Detailed Syllabus
Lab-wise Breakup

Course Code	17M15CS121	Semester – DD SUMMER	Semester: Session Summer 2023 Month from: JUNE-JULY, 2023

Course Name	**Cloud and Web Services Lab**

Credits	1	Contact Hours	2Hrs/Week

Faculty (Names)	Coordinator(s)	Deepti(first half) /Sandeep Kumar Singh(second half)
	Teacher(s) (Alphabetically)	Deepti /Sandeep Kumar Singh

COURSE OUTCOMES		COGNITIVE LEVELS
C179.1	Demonstrate the architecture and layers of Cloud Service Models, Deployment models etc.	Understand (level 2)
C179.2	Understand the working of CloudSim and run different scheduling algorithms.	Apply (level 3)
C179.3	Analyze various Scheduling algorithms and compare their performances on Virtual Machines.	Analyze (level 4)
C179.4	Apply and evaluate the performance of various Cloud based Web Services	Evaluate (level 5)

Module No.	Title of the Module	List of Experiments	CO
1.	CloudSim installations and Use	Study of CloudSim, set up CloudSim environment, Virtual Machine (VM) creation, Running VMs on CloudSim.	CO1
2.		Allocate different Cloudlets to VMs and Data Centers using different Cloud based scheduling algorithms.	CO2
3.	Analyze various Scheduling algorithms in different scenarios on CloudSim	Create different Data Centers, VM allocation and provisioning on Data Centers, and analysis of outcomes.	CO3
4.		Assigning cloudlets and analysing the scheduling parameters for various scenarios. Creating and Running applications in Cloud Environments.	CO3
5.	Implement and Analyse Cloud Based Web Services	Apply and evaluate the performance of various Cloud based Web Services	CO4

Evaluation Criteria

Components	Maximum Marks
Lab Test# 1	20
Lab Test# 2	20
D2D work 60(D2D: 40 marks, PBL: 20 marks)	
Total	**100**

Project Based Learning: A group of maximum 2 students are formed. Each group chooses a Cloud and Web Services based project. The project shall be designed and/or modeled based on any Cloud and Web Services based Platform like AWS, Google cloud, Eucalyptus, CloudSim, SOAP, RESTful Services, UDDI, WSDL or any Cloud or Web Services based tools. The project shall function and run as per the objective of the project. Live demonstration of the project shall be shown during their presentation. The project evaluation shall be done based on the quality, innovation,relevance and creativity involved.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books,

	Reference Books, Journals, Reports, Websites etc. in the IEEE format)
1.	Rajkumar Buyya, Rajiv Ranjan and Rodrigo N. Calheiros, Modeling and Simulation of Scalable Cloud Computing Environments and the CloudSim Toolkit: Challenges and Opportunities, Proceedings of the 7th High Performance Computing and Simulation Conference (HPCS 2009, ISBN: 978-1-4244-4907-1, IEEE Press, New York, USA), Leipzig, Germany, June 21 - 24, 2009.
2	Rodrigo N. Calheiros, Rajiv Ranjan, Anton Beloglazov, Cesar A. F. De Rose, and Rajkumar Buyya, CloudSim: A Toolkit for Modeling and Simulation of Cloud Computing Environments and Evaluation of Resource Provisioning Algorithms, Software: Practice and Experience, Volume 41, Number 1, Pages: 23-50, ISSN: 0038-0644, Wiley Press, New York, USA, January 2011.
3	George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud" O'REILLY publication.
4.	K. Hwang, Geoffrey C. Fox, Jack J. Dongarra, "Distributed and Cloud Computing- From Parallel Processing to the Internet of Things", Morgan Kauffman Publishers, Elsevier.

Course Code	17M15CS122	Semester Even (specify Odd/Even)	Semester 2nd Session 2021 -2022 Month from Jan'22 to June'22
Course Name	Performance Engineering Lab		
Credits	2	Contact Hours	2 hrs

Faculty (Names)	Coordinator(s)	Mr. Prashant Kaushik
	Teacher(s) (Alphabetically)	1. Dr. K Raj Lakshmi 2. Prashant Kaushik

COURSE OUTCOMES		COGNITIVE LEVELS
C174.1	Experiment with GProf to calculate the performance and statistics of a program in terms of call counts and timing information of functions.	Apply (level 3)
C174.2	Use monitoring tools and techniques to asses a database instance's performance and activity	Analyze (level 4)
C174.3	Compare the performance of different protocols by simulating various wired and wireless network scenarios in NS2 Simulator.	Analyze (level 4)
C174.4	Examine the performance of M/M/1, M/D/1 and D/M/1 Queuing models in NS2.	Analyze (level 4)
C174.5	Utilize the Weka Tool for analyzing data file.	Apply (level 3)

Module No.	Title of the Module	List of Experiments	CO
1.	GNU Profiler	Use the Gprof (GNU Profiler) to analyze the performance and statistics of a program	1
2.	Database Monitoring	Monitor a running database instance for its performance	2
3.	Network Simulation	Introduction to Network simulator (NS2) and its various utilities NAM, XGraph etc. Creation of Wired and Wireless Network Scenarios and simulation of various protocols Wired and Wireless Network Performance Analysis using AWK and Python	3
4.	Queuing Analysis	Simulation of various queues in NS2 and analyzing their performances on various performance metrics such as throughput, average delay and packet loss	4
5	Data Science Tools	Data analysis using WEKA tool/ KNIME software	5

Evaluation Criteria

Components	Maximum Marks
Evaluation-1:	10
Lab test-1:	20
Lab test-2:	20

Evaluation-2 :	15
Project:	20
Attendance:	15
Total	**100**

Project based Learning: Each student in a group of 3-4 will study the research papers related to performance analysis of software systems. The articles should be recent and in relation with the subject contents. Understanding and implementing the research paper(s) enhances the student's working experience towards studied tools and concepts.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
1.	GPROF Tutorial – How to use Linux GNU GCC Profiling Tool by by J Fenlason
3.	Marc Greis' Tutorial for the UCB/LBNL/VINT Network Simulator "ns"
4.	Introduction to Network Simulator NS2 by Teerawat Issariyakul, Ekram Hossain
5.	An Introduction to the WEKA Data Mining System by Zdravko Markov

Course Description

Subject Code	22B12CS412	Semester: Summer	Semester: 8th and 9th Session: 2023 -2024
			Month from: June to July 2023
Subject Name	Digital Forensics and Cyber Laws		
Credits	3-0-0	Contact Hours	3

Faculty (Names)	Coordinator(s)	Dr. Kapil Madan
	Teacher(s) (Alphabetically)	Dr. Kapil Madan

COURSE OUTCOMES		COGNITIVE LEVELS
C433-8.1	To explain the concept of cybercrimes and analyze legal frameworks of different types of cybercrimes	Remember Level (C1)
C433-8.2	Demonstrate a critical understanding of the Cyber law with respect to Indian IT Act.	Evaluate Level (C5)
C433-8.3	Study the different forms in digital forensic investigation and its life cycle.	Understand Level (C2)
C433-8.4	Applying the principles in collecting and analyzing the digital evidence.	Apply Level (C3)
C433-8.5	Interpret and apply various digital forensic tools in real time scenario.	Analyze Level (C4)

Module No.	Subtitle of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction to Cybercrime	Introduction, Role of Electronic Communication Devices and Information and Communication Technologies in Cybercrime, Types of Cybercrime, Classification of Cybercriminals, Tools used in Cybercrime, Challenges to Cybercrime, Strategies to Prevent Cybercrimes	05
2.	Cyber warfare and cyber laws	Introduction to Cyber War, Ransomware ,Types of Ransomware, Mode of Infection , Events in Ransomware Attack , Role of Antivirus Deep Web and Dark Web, Accessing Dark Web, Onion Router—TOR, Introduction to Cyber Laws, Cyber Laws in India and Case Studies, Information Technology Act 2000, Amendments to the Indian Evidence Act 1872 in View of Information Technology Act 2000	06
3	Introduction to Digital Forensics	Computer Forensics Investigations , Steps in Forensic Investigation ,Forensic Examination Process , Methods Employed in Forensic Analysis, Forensics classification, Incident and Incident Handling, Disk, Network, Database, Wireless, Malware, Mobile, GPS, Email, Memory forensics, Incident and Incident handling	06
4	Digital Evidence	Digital Evidence, Evidence Collection Procedure, Acquisition and Handling of Digital Evidence, from different digital devices, Operating Systems and their Boot Processes ,Storage Medium , File System, Windows Registry, Windows Artefacts , Browser Artefacts, Linux Artefacts ,Whole Disk Encryption or Full Disk Encryption, Evidence from Mobile Devices, Digital Evidence on the Internet, Challenges with Digital Evidence	06
5	Acquisition and Handling of	Preliminaries of Electronic or Digital Evidence, Acquisition and Seizure of Evidence, Chain of Custody, Acquisition of Computer and Electronic Evidence, Acquisition Procedure using Target Disk Mode from Apple	06

	Digital Evidence	Macintosh Computer, Mobile Phone and PDA, Optical and Removable Media, Digital Cameras, Handling of Digital Evidence	
6	Analysis of Digital Evidence	Introduction ,Capturing of Forensic Copy of Memory and Hard Drive with Toolkit Forensic Imager , RAM Analysis with Volatility ,Analysing Hard Drive, Working with Autopsy, Email Tracking and Tracing	06
7	Forensic Tools	Forensic Tools,Types Cyber Forensic Suite, Free and Open-source Forensic Suite, Proprietary Forensic Suites, Drive Imaging and Validation Tools, Forensic Tool for Integrity Verification and Hashing , Forensic Tools for Data Recovery, Forensic Tools for RAM Analysis Registry Analysis, Encryption/Decryption, Password Recovery, Network Analysis, Forensic Utility for Metadata Processing UNIX System Analysis	07
	Total number of Lectures		42

Evaluation Criteria

Components	Maximum Marks
T1	30
End Semester Examination	40
TA	30 (Attendance-10, Class Test/ Quiz-10, Project Based Learning - 10)
Total	100

Project Based Learning: The students are grouped into groups of size 2-3 and will be implementing various cyber forensics tools. The student will analyze the requirements and select the required applications. This will help in the employability of students in the cyber security and forensics based industry and public sectors.

	Text Books:
1.	Cyber Forensics by Murugan, S, Oxford University Press.
2	Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and Sunit Belpure, Publication Wiley.
	Reference Books:
1.	Cybercrime and Digital Forensics: An Introduction by Thomas J. Holt , Adam M. Bossler, Kathryn C. Seigfried-Spellar, Routledge; 2nd edition, 2017
2.	Digital Forensics and Incident Response: A practical guide to deploying digital forensic techniques in response to cyber security incidents by Gerard Johansen, Packt Publishing Limited, 2017
3	The Basics of Digital Forensics: The Primer for Getting Started in Digital Forensics by John Sammons, Syngress; 2nd edition, 2014

Subject Code	22B12CS422	Semester: Summer	Semester IX Session 2022 -2023
			Month from: June 2023 to July 2023
Subject Name	Cloud computing essentials: Azure and AWS		
Credits	3	Contact Hours	3-0-0

Faculty (Names)	Coordinator(s)	Dr. Prakash Kumar (J62), Akanksha Mehndiratta (J128)
	Teacher(s) (Alphabetically)	Dr. Prakash Kumar, Akanksha Mehndiratta

COURSE OUTCOMES		COGNITIVE LEVELS
C434-7.1	Examine the fundamentals of Cloud Computing, its applicability and architecture.	Understand (level 2)
C434-7.2	Examine the architecture and services of AWS (Amazon Web Services) cloud platform.	Analyze (level 4)
C434-7.3	Examine the architecture and services of Azure cloud platform.	Analyze (level 4)
C434-7.4	Examine the architecture and services of Google Cloud platform.	Analyze (level 4)
C434-7.5	Develop the applications using appropriate cloud platforms.	Apply (level 3)

Module No.	Subtitle of the Module	Topics in the Module	No. of Lectures for the module
1.	Overview of Cloud Computing	Origin of Cloud Computing, Benefits and challenges, Parallel and distributed computing, Grids and HPCs, Data center design and management for clouds, Virtualization: Why virtualization, Benefits and shortcomings, comparison with cloud, Software Defined Networks and Storage (SDN and SDS) Cloud Computing Architecture: IaaS, PaaS, SaaS, Types of cloud, Interoperability and its challenges, Cloud security, stability and fault tolerance methods and challenges, Applications for cloud, Clouds for different applications, Service Level Agreements, Concurrent, high-throughput and data intensive computing	10
2.	AWS Essentials	Introduction to Amazon Web Services, EC2: Compute services, Networking, infrastructure and reliability, Storage and database services, Amazon Elastic Block Store (Amazon EBS), Amazon Simple Storage Service (Amazon S3), Amazon Elastic File System (Amazon EFS), Amazon Relational Database Service (Amazon RDS), Amazon virtual private cloud (VPC), Identity and Access Management (IAM) and Security on AWS.	8
3.	Azure Essentials	Azure core concepts, Azure services, Describe core solutions and management tools on Azure, Describe general security and network security features, Describe identity, governance, privacy, and compliance features, Describe Azure cost management and service level agreements.	8
4.	GCP Essentials	Google Cloud Fundamentals: Core Infrastructure-Google App Engine, Google Compute Engine, Google Kubernetes Engine, Google Cloud Storage, Google Cloud SQL, and BigQuery. Google Cloud Resource Manager hierarchy and Google Cloud Identity and Access Management , Essential Google Cloud Infrastructure: Foundation, Essential Google Cloud Infrastructure: Core Services, Elastic Google Cloud Infrastructure: Scaling and Automation, Reliable Google Cloud Infrastructure: Design and Process	8
5.	Recent trends, Cloud Platforms Comparison & Project based learning	Serverless computing, Microservices, Usage of containers and Dockers, Kubernetes, Comparing the services and efficiency of AWS, Azure and GCP with respect to resource management. Discussing and Implementing a few web applications and system applications on the cloud platforms under different resource management scenarios. Analyzing and evaluating the platforms based on various parameters like security, load balancing, fault tolerance, resilience, cost-effectiveness, etc.	8
		Total number of Lectures	**42**

Evaluation Criteria

Components	Maximum Marks
T1	20
T2	20
End Semester Examination	35
TA	25 (Attendance (10), Mini-Project (10),Assignments (5))
Total	**100**

Project based learning: Groups of 2-3 students will choose a project topic. They will use the concepts of cloud technology to execute their project. In a team, they will learn how to apply the concepts for problem solving in a meaningful way. The knowledge gained will enhance their employability in the IT sector.

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)	
	Text Books
1.	Diaz, Francesco and Roberto Freato. "Cloud Data Design, Orchestration, and Management Using Microsoft Azure." *Apress* (2018).
2.	Reagan, Rob. "Web Applications on Azure." *Apress,* 2017
3.	Zaigham Mahmood, Ricardo Puttini, Thomas Erl. "Cloud Computing: Concepts, Technology & Architecture", Pearson, 2013
4.	Wilkins, Mark. "Learning Amazon web services (AWS): a hands-on guide to the fundamentals of AWS cloud". Addison-Wesley Professional, 2019
	Reference Books
1	Buyya, Rajkumar et al. "Cloud Computing Principles and Paradigms." Wiley, 2011.
2.	Pace, Eugenio et al. "Developing Applications for the Cloud on the Microsoft Windows Azure Platform." (2010).
3	Reese, George. "Cloud Application Architectures - Building Applications and Infrastructure in the Cloud." (2009).
4	Sosinsky, Barrie A.. "Cloud Computing Bible." (2010).

Research Methodology & Intellectual Property Rights (18M11GE111)

Basic idea of research, types of research, methods to write report and research papers, use of Mendeley in report writing, problem identification and solving, research ethics, patents, intellectual property rights, plagiarism regulation 2018, steps in research process and common methodologies to attempt solution to research paper, basic statistical concepts, handling of raw data, Some common probability distributions, hypothesis testing, parametric and non-parametric data, introduction to regression analysis.

Course Description

Course Code	18M11GE111	Semester Summer	Semester IX Session 2022-23 Summer Month from June 2023 -July 2023
Course Name	Research Methodology & Intellectual Property Rights		
Credits	2	Contact Hours	2-0-0
Faculty (Names)	Coordinator(s)	Prof. B.P. Chamola, Dr. Yogesh Gupta	
	Teacher(s) (Alphabetically)	Prof. B.P. Chamola, Dr. Yogesh Gupta	

COURSE OUTCOMES:		COGNITIVE LEVELS
After pursuing the above mentioned course, the students will be able to:		
C101.1	explain the basic concepts and types of research	Understanding Level (C2)
C101.2	define a research problem, its formulation, methodologies and analyze research related information	Analyzing Level (C4)
C101.3	explain research ethics, understand IPR, patents and their filing related to their innovative works.	Understanding Level (C2)
C101.4	explain and analyze the statistical data and apply the relevant test of hypothesis in their research problems	Analyzing Level (C4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Research	What is research? Types of research. What is not research? How to read a Journal paper?	3
2.	Report writing	How to write report? Use of Mendeley in report writing. How to write a research paper? Problem identification and solving.	4

3.	Ethics, IPR and Research methodologies	Research ethics, patents, intellectual property rights, plagiarism regulation 2018. Steps in research process and common methodologies to attempt solution to research paper.	8
4.	Basics of statistics and probability distributions	Basic statistical concepts. Handling of raw data, Some common probability distributions.	7
5.	Test of hypothesis and regression analysis	Hypothesis testing. Parametric and non-parametric data, Introduction to regression analysis.	8

Total number of Lectures	**30**
(Course delivery method: open ended discussion, guided self-study, lectures)	

Evaluation Criteria

Components	Maximum Marks
Mid Term Examination	30
End Semester Examination	40
Assignments	30 (Quiz, Assignments)
Total	**100**

Project based learning: Students divided in small groups will be assigned topics related to patents, intellectual property rights, plagiarism, and statistics. Students can write a report/review paper and find its similarity through plagiarism software available online. Students may collect data and test the relevant hypothesis.They may study some data set and do its regression analysis. The main purpose is to expose students to a wider arena of applicable knowledge of the subject

Recommended Reading material: Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)

Stuart Melville and Wayne Goddard, Research Methodology: An Introduction for Science & Engineering Students, Kenwyn, South Africa: Juta & Co. Ltd., 1996.

Kothari, C.R., Research Methodology: Methods and Techniques, New Age International, New Delhi, 2009.

Kumar, Ranjit, Research Methodology: A Step by Step Guide for Beginners, 2nd Edition, Sage Publications Ltd., 2005.

Ramappa, T., Intellectual Property Rights Under WTO, S. Chand, New Delhi, 2008.

Wayne Goddard and Stuart Melville, Research Methodology: An Introduction, Kenwyn, South Africa: Juta & Co, 2001.