John Wilson Education Society's

Wilson College (Autonomous)

(

howpatty, Mumbai-400007

Affiliated to the

UNIVERSITY OF MUMBAI

Syllabus for MSc.I.T
Program: MSc.I.T

Programme Code: WSITC

Choice Based Credit System (CBCS) with effect from NEP-2020 for Academic year 2023–2024

PROGRAM OUTLINE 2022-2023

YEAR	SEM	COURSE CODE	COURSE TITLE	CREDITS
Part 1	I	WSITCMT511	Data Science	4
		WSITCMT512	Cloud Technology	4
		WSITCMT513	Data Science Practical	2
		WSITCMP514	Cloud Technology Practical	2
		WSITCET511	Soft Computing Thory (Elective)	2
		WSITCEP512	Soft Computing Practicals(Elective)	2
		WSITCRM511	Research Methodology	4
	II			
		WSITCMT521	Predictive Analysis	4
		WSITCMT522	Robotics	4
		WSITCMT523	Predictive Analysis Practical	2
		WSITCMP524	Robotics Practical	2
		WSITCET521	Big Data Analytics(Elective)	2
		WSITCEP522	Big Data Analytics Practicals(Elective)	2
		WSITCFP521	Project Implementation or Internship /Industrial Training	4

PROGRAMME SPECIFIC OUTCOME (PSOs)

After completing two years course of in Information Technology, the learner will be able to:

1. Equip with the professional & technical skills essential for making a career in the Front-end Developer, Back-end Developer, Software Tester, Programmer, Network Administrator, Security Expert etc.
2. Students would demonstrate the ability to apply research principles in a variety of creative, organizational, professional venues.
3. Apply the knowledge of engineering and management principles to manage projects effectively in diverse environments as a member or a leader in the team
4. Learners will understand technology as a system of interrelated forces, including automation, Robotics, Big data analytics, Advance Programming, Networking, Security, Cyber law, Regulatory constraints, and ethical concerns.
5. Learners will be able to create and design technological products, including website, software, robots, RFID, Hardware Automation, Also, will be able to become Software Engineer, Tester and Pen tester

PREAMBLE:

With the introduction of Choice Based Credit System (CBCS) by the esteemed University of Mumbai from academic year 2016-17, the existing syllabus of FYBSCIT is restructured according to the CBCS pattern.

In the last two decades, the technology has made a paradigm shift in the way society functions. Media, being the important segment of the society plays a pivotal role in the political, sociological, psychological, and economical aspects in society. In addition to the knowledge of the technical skills of mass media, the current syllabus orients to the theoretical framework relating to media-audience relationship.

The first year of BSCIT course introduces the students to various fields available under the umbrella of mass Programming, Mathematics, Communication Skills, Software's, Database, Website Design.

The fundamentals of Information Technology prepare the students for advanced theoretical and practical related to filed introduced. In the second year of BSCIT, followed by the elaboration on Information Technology research concepts and methodologies. Inclusion of field-based learning begins in the third year of BSCIT, with specialization in Information Technology

WILSON COLLEGE (AUTONOMOUS) NEP SYLLABUS FOR MSC.I.T.

PROGRAM: MSCIT			**SEMESTER: I**		
Course: Data Science			**Course Code: WSITCMT511**		
Teaching Scheme					**Evaluation Scheme**
Lectures (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Continuous Internal Assessment (CIA) (Marks-40)**	**Semester End Examination (Marks- 60)**
4	**-**	**_**	**4**	**40**	**60**

Learning Objectives:

1. Develop in depth understanding of the key technologies in data science and business analytics: data mining, machine learning, visualization techniques, predictive modeling, and statistics.
2. Practice problem analysis and decision-making.
3. Gain practical, hands-on experience with statistics programming languages and big data tools through coursework and applied research experiences..

Course Outcomes:

At the end of the course, the learner will be able to:

1. Basic understanding of statistics

DETAILED SYLLABUS

Course Code/ Unit	**Subunit**	**Course/ Unit Title**	**Credits/ Lectures**
I		**Data Science Technology Stack**	**4/15L**
	1.1	Rapid Information Factory Ecosystem, Data Science Storage Tools, Data Lake, Data Vault, Data Warehouse Bus Matrix, Data Science Processing Tools, Spark, Mesos, Akka, Cassandra, Kafka, Elastic Search, R	3L

		,Scala, Python, MQTT, The Future	
	1.2	Layered Framework: Definition of Data Science Framework, Cross-Industry Standard Process for Data Mining (CRISP- DM)	3L

	1.3	Homogeneous Ontology for Recursive Uniform Schema, The Top Layers of a Layered Framework, Layered Framework for High-Level Data Science and Engineering	3L
	1.4	Business Layer: Business Layer, Engineering a Practical Business Layer	3L
	1.5	Utility Layer: Basic Utility Design, Engineering a Practical Utility Layer	3L
II		**Three Management Layers**	**4/15L**
	2.1	Operational Management Layer, Processing-Stream Definition and Management, Audit, Balance, and Control Layer, Balance, Control, Yoke Solution, Cause- and-Effect	3L
	2.2	Analysis System, Functional Layer, Data Science Process	4L
	2.3	Retrieve Superstep : Data Lakes, Data Swamps, Training the Trainer Model, Understanding the Business Dynamics of the Data Lake	4L
	2.4	Actionable Business Knowledge from Data Lakes, Engineering a Practical Retrieve Superstep, Connecting to Other Data Sources,.	4L
III		**Assess Superstep:**	**4/15L**
	3.1	Assess Superstep, Errors, Analysis of Data, Practical Actions, Engineering a Practical Assess Superstep	15L

IV		Supersteps	4/15L
	4.1	Process Superstep: Data Vault, Time-Person-Object- Location-Event Data Vault, Data Science Process, Data Science	3L
	4.2	Transform Superstep: Transform Superstep, Building a Data Warehouse, Transforming with Data Science, Hypothesis Testing, Overfitting and Underfitting, Precision-Recall, Cross-Validation Test.	4L
	4.3	Transform Superstep: Univariate Analysis, Bivariate Analysis, Multivariate Analysis, Linear Regression, Logistic Regression, Clustering Techniques, ANOVA, Principal Component Analysis (PCA), Decision Trees, Support Vector Machines, Networks, Clusters, and Grids, Data Mining, Pattern Recognition, Machine Learning, Bagging Data, Random Forests, Computer Vision (CV), Natural Language Processing (NLP), Neural Networks, TensorFlow.	4L
	4.4	Organize and Report Supersteps: Organize Superstep, Report Superstep, Graphics, Pictures, Showing the Difference	4L

References:

1. Practical Data Science Andreas François Vermeulen APress 2018
2. Principles of Data Science Sinan Ozdemir PACKT 2016
3. Data Science from Scratch Joel Grus O'Reilly 2015

WILSON COLLEGE (AUTONOMOUS) NEP SYLLABUS FOR MSC.I.T.

PROGRAM: MSC.I.T.			**SEMESTER: I**		
Course: Cloud Technology			**Course Code: WSITCMT512**		
Teaching Scheme					**Evaluation Scheme**
Lectures (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Continuous Internal Assessment (CIA) (Marks- 40)**	**Semester End Examination (Marks- 60)**
4	**-**	**-**	**4**	**40**	**60**

Learning Objectives:

1. To provide students with mathematics that would help them visualize and communicate for data.
2. It will help to inculcate the idea of data analysis

Course Outcomes:

After the end of the course, the learner will be able to:

1. Understand the data analysis.
2. Mining the information and analyze the output

DETAILED SYLLABUS

Course Code/ Unit	**Subunit**	**Course/ Unit Title**	**Credits / Lectures**
I		**Introduction**	**4/15L**
	1.1	Introduction to Cloud Computing: Introduction, Historical developments, Building Cloud Computing Environments, Principles of	5L
	1.2	Parallel and Distributed Computing: Eras of Computing, Parallel v/s distributed computing, Elements of Parallel Computing, Elements of distributed computing, Technologies for distributed computing.	5L

	1.3	Virtualization: Introduction, Characteristics of	5L

		Virtualized environments, Taxonomy of virtualization techniques, Virtualization and cloud computing, Pros and cons of virtualization, Technology examples. Logical Network Perimeter, Virtual Server, Cloud Storage Device, Cloud usage monitor, Resource replication, Ready-made environment.	
II		**Computing & Development**	**4/15L**
	2.1	Cloud Computing Architecture: Introduction, Fundamental concepts and models, Roles and boundaries, Cloud Characteristics, Cloud Delivery models, Cloud Deployment models, Economics of the cloud, Open challenges.	5L
	2.2	Fundamental Cloud Security: Basics, Threat agents, Cloud security threats, additional considerations.	5L
	2.3	Industrial Platforms and New Developments: Amazon Web Services, Google App Engine, Microsoft Azure	5L
III		**Specialized Cloud Mechanisms:**	**4/15L**
	3.1	Automated Scaling listener, Load Balancer, SLA monitor, Pay-per-use monitor, Audit monitor, fail over system, Hypervisor, Resource Centre, Multidevice broker, State Management Database. Cloud Management Mechanisms: Remote administration system, Resource Management System, SLA Management System, Billing Management System, Cloud Security Mechanisms: Encryption, Hashing, Digital Signature, Public Key Infrastructure (PKI), Identity and Access Management (IAM), Single Sign-On (SSO),	15L

		Cloud- Based Security Groups, Hardened Virtual Server Images	
IV		**Cloud Architecture**	**4/15L**

	4.1	Fundamental Cloud Architectures: Workload Distribution Architecture, Resource Pooling Architecture, Dynamic Scalability Architecture, Elastic Resource Capacity Architecture, Service Load Balancing Architecture, Cloud Bursting Architecture, Elastic Disk Provisioning Architecture, Redundant Storage Architecture. Advanced	5L
	4.2	Cloud Architectures: Hypervisor Clustering Architecture, Load Balanced Virtual Server Instances Architecture, Non-Disruptive Service Relocation Architecture, Zero Downtime Architecture, Cloud Balancing Architecture, Resource Reservation Architecture, Dynamic Failure Detection and Recovery Architecture, Bare-Metal Provisioning Architecture, Rapid Provisioning Architecture, Storage Workload Management Architecture	5L
	4.3	Cloud Delivery Model Considerations: Cloud Delivery Models: The Cloud Provider Perspective, Cloud Delivery Models: The Cloud Consumer Perspective, Cost Metrics and Pricing Models: Business Cost Metrics, Cloud Usage Cost Metrics, Cost Management Considerations, Service Quality Metrics and SLAs: Service Quality Metrics, SLA Guidelines	5L

References:

1. Mastering Cloud Computing Foundations and Applications Programming Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi Elsevier – 2013
2. Cloud Computing Concepts, Technology & Architecture Thomas Erl, Zaigham Mahmood, and Ricardo Puttini Prentice Hall 2013

WILSON COLLEGE (AUTONOMOUS) NEP SYLLABUS FOR MSC.I.T.

PROGRAM: MScIT		**SEMESTER: I**			
Course:-Data Science Practicals		**Course Code: WSITCMT513**			
Teaching Scheme					**Evaluation Scheme**
Lectures (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Continuous Internal Assessment (CIA) (Marks- 40)**	**Semester End Examination (Marks- 60)**
-	**4**	**-**	**2**	**40**	**60**

DETAILED SYLLABUS

Course code	**Data Science Practicals**	**Credits**
	(UNIT 1 TO UNIT 5)	2
1	Install, configure and run Hadoop and HDFS ad explore HDFS.	
2	Implement word count / frequency programs using MapReduce	
3	Implement a MapReduce program that processes a weather dataset.	
4	Implement an application that stores big data in Hbase / MongoDB and manipulate it using R / Python	
5	Implement the program in practical using Pig.	
6	Prerequisites Data Science Practical. Creating data model using cassandra	
7	Conversion from different formats to hours format: a.text delimited CSV format b.XML	

8	Conversion from different formats to hours format: a.Audio b.Video c. Picture	
9	Utilities and auditing	
10	Retrieving Data	

PROGRAM: MScIT		SEMESTER: I			
Course:-Cloud Technology Practicals		Course Code: WSITCMP514			
Teaching Scheme					Evaluation Scheme
Lectures (Hours per week)	Practical (Hours per week)	Tutorial (Hours per week)	Credit	Continuous Internal Assessment (CIA) (Marks- 40)	Semester End Examination (Marks- 60)
-	4	_	2	40	60

DETAILED SYLLABUS

Course code	Cloud Technology Practicals	2
1	Write a program for implementing Client Server communication model using TCP.	
2	Write a program for implementing Client Server communication model using UDP.	
3	A multicast Socket example	
4	Write a program to show the object communication using RMI.	
5	Implement Xen virtualization and manage with Xen Center	
6	Implement virtualization using VMWare ESXi Server and managing with vCenter.	
7	Develop application for Microsoft Azure.	
8	Develop application for Google App Engine	
9	Implement Windows Hyper V virtualization	
10	Show the implementation of web services	

WILSON COLLEGE (AUTONOMOUS) NEP SYLLABUS FOR MSC.I.T.

PROGRAM: MScIT			**SEMESTER: I**		
Course: Soft Computing Theory(Elective)			**Course Code: WSITCET511**		
Teaching Scheme					**Evaluation Scheme**
Lectures (Hours per week)	**Practical (Hours perweek)**	**Tutorial (Hours per week)**	**Credit**	**Continuous Internal Assessment (CIA) (Marks- 40)**	**Semester End Examination (Marks- 60)**
2	**-**	**_**	**2**	**40**	**60**

Learning Objectives:

1. To introduce students to the tools, techniques, components used for communication.
2. To understand how digital communication work.

Course Outcomes:

After the end of the course, the learner will be able to:

1. Gain the knowledge understanding of the communication history, evolution.
2. Development of Mass Communication with electronics.

Course Code/ Unit	**Subunit**	**Course/ Unit Title**	**Credits/ Lectures**
I		Introduction of soft computing, soft computing vs. hard computing, various types of soft computing techniques, Fuzzy Computing, Neural Computing, Genetic Algorithms, Associative Memory, Adaptive Resonance Theory, Classification, Clustering, Bayesian Networks, Probabilistic reasoning, applications of soft computing.	**2/7L**

II		**Artificial Neural Network (ANN)** Fundamental concept, Evolution of Neural Networks, Basic Models, McCulloh-Pitts Neuron, Linear Separability, Hebb Network.	**2/8L**
III		**Unsupervised Learning Networks:** Supervised Learning Network: Perceptron Networks, Adaptive Linear Neuron, Multiple Adaptive Linear Neurons, Backpropagation Network, Radial Basis Function, Time Delay Network, Functional Link Networks, Tree Neural Network.	**2/7L**

IV	4.1	**Associative Memory Networks:** Training algorithm for pattern Association, Auto associative memory network, hetro associative memory network, bi-directional associative memory,Hopfield networks, iterative auto associative memory networks, temporal associative memory networks.	**2/8L** **3L**
	4.2	Introduction to Fuzzy Logic, Classical Sets and Fuzzy sets: Classical sets, Fuzzy sets. Classical Relations and Fuzzy Relations: Cartesian Product of relation, classical relation, fuzzy relations, Membership Function	**3L**
	4.3	Genetic Algorithm: Biological Background, Traditional optimization and search techniques, genetic algorithm and search space, genetic algorithm vs. traditional algorithms, basic terminologies, simple genetic algorithm, general genetic algorithm, operators in genetic algorithm, stopping condition for genetic algorithm flow	**2L**

References:

1. Artificial Intelligence and Soft Computing Anandita Battacharya Das SPD 3rd 2018
2. Principles of Soft computing S.N.Sivanandam S.N.Deepa Wiley 3rd 2019

WILSON COLLEGE (AUTONOMOUS) NEP SYLLABUS FOR MSC.I.T.

PROGRAM: MScIT		**SEMESTER: I**			
Course: Soft Computing Practicals (Elective)		**Course Code: WSITCEP512**			
Teaching Scheme					**Evaluation Scheme**
Lectures (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Continuous Internal Assessment (CIA) (Marks-40)**	**Semester End Examination (Marks-60)**
-	**4**	**_**	**2**	**40**	**60**

Course code WSITCEP512	**Soft Computing Practicals (Elective)**	**Credits** 2
	(UNIT 1 TO UNIT 5)	
1	Design a simple linear neural network model. .	
2	Calculate the output of neural net using both binary and bipolar sigmoidal function.	
3	Generate AND/NOT function using McCulloch-Pitts neural net.	
4	Write a program to implement Hebb's rule	
5	Write a program to implement Delta rule	
6	Membership and Identity Operators | in, not in,	
7	Membership and Identity Operators is, is not	
8.	Find ratios using fuzzy logic	

WILSON COLLEGE (AUTONOMOUS) NEP SYLLABUS FOR MSC.I.T.

PROGRAM(s): MScIT		**SEMESTER: I**			
Course: Research Methodology		**Course Code: WSITCRM511**			
Teaching Scheme					**Evaluation Scheme**
Lectures (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Continuous Internal Assessment (CIA) (Marks-40)**	**Semester End Examination (Marks-60)**
4	**-**	**-**	**4**	**40**	**60**

Learning Objectives:

1. To be able to conduct business research with an understanding of all the latest theories.
2. To develop the ability to explore research techniques used for solving any real world or innovate problem.

Course Outcomes:

After the end of the course, the learner will be able to:

1. Basic knowledge of statistical methods. Analytical and logical thinking.

Course Code/ Unit	**Subunit**	**Course/ Unit Title**	**Credits/ Lectures**
I		**Introduction to Research Methodology**	**4/15L**
	1.1	**Research Methodology-An Introduction:** Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India	4L

	1.2	**Defining the Research Problem:** What is a Research Problem?, Selecting the Problem, Necessity of Defining	4L

		the Problem, Technique Involved in Defining a Problem, An Illustration	
	1.3	**Research Design:** Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs.	7L
II		**Design, Scaling**	**4/15L**
	2.1	**Sampling Design:** Census and Sample Survey, Implications of a Sample Design, Steps in Sampling Design, Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of Sample Designs, How to Select a Random Sample?, Random Sample from an Infinite Universe, Complex Random Sampling Designs	7L
	2.2	**Measurement and Scaling Techniques:** Measurement in Research, Measurement Scales, Sources of Error in Measurement, Tests of Sound Measurement, Technique of Developing Measurement Tools, Scaling, Meaning of Scaling, Scale Classification Bases, Important Scaling Techniques, Scale Construction Techniques	4L
	2.3	**Methods of Data Collection:** Collection of Primary Data, Observation Method, Interview Method, Collection of Data through Questionnaires, Collection of Data through Schedules, Difference between Questionnaires and Schedules, Some Other Methods of Data Collection, Collection of Secondary Data, Selection of Appropriate Method for Data Collection, Case Study Method, (i) Guidelines for Constructing Questionnaire/Schedule (ii) Guidelines for Successful Interviewing (iii) Difference between	4L

		Survey and Experiment	
III		**Process**	**4/15L**
	3.1	**Processing and Analysis of Data:** Processing Operations, Some Problems in Processing, Elements/Types of Analysis, Statistics in Research, Measures of Central Tendency, Measures of Dispersion, Measures of Asymmetry (Skewness), Measures of	4L

		Relationship, Simple Regression Analysis, Multiple Correlation and Regression, Partial Correlation, Association in Case of Attributes, Other Measures, Summary Chart Concerning Analysis of Data	
	3.2	**Sampling Fundamentals:** Need for Sampling, Some Fundamental Definitions, Important Sampling Distributions, Central Limit Theorem, Sampling Theory, Sandler's *A*-test, Concept of Standard Error, Estimation, Estimating the Population Mean (m), Estimating Population Proportion, Sample Size and its Determination, Determination of Sample Size through the Approach Based on Precision Rate and Confidence Level, Determination of Sample Size through the Approach, Based on Bayesian Statistics	7L
	3.3	**Testing of Hypotheses:** What is a Hypothesis? Basic Concepts Concerning Testing of Hypotheses, Procedure for Hypothesis Testing, Flow Diagram for Hypothesis Testing, Measuring the Power of a Hypothesis Test, Tests of Hypotheses, Important Parametric Tests, Hypothesis Testing of Means, Hypothesis Testing for Differences between Means, Limitations of the Tests of Hypotheses	4L
IV		**Interpretation & Tools**	**4/15L**

	4.1	**Interpretation of Data and Paper Writing** – Layout of a Research Paper, Journals in Computer Science, Impact factor of Journals, When and where to publish ?, UGC- CARE, Web of Science, SCOPUS, Ethical issues related to publishing, Copyright, Data Privacy, Plagiarism and Self-Plagiarism, Software for detection of Plagiarism. Shodh Shudhhi (PDS), smallseotools.com Use of Encyclopedias, Research Guides, Handbook etc., Academic Databases for Computer Science and Information Technology Discipline. Google Scholar, shodhganga, IEEE Xplore, ResearchGate, IDELS, DASH	3L
	4.2	**Use of tools / techniques for Research:** Chicago, Turabian, MLA and APA Style, Reference Management Software like EndNote, Zotero or Mendeley; Software for paper formatting like LaTeX/MS Office/ **Scrivener/ Open Office/Google Doc/ DropBox Paper**.	3L
	4.3	**Ethics in business research:** What Are Research Ethics? Ethical Treatment of Participants, Ethics and the Sponsor, Researchers and Team Members, Professional Standards, Resources for Ethical Awareness	3L
	4.4	**Think like a Researcher:** The Language of Research, Concepts, Constructs, Definitions, Variables, Propositions and Hypotheses, Theory, Models, Research and the Scientific Method, Sound Reasoning for Useful Answers	3L
	4.5	**E-Research**: Introduction, The Internet as object of analysis, Using websites to collect data from individuals. Virtual ethnography, Qualitative research using online focus groups, Qualitative research using online personal interviews, Online social surveys, Ethical considerations in e-research, The state of e-research	3L

References:

1. Business Research Methods Business Research Methods Edition-8e
2. Business Analytics Albright Winston 5e
3.

Research Methodology – Methods and techniques	C. R. Kothari	New Age International (P) Ltd., Publishers	---
Business Research Methods	Donald R. Cooper Pamela Schindler	McGraw-Hill/Irwin	12th Ed
Business Research Methods	Allan Bryman Emma Bell	OXFORD University Press	---
RESEARCH METHODOLOGY - a step by step guide for beginners	Ranjit Kumar	SAGE Publication Ltd	---
Research Methods for Business Students	Mark Saunders Philip Lewis Adrian Thornhill	Pearson Education Limited	---

SEMESTER-II

WILSON COLLEGE (AUTONOMOUS) NEP SYLLABUS FOR MSC.I.T.

PROGRAM: MScIT		**SEMESTER: II**			
Course: Predictive Analysis		**Course Code: WSITCMT521**			
Teaching Scheme					**Evaluation Scheme**
Lectures (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Continuous Internal Assessment (CIA) (Marks- 40)**	**Semester End Examination (Marks- 60)**
4		**_**	**4**	**40**	**60**

Learning Objectives:

1. To predict the data
2. To analyze the data

Course Outcomes:

At the end of the course, the learner will be able to:

1. Handle the data.
2. Design own databases.
3. Formulate the changes in the data.

DETAILED SYLLABUS

	Subunit	**Course/ Unit Title**	**Credits /Lectures**
I		**Overview of predictive analysis**	**4/15L**

	1.1	What Is Analytics? 3 What Is Predictive Analytics? 3 Supervised vs. Unsupervised Learning 5 Parametric vs. Non-Parametric Models 6 Business Intelligence 6Predictive Analytics vs. Business Intelligence 8 Do Predictive Models Just State the Obvious? 9 Similarities between Business Intelligence and Predictive Analytics 9 Predictive Analytics vs. Statistics 10 Statistics and Analytics 11 Predictive Analytics and Statistics Contrasted 12 Predictive Analytics vs. Data Mining 13 Who Uses Predictive Analytics? 13 Challenges in Using Predictive Analytics 14	15L

		Obstacles in Management 14 Obstacles with Data 14 Obstacles with Modeling 15 Obstacles in Deployment 16 What Educational Background Is Needed to Become a Predictive Modeler?	
II		**Setting up the problem**	**4/15L**
	2.1	Predictive Analytics Processing Steps: CRISP-DM 19 Business Understanding 21 The Three-Legged Stool 22 Business Objectives	7L

	2.2	Defining Data for Predictive Modeling 25 Defining the Columns as Measures 26 Defining the Unit of Analysis 27 Which Unit of Analysis? 28 Defining the Target Variable 29 Temporal Considerations for Target Variable 31 Defining Measures of Success for Predictive Models 32 Success Criteria for Classifi cation 32 Success Criteria for Estimation 33 Other Customized Success Criteria 33 Doing Predictive Modeling Out of Order 34 Building Models First 34 Early Model Deployment 35 Case Study: Recovering Lapsed Donors 35 Overview 36 Business Objectives 36 Data for the Competition 36 The Target Variables 36 Modeling Objectives 37 Model Selection and Evaluation Criteria 38 Model Deployment 39 Case Study: Fraud Detection 39 Overview 39 Business Objectives 39 Data for the Project 40 The Target Variables 40 Modeling Objectives 41 Model Selection and Evaluation Criteria 41 Model Deployment 41	8L
III		**Data Understanding**	**4/15L**
	3.1	Mean	3L
	3.2	Standard Deviation	3L
	3.3	Kurtosis	3L

	3.4	Variable Cleaning 84 Incorrect Values 84 Consistency in Data Formats 85 Outliers 85 Multidimensional Outliers 89 Missing Values 90 Fixing Missing Data 91 Feature Creation 98 Simple Variable Transformations 98 Fixing Skew 99 Binning Continuous Variables 103 Numeric Variable Scaling 104 Nominal Variable Transformation 107 Ordinal Variable Transformations 108 Date and Time Variable Features 109 ZIP Code Features 110 Which Version of a Variable Is Best? 110 Multidimensional Features 112 Variable Selection Prior to Modeling 117 Sampling 123 Example: Why Normalization Matters for K-Means Clustering 139	6L
IV		**Predictive Modeling**	**4/15L**
	4.1	Decision Trees 214 The Decision Tree Landscape 215 Building Decision Trees 218	7L

		Bayes' Theorem 264 The Naïve Bayes Classifi er 268 Interpreting Naïve Bayes Classifi ers 268 Other Practical Considerations for Naïve Bayes 269 Regression Models 270 Linear Regression 271 Linear Regression Assumptions 274 Variable Selection in Linear Regression 276 Interpreting Linear Regression Models 278 Using Linear Regression for Classifi cation 279 Other Regression Algorithms	

	4.2	Motivation for Text Mining 328 A Predictive Modeling Approach to Text Mining 329 Structured vs. Unstructured Data 329 Why Text Mining Is Hard 330 Text Mining Applications 332 Data Sources for Text Mining 333 Data Preparation Steps 333 POS Tagging 333 Tokens 336 Stop Word and Punctuation Filters 336 Character Length and Number Filters 337 Stemming 337 Dictionaries 338 The Sentiment Polarity Movie Data Set 339 Text Mining Features 340 Term Frequency 341 Inverse Document Frequency 344 TF-IDF 344 Cosine Similarity 346 Multi-Word Features: N-Grams 346 Reducing Keyword Features 347 Grouping Terms 347 Modeling with Text Mining Features 347 Regular Expressions 349 Uses of Regular Expressions in Text Mining 351 Summary 352	8L

References: Dean Abott Wiley predictive analysis

WILSON COLLEGE (AUTONOMOUS) NEP SYLLABUS FOR MSC.I.T

Program:-MScIT		**SEMESTER: II**			
Course: **Robotics**		**Course Code: WSITCMT522**			
Teaching Scheme					**Evaluation Scheme**
Lectures (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Continuous Internal Assessment (CIA) (Marks- 40)**	**Semester End Examination (Marks- 60)**
4	**-**	**_**	**4**	**40**	**60**

Learning Objectives:

1. To provide students with tools & data structure.
2. Students will use these tools to solve application problems.
3. Compute limits, derivatives, and integrals.

Course Outcomes:

At the end of the course, the learner will be able to:

1. Communicate effectively by deploying tools of mathematics.

DETAILED SYLLABUS

	Sub unit	**Course/ Unit Title**	**Credits/ Lectures**
I		**Introduction**	**4/15L**
	1.1	Robotic Process Automation: Scope and techniques of automation, About UiPath	7L
	1.2	Record and Play: UiPath stack, Downloading and installing UiPath Studio, Learning UiPath Studio, Task recorder, Step-by-step examples using the recorder	8L
II		**Robotics Engineering**	**4/15L**

	2.1	Sequence, Flowchart, and Control Flow: Sequencing the workflow, Activities, Control flow, various types of loops, and decision making, Step-by-step example using Sequence and Flowchart, Step-by-step example using Sequence and Control flow	4L
	2.2	Data Manipulation: Variables and scope, Collections,	4L
		Arguments – Purpose and use, Data table usage with examples, Clipboard management, File operation with step-by-step example, CSV/Excel to data table and vice versa (with a step-by-step example) Taking Control of the Controls: Finding and attaching windows, Finding the control, Techniques for waiting for a control	
	2.3	Act on controls – mouse and keyboard activities, Working with UiExplorer, Handling events, Revisit recorder, Screen Scraping, When to use OCR, Types of OCR available, How to use OCR, Avoiding typical failure points	7L
III		**Control System**	**4/15L**
	3.1	Tame that Application with Plugins and Extensions: Terminal plugin, SAP automation, Java plugin, Citrix automation, Mail plugin, PDF plugin, Web integration, Excel and Word plugins, Credential management, Extensions – Java, Chrome, Firefox, and Silverlight	4L
	3.2	Handling User Events and Assistant Bots: What are assistant bots?, Monitoring system event triggers, Hotkey trigger, Mouse trigger, System trigger ,Monitoring image and element triggers, An example of 12 CO4 36 monitoringemail, Example of monitoring a copying event and blocking it, Launching an assistant bot on a keyboard event	4L
	3.3	Exception Handling, Debugging, and Logging: Exception handling, Common exceptions and ways to handle them, Logging and taking screenshots, Debugging techniques, Collecting crash dumps, Error reporting	7L
IV		**Robotics Based Industrial Automation**	**4/15L**

	4.1	Managing and Maintaining the Code: Project organization, Nesting workflows, Reusability of workflows, Commenting techniques, State Machine, When to use Flowcharts, State Machines, or Sequences, Using config files and examples of a config file, Integrating a TFS server	5L
	4.2	Deploying and Maintaining the Bot: Publishing using publish utility, Overview of Orchestration Server, Using Orchestration Server to control bots, Using Orchestration Server to deploy bots, License management, Publishing and managing updates	5L
	4.3	Introduction to RPA Tools.	5L

References:

1. Learning Robotic Process Automation, Alok Mani Tripathi, Packt, first edition, 2018
2. Robotic Process Automation Tools, Process Automation and their benefits: Understanding RPA andIntelligent Automation, Srikanth Merianda, Createspace Independent Publishing, first edition, 2018
3. The Simple Implementation Guide to Robotic Process Automation (Rpa): How to Best Implement Rpa inan Organization, Kelly Wibbenmeyer, iUniverse, first edition, 2018
4. http://ipu.ac.in/syllabus/MTech%20Robotics.pdf

WILSON COLLEGE (AUTONOMOUS) NEP SYLLABUS FOR MSC.I.T.

PROGRAM: MScIT		**SEMESTER: II**			
Course: Predictive Analysis Practical		**Course Code: WSITCMT523**			
Teaching Scheme					**Evaluation Scheme**
Lectures (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Continuous Internal Assessment (CIA) (Marks-40)**	**Semester End Examination (Marks-60)**
-	**4**	_	**2**	**40**	**60**

Course code: WSITCMT523	**Predictive Analytics Practical's**	**Credits**
	(UNIT 1 TO UNIT 5)	2
	8 Practical will be based on theory	
	Teacher can decide which practical should be conducted	
	Data collection & Predication will play an important role. Hence, it is mandatory to collect and predict the data during the practical lectures.	

WILSON COLLEGE (AUTONOMOUS) NEP SYLLABUS FOR MSC.I.T.

PROGRAM: MScIT		**SEMESTER: II**			
Course: Robotics Practical		**Course Code: WSITCMP524**			
Teaching Scheme					**Evaluation Scheme**
Lectures (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Continuous Internal Assessment (CIA) (Marks-40)**	**Semester End Examination (Marks-60)**
-	**4**	**_**	**2**	**40**	**60**

DETAILED SYLLABUS

Course code WSITCMP524	**Robotics Practical's**	**Credits**
	(UNIT 1 TO UNIT 5)	2
1	To study an introduction to Robot configuration	
2	Study of ROBOT With 2DOF, 3DOF & 4DOF.	
3	Programming the robot for application in val ii	
4	Two programming exercises for robots	
5	Exercise on robotic simulation software	
6	Two case studies of applications in industry	
7	Student choice practical	

WILSON COLLEGE (AUTONOMOUS) NEP SYLLABUS FOR MSC.I.T.

PROGRAM: MScIT		**SEMESTER: II**			
Course: Big Data Analytics (Elective)		**Course Code: WSITCET521**			
Teaching Scheme					**Evaluation Scheme**
Lectures (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Continuous Internal Assessment (CIA) (Marks- 40)**	**Semester End Examination (Marks- 60)**
2	**-**	**_**	**2**	**40**	**60**

Learning Objectives:

1. To provide an overview of an exciting growing field of big data analytics.
2. To introduce the tools required to manage and analyze big data like Hadoop, NoSql MapReduce.
3. To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.
4. To enable students to have skills that will help them to solve complex real-world problems in for decision support.

Course Outcomes:

At the end of the course, the learner will be able to:

1. Understand the importance of data analytics.
2. Hadoop Architecture

DETAILED SYLLABUS

	Subunit	**Course/ Unit Title**	**Credits/ Lectures**
I		**Introduction**	**2/7L**

	1.1	Introduction to Big Data, Characteristics of Data, and Big Data Evolution of Big Data, Definition of Big Data, Challenges with big data, Why Big data? Data Warehouse environment, Traditional Business Intelligence versus Big Data. State of	7L

		Practice in Analytics, Key roles for New Big Data Ecosystems, Examples of big Data Analytics. Big Data Analytics, Introduction to big data analytics, Classificationof Analytics, Challenges of Big Data, Importance of Big Data, Big Data Technologies, Data Science, Responsibilities, Soft state eventual consistency. Data Analytics Life Cycle	
II		**Analytical Theory and Methods**	**2/8L**
	2.1	Clustering and Associated Algorithms, Association Rules, Apriori Algorithm, Candidate Rules, Applications of Association Rules, Validation and Testing, Diagnostics, Regression, Linear Regression, Logistic Regression, Additional Regression Models.	8L
III		**Models**	**4/7L**
	3.1	Analytical Theory and Methods: Classification, Decision Trees, Naïve Bayes, Diagnostics of Classifiers, Additional Classification Methods, Time Series Analysis, Box Jenkins methodology, ARIMA Model, Additional methods. Text Analysis, Steps, Text Analysis Example, Collecting Raw Text, Representing Text, Term Frequency-Inverse Document Frequency (TFIDF), Categorizing Documents by Topics, Determining Sentiments	7L

IV		Code Conversion	4/8L
	4.1	Data Product, Building Data Products at Scale with Hadoop, Data Science Pipeline and Hadoop Ecosystem, Operating System for Big Data, Concepts, Hadoop Architecture, Working with Distributed file system, Working with Distributed Computation, Framework for Python and Hadoop Streaming, Hadoop Streaming, MapReduce with Python, Advanced MapReduce. In-Memory Computing with Spark, Spark Basics, Interactive Spark with PySpark, Writing	2L

		Spark Applications	
	4.2	Distributed Analysis and Patterns, Computing with Keys, Design Patterns, Last-Mile Analytics, Data Mining and Warehousing	2L
	4.3	Structured Data Queries with Hive, HBase, Data Ingestion, Importing Relational data with Sqoop, Injesting stream data with flume.	2L
	4.4	Analytics with higher level APIs, Pig, Spark's higher level APIs.	2L

References:

1. Big Data and Analytics Subhashini Chellappan Seema Acharya Wiley First edition
2. Data Analytics with Hadoop an Introduction for Data Scientists Benjamin Bengfort and Jenny Kim O'Reilly 2016
3. Big Data and Hadoop V.K Jain Khanna Publishing First 2018 edition

WILSON COLLEGE (AUTONOMOUS) NEP SYLLABUS FOR MSC.I.T.

PROGRAM: MScIT	**SEMESTER: II**				
Course: Big Data Analytics Practicals (Elective)	**Course Code: WSITCEP522**				
Teaching Scheme					**Evaluation Scheme**
Lectures (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Continuous Internal Assessment (CIA) (Marks-40)**	**Semester End Examination (Marks-60)**
-	**4**	**_**	**2**	**40**	**60**

Course code WSITCEP522	**Big Data Analytics Practical's**	**Credits**
	(UNIT 1 TO UNIT 5)	2
1	Create a data model using Cassandra	
2	Conversion from different formats to HORUS A CSV to HORUS B XML to HORUS C JSON to HORUS D mysql Database to HORUS E Picture to HORUS F Video to HORUS G Audio to HORUS	
3	Utilities and Auditing A Fixer Utilities B Data Binning or Bucketing C Aggregating of Data D Outlier Detection E Audit	
4	Retrieving Data A Data Processing B Retrieve different attributes of data C Data Pattern D Loading IP_DATA_ALL.csv E Building a diagram for scheduling of jobs F Connecting other Data Sources	
5	Assessing Data	
6	Processing Data	
7	Transforming Data	

8	Organizing Data A Horizontal Style B Vertical Style C Island Style D Secure Vault Style	
9	Reporting Data A Create a network routing diagram B Directed Acyclic Graph C Graphics	
10	Working with Power BI A Importing data from Excel B Importing data from OData Feed C Data Visualization with Power BI	

WILSON COLLEGE (AUTONOMOUS) NEP SYLLABUS FOR MSC.I.T.

PROGRAM: MScIT		**SEMESTER: II**			
Course: Project Implementation or Internship/Industrial Training		**Course Code: WSITCRM521**			
Teaching Scheme					**Evaluation Scheme**
Lectures (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Continuous Internal Assessment (CA) (Marks-40)**	**Semester End Examination (Marks-60)**
-	**-**	**_**	**4**	**40**	**60**

1. **Learning Objectives:**
2. Gain a thorough understanding of the philosophy and architecture of Web applications using ASP.NET Core MVC; Gain a practical understanding of.NET Core; Acquire a working knowledge of Web application development using
3. ASP.NET Core MVC 6 and Visual Studio
4. Persist data with XML Serialization and ADO.NET with SQL Server
5. Create HTTP services using ASP.NET Core Web API;
6. Deploy ASP.NET Core MVC applications to the Windows Azure cloud.

Course Outcomes:

After the end of the course, the learner will be able to:

1. Understand and incorporate the different AS