain a fundamental understanding of a Cyber-attack and Challenges in identify and prevent them from occurring.
3. To gain a fundamental knowledge of Tools and Methods used in Cyber crime for prevention.
4. To understand the need of Cyber law and the fundamental concepts of Cyber Forensic.
5. To provide the fundamental skills and understanding needed to identify Cyber Security threats.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes.

The students will be able to

1. Identify physical points of vulnerability in simple networks and security needs of an organization.
2. Evaluate the Legal Perspective of Cybercrime and Cyber Security.
3. Formulate, update and communicate short- and long-term organizational cyber-security strategies and policies.
4. Troubleshoot, maintain and update an enterprise-level information security system.
5. Investigate the Cybercrime with the help of Cyber Forensic.

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BTIT603	DCC	Cyber and Network Security	60	20	20	30	20	3	0	2	4

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Syllabus

Unit I   10HRS

Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security mechanism, Fundamental Security Design Principles, Attack Surface and Attack trees, A Model for Network Security. Introduction to Cybercrime, Cybercrime and Information Security, Classification of Cybercrimes: The Legal Perspective, Cybercrime: An Indian Perspective.

Unit II   9HRS

Introduction to Cyber offence, How Criminal plan the attack, Social Engineering, Cyber stalking, Cyber café and cybercrime, Botnets: The fuel of cybercrime, Attack vector, cloud computing. Cybercrime: Mobile and Wireless devices, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Setting for Mobile Devices, Authentication Service Security, Attack on Mobile Phones.

Unit-III   8HRS

Tools and Methods Used in Cybercrime, Proxy Server and Anonymizers, Phishing and Identity Theft, Password Cracking, Keylogger and Spyware, Virus and Worms, Trojan Horse and Backdoors, Steganography DoS and DDoS Attacks, SQL Injection, Buffer Overflow, Attack on Wireless Networks.

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SEMESTER V

SUBJECT CODE	Category	SUBJECT NAME	TEACHING & EVALUATION SCHEME					Th	T	P	CREDITS
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTIT603	DCC	Cyber and Network Security	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical;   **C** - Credit;

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Unit-IV   **7HRS**

Cybercrime and the Legal Landscape around the World, Why Do We Need Cyber laws, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India, Information Technology Act, Digital Signature and the IT Act, cybercrime and punishment.

Introduction to Cyber Forensics, Historical Background of Cyber Forensics, Cyber Forensics and Digital Evidence, Forensic Analysis of E-Mail, Digital Forensic Life Cycle, Approaching Computer Forensic Investigation, Relevance of OSI Model to Computer Forensic, Challenges in Computer Forensic.

Unit-V   **8HRS**

Network Access Control and Cloud Security, Transport- Level Security, Wireless Network Security, Electronic Mail Security, IP Security.

TEXT BOOKS:
1. William Stallings, "Cryptography and Network Security: Principles and Practice",7th EditionPearson,2017
2. Sunit Belapure, Nina Godbole"Cyber Security",1st edition, Wiley Publication, 2011

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BTIT603	DCC	Cyber and Network Security	60	20	20	30	20	3	0	2	4

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REFERENCES:
1. Carl Endorf, Eugene Schultz, Jim Mellander"Intrusion Detection&Prevention",1stEdition,TMH,2007
2. Neal, Krawetz, Introduction to Network Security,1st Edition ,Cengage Learning,2006
3. Atul Kahate,"Cryptography and Network Security",McGraw Hill,,2009
4. Charlie Kaufman, Radia Perlman, Mike Speciner, Michael Speciner, " Network Security - Private communication in a public world" ,2nd Edition,TMH,2002
5. Fourozon, "Cryptography & Network Security" 4thEdition ,TMH,2005
6. Mayank Bhushan "Fundamentals of Cyber Security",1st Edition ,BPB Publication,2017
7. GauravGupta,Sarika Gupta "Information Security and Cyber Laws",1st Edition,Khanna Book Publishing,2011.

List of Practical's:

1. Compare the security features of at least three web browsers.
2. Write study and installation of wireshark.
3. Implementation Symmetric Encryption technique Ceaser Cipher .
4. Implementation Symmetric Encryption technique polyalphabetic substitution.
5. Asymmetric Encryption technique implementation.
6. Study and execution of networking commands.

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BTIT603	**DCC**	**Cyber and Network Security**	60	20	20	30	20	3	0	2	4

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7. Study and working of telnet.
8. Study and installation of cisco packet tracer.
9. Social media data analytics for any website.
10. Case study of current IT act related cases.
11. Case study of social networking related crimes.
12. Finding out the vulnerable data on Social Networking sites.
13. Find out attacks on Social networking sites.
14. Write the features of any social media dataset used for data analytics.
15. Data Analytics on Social Media website
16. Write features of any Social media data analytics tools available free online. (Likealyzer, Facebook or any other tool)
17. Study of the features of firewall in providing network security and to set Firewall Security in windows.
18. Study of different types of vulnerabilities for hacking a websites / Web Applications.
19. Analysis the Security Vulnerabilities of E-commerce services.
20. Analysis the security vulnerabilities of E-Mail Application.

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BTIBM C602	**DCC**	**Big Data Technologies(Hadoop)**	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical;   **C** - Credit;
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Course Educational Objectives (CEOs):

The objective of this course is to teach students about:

1. Big Data and its importance in business world.
2. Focused on conceptualization and summarization of big data trivial data versus big data
3. Big data computing technologies, Watson studio
4. Understand the challenges posed by distributed applications and how ZooKeeper is designed to Handle.

Course Outcomes (COs):

At the end of the course, students shall be able to:

1. Develop an understanding of the complete open-source Hadoop ecosystem and its near term future direction.
2. Understand the functions and features of HDP.
3. Understand the MapReduce model v1 and review java code.

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| SUBJECT CODE | Category | SUBJECT NAME | TEACHING & EVALUATION SCHEME | | | | | Th | T | P | CREDITS |
| | | | THEORY | | | PRACTICAL | | | | | |
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BTIBM C602	DCC	Big Data Technologies(Hadoop)	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical;   **C** - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Syllabus:

UNIT I   **10HRS**

Introduction to Big Data: Develop an understanding of the complete open-source Hadoop ecosystem and its near term future directions, compare and evaluate the major Hadoop distributions and their ecosystem components both their strengths and their limitations, hands-on experience with key components of various big data ecosystem components and roles in building a complete big data, solution to common business problems.

UNIT II   **9HRS**

Hadoop and HDFS: The basic need for a big data strategy in terms of parallel reading of large data files and internode network speed in a cluster, Hadoop Distributed File System (HDFS), function of the NameNode and DataNodes in a Hadoop cluster, files are stored and blocks ("splits") are replicated. Hive, Sqoop

UNIT III   **7HRS**

Introduction to Hortonworks and its components

Apache Ambari: The purpose of Apache Ambari in the HDP stack, the overall architecture of Ambari and Ambari' relation to other services and components of a Hadoop cluster, the functions of the main components of Ambari, initiating start and stop services from Ambari Web Console.

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BTIBM C602	DCC	**Big Data Technologies(Hadoop)**	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
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Overview about Hortonworks Data Platform – HDP: The functions and features of HDP, the IBM value-add components, what IBM Watson Studio is, a brief description of the purpose of each of the value-add components

UNIT IV   8HRS

MapReduce and YARN: MapReduce model v1, the limitations of Hadoop 1 and MapReduce, review the Java code required to handle the Mapper class, Reducer class and the program driver needed to access MapReduce, the YARN model, compare Hadoop 2/YARN with Hadoop 1

UNITV   8HRS

ZooKeeper, Slider, and Knox: The challenges posed by distributed applications and how ZooKeeper is designed to handle them, the role of ZooKeeper within the Apache Hadoop infrastructure and the realm of Big Data management, the generic use cases and some real-world scenarios for ZooKeeper, the ZooKeeper services that are used to manage distributed systems, use the ZooKeeper CLI to interact with ZooKeeper services

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TEXT BOOKS:
1. Introduction to Infosphere BigInsights, IBM Career Education
2. Changing Business with Data Insight, IBM Career Education
3. Big Insights Analytics for Business Analysts, IBM Career Education
4. Tom White," Hadoop: The Definitive Guide Paperback – 2015" Shroff Publishers & Distributers Private Limited - Mumbai; Fourth edition (2015).
5. V. K. Jain (Author)," Big Data and Hadoop" Khanna Publishers; 1 edition (1 June 2015)

REFERENCE BOOKS:
1. Big Data: A Revolution That Will Transform How We Live, Work, and Think; Kenneth Cukier, Viktor Mayer-Schönberger; Mariner Books; Edition (2014)
2. Big Data: Using Smart Big Data, Analytics and Metrics to Make Better; Bernard Marr; Wiley; Edition 1st (2015)
3. Hadoop For Dummies, Dirk deRoos, For Dummies, 2014
4. Cohen et al."MAD Skills: New Analysis Practices for Big Data", 2009
5. Ullman, Rajaraman, Mining of Massive Datasets, Chapter 2
6. Stonebraker et al., "MapReduce and Parallel DBMS's: Friends or Foes?", Communications of the ACM, January 2010.
7. Dean and Ghemawat, "MapReduce: A Flexible Data Processing Tool", Communications of the ACM, January 2010.

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LIST OF PRACTICALS:

1. Installing Hadoop, configure HDFS, Install Zookeeper , Pig Installation, Sqoop Installation, Hbase Installation
2. Configuring Hadoop
3. Running jobs on Hadoop
4. Working on HDFS
6. Hadoop streaming
7. Creating Mapper function using python.
8. Creating Reducer function using python
9. Python iterator and generators
10. Twitter data sentimental analysis using Flume and Hive
11. Business insights of User usage records of data cards
12. Wiki page ranking with hadoop
13. Health care Data Management using Apache Hadoop ecosystem

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BTIBM505	DCC	Introduction to Data Science	60	20	20	30	20	3	0	2	4

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical;   **C** - Credit;

Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:
1. To provide an overview of an exciting field of Data Science.
2. To introduce the tools required managing and analyse data science project like: Jupyter Notebook.
3. Develop an understanding of the complete process of data science project and it's near term future direction.
4. To teach the fundamental techniques and principles in achieving data science with scalability and streaming capability.
5. To enable students to have skills that will help them to solve complex real-world problems in for business decisions.

Course Outcomes:
After the successful completion of this course students will be able to:
1. Understand the concept of Data Science from a global context.
2. To understand and apply Python in Market perspective of Data Science.
3. Applying and analyzing architecture of Machine Learning Algorithms to achieving data science.
4. Supervised, Unsupervised Machine Learning and relation of statistical modelling to machine learning, Learn to use optimization techniques to find the minimum error in your machine learning model, learn various algorithms like KNN, Decision Trees, SVM.

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BTIBM505	DCC	**Introduction to Data Science**	60	20	20	30	20	3	0	2	**4**

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5. Design and implement various Data Science model in a range of real-world applications.
6. Creating projects and research activities based on Data Science Machine Learning using Python.

Syllabus:

UNIT I 10HRS

Introduction to Data Science: What is Data Science, what does a data scientist do, various examples of Data Science in the industries, How Python is deployed for Data Science applications, Various steps in Data Science process like data wrangling, data exploration and selecting the Model.

UNIT II 8HRS

Data Manipulation and Visualization: Introduction to NumPy, Pandas and Matplotlib, How to import NumPy module, what is a data Manipulation using Pandas library? Series object in pandas, Data Frame in Pandas, Loading and handling data with Pandas, Introduction to Matplotlib, Using Matplotlib for plotting Graphs and charts like Scatter, Bar, Pie, Line, Histogram and more**.**

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BTIBM505	DCC	**Introduction to Data Science**	60	20	20	30	20	3	0	2	**4**

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UNIT III   8HRS
Machine Learning using Python: Introduction to machine learning, Need of Machine learning, Types of machine learning and workflow of Machine Learning, Uses Cases in Machine Learning & its various algorithms.

Unit IV   8HRS
Supervised and Unsupervised Learning: What is linear regression? Logistic Regression, What is classification? Decision Tree, Confusion Matrix, Random Forest, Naïve Bayes classifier, support vector machine, Use cases of unsupervised learning, What is clustering and Types of clustering. What is K-means clustering and Hierarchical Clustering? Step by step calculation of k-means algorithm.

Unit V   8HRS
PROJECT: Research Activities on Data Science with projects and research letters.

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TEXT/REFERENCE BOOKS:

1. Data Science Fundamentals and Practical Approaches: Understand Why Data Science Is the Next by Dr Gypsy Anand/ Dr Rupam Sharma.
2. Python Data Science Handbook: Essential Tools for Working with Data by Jake VanderPlas.
3. Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data" by EMC Education Services.
4. IBM Content/Books.

Further Suggested Readings:

1. Analytics: Data Science, Data Analysis and Predictive Analytics for Business" by Daniel Covington.
2. Machine Learning for Big Data: Hands-On for Developers and Technical Professionals" by Jason Bell.

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LIST OF EXPERIMENTS:

1. Write a python program to check given no. is positive, negative or zero.
2. Write a python program to get the statistical summary and nature of the data of a given data frame.
3. Draw a bar chart of given data set.
4. Write a program to implement Linear Regression algorithm.
5. Write a program to implement Logistic Regression algorithm. Compute the accuracy of the classifier.
6. Write a program to implement k-Nearest Neighbor algorithm to classify data set.
7. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
8. Write a program to implement the naïve Bayesian classifier for a sample training data set. Compute the accuracy of the classifier.
9. Write a program for clustering using k-Means algorithm.
10. Write a program for clustering using Hierarchical clustering algorithm.

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Project Statement

Project Title – Text Message Classification Spam or Ham

How often have we come across messages saying we have won a trip to Hawaii or won a million dollar or won a cash prize. This form of scam through text messages which are generally spam messages is called smishing. A lot of times they ask us to fill in forms and ask our personal information or SSN number which is really fishy or bound to be a fraud. The goal of this project is to use Data Science to accurately classify whether a message is spam or not.

Since not all online reviews are truthful and trustworthy, it is important to develop techniques or detecting review spam. By extracting meaningful features from the text using Natural Language Processing (NLP), it is possible to conduct review spam detection using various machine learning techniques. Additionally, reviewer information, apart from the text itself, can be used to aid in this process. In this project, we survey the prominent machine learning techniques that have been proposed to solve the problem of review spam detection and the performance of different approaches for classification and detection of review spam.

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BTCS407	**DCC**	**Programming with Python**	0	0	0	60	40	0	0	4	2

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical;   **C** - Credit;

***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Educational Objectives (CEOs):

1. To develop proficiency in creating based applications using the Python Programming Language.
2. To be able to understand the various data structures available in Python programming language and apply them in solving computational problems.
3. To be able to do testing and debugging of code written in Python.
4. To be able to draw various kinds of plots using PyLab.
5. To be able to use generators for generating series like fibonacci.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes. The students will be able to

1. Ability to create robust applications using the Python programming language.
2. Ability to test and debug applications written using the Python programming language.
3. Ability to create applications for solving computational problems using the Python Programming Language.

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BTCS407	**DCC**	**Programming with Python**	0	0	0	60	40	0	0	4	2

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical;   **C** - Credit;

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Syllabus

Unit I   **10HRS**
Introduction to Python: The basic elements of Python, Branching programs, Strings and Input, Iteration. Functions, Scoping and Abstraction: Functions and Scoping, Specifications, Recursion, Global variables, Modules, Files.

Unit II   **9HRS**
Testing and Debugging: Testing, Debugging. Structured Types, Mutability and Higher order Functions: Tuples, Lists and Mutability, Functions as Objects, Strings, Tuples and Lists, Dictionaries.

Unit-III   **8HRS**
Exceptions and assertions: Handling exceptions, Exceptions as a control flow mechanism, Assertions. Classes and Object oriented Programming: Abstract Data Types and Classes, Inheritance, Encapsulation and information hiding.

Unit-IV   **7HRS**
Some simple Algorithms and Data Structures: Search Algorithms, Sorting Algorithms, Hashtables. Plotting and more about Classes: Plotting using PyLab, Plotting mortgages and extended examples.

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Unit-V   **8HRS**

Dynamic Programming: Fibonacci sequence revisited, Dynamic programming and the 0/1 Knapsack algorithm, Dynamic programming and divide and conquer.

Text Books:
1. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India
2. Allen Downey, Jeffrey Elkner and Chris Meyers "How to think like a Computer Scientist, Learning with Python", Green Tea Press.
3. Mark Lutz "Learning Python" O'Reilly Media; 5 edition.
4. David Beazley "Python Cookbook, Third edition" O'Reilly Media

References:
1. Python Essential Reference, 4th Edition Addison-Wesley Professional.
2. Mark Lutz "Programming Python: Powerful Object-Oriented Programming "David Beazley "Python Cookbook" Third edition, O'Reilly Media

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List of Experiments:

1. Write a Python Program to Print Hello world!
2. Write a Program to Add Two Numbers.
3. Write a Program to Find the Square Root.
4. Write a Program to Calculate the Area of a Triangle.
5. Write a Program to Solve Quadratic Equation.
6. Write a Program to Swap Two Variables.
7. Write a Program to Generate a Random Number.
8. Write a Program to Convert Kilometers to Miles.
9. Write a Program to Convert Celsius To Fahrenheit.
10. Write a Program to check if a number is positive, negative or zero.
11. Write a Program to Check if a Number is Odd or Even.
12. Write a Program to Check Leap Year.
13. Write a Program to Find the Largest Among Three Numbers.
14. Write a Program to Check Prime Number.
15. Write a Program to Print all Prime Numbers in an Interval.
16. Write a Program to Find the Factorial of a Number.
17. Write a Program to Display the multiplication Table.
18. Write a Program to Print the Fibonacci sequence.
19. Write an English sentence with understandable semantics but incorrect syntax. Write another English sentence which has correct syntax but has semantic errors.

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BTCS607	**DCC**	**Scripting Languages**	0	0	0	60	40	0	0	4	2

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Course Educational Objectives (CEOs):

The student will have ability to:
1. To understand different types of scripting languages.
2. To gain knowledge about client side scripts and server side scripting.
3. To learn about PHP, PERL and Python languages and their usage in implementation.
4. To build web application project using scripting languages.

Course Outcomes (COs):

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes. The students will be able to

1. Student will be Able to understand difference between scripting languages.
2. Student will be able to create programs using functions, control structures.
3. Student will learn implementation of scripting languages on different tools
4. Student can apply knowledge of scripting languages for creating a web application project using scripting languages implementation.

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Unit I   **10HRS**
Introduction of scripting languages, need of scripting, characteristics of scripting languages, uses of scripting languages, Introduction of client side scripting languages like JavaScript, VBScript, HTML5 (Structure), CSS3 (Designing), AJAX, jQuery, Server side scripting languages like PHP, ASP.NET (C# OR Visual Basic), C++ , Java and JSP, Python, Ruby on Rails.

Unit II   **9HRS**
PHP basic features, Embedding php code in your web pages, outputting the data to the browser, data types, variables, constants, expressions, string interpolation, control structure, function, creating a function, function library, Arrays, String & regular expression, Web forms, Files, Authentication, Uploading file with PHP, sending email using PHP.

Unit-III   **8HRS**
Python: Introduction to python languages, python syntax, statements, functions, build-in functions, methods, module in python, exception handling, integrated web application in python- Building small, efficient python web system, web application framework.

Unit-IV   **7HRS**
Introduction to Perl and scripting, scripts, programs, Web scripting and PERL names , values, variable, scalar expression, control structures, arrays, list, hashes, strings, patterns, and regular expression, subroutine.

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Unit-V   **8HRS**

Introduction of Angular JS, Industrial usage of angular JS.benefits of Angular JS, Creation of Web application project using database, scripting, HTML, & CSS.

Text Books:
1. The World of Scripting Languages, David Barron, Wiley Publications.
2. Python Web Programming, Steve Holden and David Beazley, New Riders Publications.
3. Beginning PHP and MySQL, 3" Edition, Jason Gilmore, Apress Publications (Dream tech.).

References:
1. Open Source Web Development with LAMP using Linux, Apache, MySQL, Pen and PHP, J.Lee and B.Ware(Addison Wesley) Pearson Education.
2. Programming Python,M.Lutz,SPD.
3. PHP 6 Fast and Easy Web Development, Julie Meloni and Matt Telles, Cengage Learning Publications.
4. PHP 5.1,l.Bayross and S.Shah, The X Team, SPD.
5. Core Python Programming, Chun, Pearson Education.
6. Guide to Programming with Python, M.Dawson, Cengage Learning.
7. Pen by Example, E.Quigley, Pearson Education.
8. Programming Perl,Larry Wall, T.Christiansen and J.Orwant,O'Reilly, SPD.

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9. Tcl and the Tk Tool kit, Ousterhout, Pearson Education.
10. PHP and MySQL by Example, E.Quigley, Prentice HalI(Pearson).
11. Perl Power, J.RFlynt, Cengage Learning.
12. PHP Programming solutions, V.Vaswani, TMH.

List of Experiments:

1. Javascript program to generate Fibonacci series and to look for motifs and patterns in sequences.
2. Javascript program to find out frequency of characters existing in nucleotide and protein sequences 6 Javascript's implementation to generate dynamic HTML pages.
3. Write PHP programs to do basic operations to deal with strings, and arrays, and to implement various mathematical functions.
4. Development of an PHP program to take set of sequences and find out conserved sequences.
5. Create a MySQL database tables and execute all SQL queries.
6. Write a PHP program to connect MySQL database and execute all SQL commands.
7. Construct a PHP interface for a given Web page and to produce its overall connectivity.
8. Implement database and server site connectivity all together to generate complete dynamic web based applications through PHP, HTML and MySQL.

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9. Write programs in Perl to implement string handling and other functions to be implemented to deal with biological data management.
10. Write PHP programs to do basic server side programming**.**