Lesson Plan

B.E. (ECS) (Semester VIII)

Subject: System Security

Subject Code: ECC DO802

Teacher-in-charge: Prof. Prajakta Bhangale

Academic Term: Jan– May 2023

ModuleNo.	Contents	Hrs.
1	**The Need for System Security**	03
	1.1 Risks, Threats, and Vulnerabilities,Tenets of Information Systems Security (Confidentiality,Integrity ,Availability)	
	1.2 Malicious Attack Birthday Attacks ,Brute-Force Password Attacks , Dictionary Password Attacks, IP Address Spoofing Hijacking ,Replay Attacks ,Man-in-the-Middle Attacks Masquerading ,Eavesdropping ,Social Engineering, Phreaking ,Phishing ,Pharming	
2	**Cryptography**	05
	2.1 Cryptography : Overview of Cryptography : What is cryptography , encryption and decryption techniques ,Symmetric and asymmetric key cryptography : AES, DES, RSA, Knapsack cryptosystem. 3 N.	
3	**Network Security**	06
	3.1 Firewall: Need of Firewall, types of firewall- Packet Filters, Stateful Packet Filters, Application Gateways, Circuit gateways. Firewall Policies, Configuration, limitations, DMZ, VPN.	
	3.2 Intrusion Detection System Vulnerability Assessment, Misuse detection, Anomaly Detection, Network Based IDS, Host-Based IDS, Honeypots	
	3.3 Kerberos: Working, AS, TGS, SS	
	3.4 IP Security- Overview, Protocols- AH, ESP, Modes- transport and Tunnel.	
	3.5 Public key infrastructure Introduction, Certificates, (PKI): Certificate Authority, authority, Registration	
	3.6 X.509/PKIX certificate format.	
	3.7 Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3	
4	**Web Security**	06

	4.1 Web Security Considerations, User Authentication and Session Management, Cookies, SSL, HTTPS, SSH, Privacy on Web, Web Browser Attacks, Account Harvesting, Web Bugs, Clickjacking, CrossSite Request Forgery, Session Hijacking and Management, Secure Electronic Transaction, Email Attacks, DNS Attacks, Web Service Security	
5	5.1 Finding Similar Item: Nearest Neighbor Search, Similarity of Documents, Distance Measures: Euclidean, Jaccard , Cosine , Edit and Hamming Distance with its Examples 5.2 Mining Data Streams: Data Stream Management Systems, Data Stream Model, Examples of Data Stream Applications: Sensor Networks, Network Traffic Analysis Filtering streams: The Blooms filter. 5.3 Link Analysis: PageRank Definition, Structure of the web, dead ends, Using Page rank in a search engine, Efficient computation of Page Rank: Page Rank Implementation Using MapReduce 5.4 Frequent Itemset Mining: Market-Basket Model, Apriori Algorithm, Algorithm of Park-Chen-Yu	**13**
6	6.1 Recommendation Systems: Introduction, A Model for Recommendation Systems: Collaborative-Filtering System, Content based system and its Examples. 6.2 Mining Social-Network Graphs: Social Networks as Graphs, Types of Social-Network. Clustering of Social Graphs: Applying Standard Clustering Techniques, Counting triangles using MapReduce	**06**
		39

Course 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, Map Reduce.
3. To teach the fundamental techniques in achieving big data analytics with scalability and streaming capability.

Course Outcomes:

After successful completion of the course student will be able to:

1. Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.
2. Acquire fundamental enabling techniques and scalable algorithms like Hadoop, MapReduce & NoSQL in big data analytics.
3. Interpret business models and scientific computing paradigms, and apply software tools for big data Analytics.
4. Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.
5. Develop applications for Big Data analysis using Hadoop and NoSQL etc.

CO-PO-PSO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PSO 1	PSO 2
ECCDLO7014.1	2	3												
ECCDLO7014.2 .2	2													
ECCDLO7014.3 .3	3	2		2										
ECCDLO7014.4 .4	3	2		2										
ECCDLO7014.5 .5	2	2			3									

Provide justification of PO to CO mapping

ECCDLO7014.1	**PO1**	1.1.1 Apply the knowledge of discrete structures, linear algebra, statistics and numerical techniques to solve problems 1.1.2 Apply the concepts of probability, statistics and queuing theory in modeling of computer-based system, data and network protocols. 1.3.1 Apply engineering fundamentals 1.4.1 Apply theory and principles of Electronics and/or computer science and engineering to solve an engineering problem

	PO2	2.1.3 Identify processes/modules/algorithms of a computer-based system and parameters to solve the problems 2.1.4 Identify mathematical algorithmic knowledge that applies to a given problem 2.1.4 Identify mathematical algorithmic knowledge that applies to a given 2.2.4 Compare and contrast alternative solution/methods to select the best Methods problem
ECCDLO7014.2	**PO1**	1.3.1 Apply engineering fundamentals 1.4.1 Apply theory and principles of Electronics and/or computer science and engineering to solve an engineering problem
	PO2	2.1.3 Identify processes/modules/algorithms of a computer-based system and parameters to solve the problems 2.1.4 Identify mathematical algorithmic knowledge that applies to a given problem
ECCDLO7014.3	**PO1**	1.1.1 Apply the knowledge of discrete structures, linear algebra, statistics and numerical techniques to solve problems 1.1.2 Apply the concepts of probability, statistics and queuing theory in modeling of computer-based system, data and network protocols. 1.3.1 Apply engineering fundamentals 1.4.1 Apply theory and principles of Electronics and/or computer science and engineering to solve an engineering problem
	PO2	2.1.3 Identify processes/modules/algorithms of a computer-based system and parameters to solve the problems 2.1.4 Identify mathematical algorithmic knowledge that applies to a given problem 2.1.4 Identify mathematical algorithmic knowledge that applies to a given 2.2.4 Compare and contrast alternative solution/methods to select the best Methods problem
	PO5	5.1.1 Identify modern engineering tools, techniques and resources for engineering activities

ECCDLO7014.4	**PO1**	1.1.1 Apply the knowledge of discrete structures, linear algebra, statistics and numerical techniques to solve problems 1.1.2 Apply the concepts of probability, statistics and queuing theory in modeling of computer-based system, data and network protocols. 1.3.1 Apply engineering fundamentals 1.4.1 Apply theory and principles of Electronics and/or computer science and engineering to solve an engineering problem
	PO2	2.1.3 Identify processes/modules/algorithms of a computer-based system and parameters to solve the problems 2.1.4 Identify mathematical algorithmic knowledge that applies to a given problem 2.1.4 Identify mathematical algorithmic knowledge that applies to a given 2.2.4 Compare and contrast alternative solution/methods to select the best Methods problem
ECCDLO7014.5	**PO1**	1.1.1 Apply the knowledge of discrete structures, linear algebra, statistics and numerical techniques to solve problems 1.1.2 Apply the concepts of probability, statistics and queuing theory in modeling of computer-based system, data and network protocols. 1.3.1 Apply engineering fundamentals 1.4.1 Apply theory and principles of Electronics and/or computer science and engineering to solve an engineering problem
	PO2	2.1.3 Identify processes/modules/algorithms of a computer-based system and parameters to solve the problems 2.1.4 Identify mathematical algorithmic knowledge that applies to a given problem 2.1.4 Identify mathematical algorithmic knowledge that applies to a given 2.2.4 Compare and contrast alternative solution/methods to select the best Methods problem
	PO5	5.2.1 Identify the strengths and limitations of tools for (i) acquiring information, (ii) modeling and simulating, (iii) monitoring system performance, and (iv) creating engineering designs. 5.2.2 Demonstrate proficiency in using discipline-specific tools

CO Assessment Tools:

Course Outcome	***Direct Method (80%)***					***Indirect Method (20%)***	
	Unit Tests		Assignments			End Sem Exam	Course exit survey
	1	2	1	2			
ECCDO702.1	20%	--	20%	--		30%	100%
ECCDO702.2	20%	--	20%			30%	100%
ECCDO702.3	20%	---	20%			30%	100%
ECCDO702.4	--	20%	--			30%	100%
ECCDO702.5		20%		20%		30%	100%
ECCDO702.6		20%		20%		30%	100%

CO calculation= (0.8 *Direct method + 0.2*Indirect method)

Rubrics for Assignment:

Indicator				
Timeline (3)	More than two sessions late (0)	More than one session late (1)	One session late (2)	On time (3)
Depth of Understanding (4)	Unsatisfactory (1)	Superficial (2)	Satisfactory (3)	Adequate (4)
Completeness (3)	Not submitted (0)	Major topics are omitted or addressed minimally (1)	Most major and some minor points are covered and are accurate (2)	All major and minor points are covered and are accurate (3)

Curriculum Gap identified: (with action plan): NIL

Content beyond syllabus:

Guest Lecture

Big Data Analytics:Real world Applications

By Ms. Prachi Ghadge (Morgan Stanley)

Modes of content delivery

Modes of Delivery	Brief description of content delivered
Class room lecture	Lecturs Delivered using PPTS and whiteboard
Assignments	Two Assignments: Assignment 1 Assignment 2
Guest Lecture	

Textbooks

1. Radha Shankarmani and M Vijayalakshmi —Big Data Analytics‖, Wiley
2. Alex Holmes —Hadoop in Practice‖, Manning Press, Dreamtech Press.
3. Dan McCreary and Ann Kelly —Making Sense of NoSQL – A guide for managers and the rest of us, Manning Press.

Reference Books:

1. Bill Franks, —Taming The Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics‖, Wiley
2. Chuck Lam, —Hadoop in Action‖, Dreamtech Press

E-Resources:

1. https://www.analyticsvidhya.com/blog/2014/05/hadoop-simplified
2. https://www.analyticsvidhya.com/blog/2014/05/introduction-mapreduce/
3. https://www.pdfdrive.com/big-data-analytics-a-hands-on-approach-e158549112.html
4. https://www.pdfdrive.com/data-science-and-big-data-analytics-e58447171.html

Lesson Plan

CLASS	BE Electronics and Computer science, Semester VII		
Academic Term	July- October 2021		
Subject	**Big Data Analytics(ECCDLO7014)** **7014)**		
Periods (Hours) per week	***Lecture***	***3***	
	Practical		
	Tutorial		
Evaluation System		***Hours***	***Marks***
	Theory examination	3	80
	Internal Assessment	--	20
	Practical Examination	--	--
	Oral Examination	--	--
	Term work	--	--
	Total	--	100
Time Table	***Day***	***Time***	
	Tuesday	2.30-3.30	
	Wednesday	9.45-10.45	
	Friday	9.45-10.45	
Course Content and Lesson plan			

Week	Lecture No.	Date		Topic	
		Planned	Actual		Remarks (If any)
1	1	17/7	23/7	Introduction to Big Data, Big Data characteristics, Types of Big Data, Traditional vs. Big Data a business approach	Lectures adjusted on Saturday
	2	18/7	23/7	Technologies Available for Big Data, Study of Big Data Solutions	
	3	20/7	23/7	Infrastructure for Big Data, Big Data Challenges, Case	
2	4	24/7	27/7	Introduction to Hadoop. Core Hadoop Components	
	5	25/7	2/8	Hadoop Ecosystem-Apache HBase	
	6	27/7	3/8	Hive, HCatalog	
	7	2/8	5/8	Pig, Mahout, Oozie, Zookeeper, Sqoop,	
	8	3/8	4/8	Physical Architecture, Hadoop limitations	
3	9	5/8	5/8	Introduction to NoSQL, NoSQL business drivers, NoSQL database case studies.	
	10	10/8	10/8	NoSQL data architecture patterns: Key-value stores, Graph stores	
	11	11/8	12/8	Column family, (Bigtable) stores, Document stores,	
	12	17/8	17/8	Variations of NoSQL architectural patterns	
	13	18/8	17/8	Using NoSQL to manage big data: What is a big data NoSQL solution? Understanding the types of big data problems; Analyzing big data with a shared-nothing architecture;	
	14	23/8	23/8	Choosing distribution models: master-slave versus peer-to-peer; Four ways that NoSQL systems handle	

				big data problems,	
4	15	24/8	24/8	MapReduce and The New Software Stack: Distributed File Systems, Physical Organization of Compute Nodes, Large Scale File-System Organization.	
	16	25/8	26/8	MapReduce: The Map Tasks, Grouping by Key, The Reduce Tasks, Combiners, Details of MapReduce Execution, Coping With Node Failures	
	17	30/8	30/8	Algorithms Using MapReduce: MapReduce WordCount Program,	
	18	6/9	6/9	Relational-Algebra Operations by MapReduce, Matrix Operations,	
	19	7/9	10/9	Matrix Multiplication by MapReduce.	
	20	8/9	14/9	Matrix-Vector Multiplication by MapReduce	
5	21	14/9	20/9	Finding Similar Item: Nearest Neighbor Search, Similarity of Documents, Distance Measures: Euclidean, Jaccard , Cosine , Edit and Hamming Distance with its Examples	
	22	15/9	23/9	Finding Similar Item: Nearest Neighbor Search, Similarity of Documents, Distance Measures: Euclidean, Jaccard , Cosine , Edit and Hamming Distance with its Examples	
	23	20/9	27/9	Mining Data Streams: Data Stream Management Systems	
	24	21/9	28/9	Data Stream Model	
	25	22/9	30/9	Examples of Data Stream Applications: Sensor Networks,	
	26	27/9	6/10	Network Traffic Analysis	
	27	28/9	7/10	Filtering streams: The Blooms filter.	
	28	29/9	11/10	Link Analysis: PageRank Definition, Structure of the web, dead ends, Using Page rank in a search engine	
	29	04/10	12/10	computation of Page Rank: Page Rank Implementation Using	

				MapReduce	
	30	6/10		Frequent Itemset Mining: Market-Basket Model, Apriori Algorithm,PCY	
6					
	31	11/10	13/10	Recommendation Systems: Introduction, A Model for Recommendation Systems: Collaborative-Filtering System	
	32	12/10	20/10	Content based system and its Examples.	Online(3hrs)
	33	13/10	20/10	Mining Social-Network Graphs: Social Networks as Graphs, Types of Social-Network	
	34	20/10	20/10	Clustering of Social Graphs: Applying Standard Clustering Techniques, Counting triangles using MapReduce	
			3/12/2022	Data Analytic:Real world applications Guest lecture	1.5 hrs
Total	34	34	35		

Examination Scheme

Module		Lecture Hours	Marks distribution in Test (For internal assessment/TW)		Approximate Marks distribution in Sem. End Examination
			Test 1	Test 2	
1	Introduction to Big Data Analytics	3	5		
2	Hadoop	5	10		
3	NoSQL	6	5		
4	MapReduce	6		10	
5	Techniques in Big Data Analytics	13		5	

6	Big Data Analytics Applications	6		5	

Identification of Strong and Weak Students using Test

		No of Students					
Test No.	**Test Date**	**Total Students**	**Full Marks**	**>80%**	**79%>marks>60 %**	**less than 60%**	**Failed**
1	**9/3**	**23**	**0**	**0**	**6**	**17**	**1**
2	**28/4**	**23**	**0**	**3**	**13**	**7**	**1**

Classification: Tool (Test)	**Category**
Strong students	Students scoring above 60%
Weak Students	Students scoring below 50%

Submitted By	**Approved By**
Prof.Prajakta Bhangale	ii) Dr. D. V. Bhoir Sign:
Sign:	ii) Prof. K. Narayanan Sign:
	iii) Prof. Shilpa Patil Sign:
Date of Submission:	**Date of Approval:**
Remarks by PAC (if any)	