

Detailed Syllabus
Lab-wise Breakup

Course Code	17M15CS122	Summer Semester	Session: 2023 - 2024
Course Name	Performance Engineering Lab		
Credits	2	Contact Hours	2 hrs

Faculty (Names)	Coordinator(s)	Dr. Parmeet Kaur, Ms.Neha
	Teacher(s) (Alphabetically)	Dr. Parmeet Kaur, Ms.Neha

COURSE OUTCOMES		COGNITIVE LEVELS
C174.1	Experiment with profilers to calculate the performance and statistics of a program in terms of call counts and timing information of functions.	Apply (level 3)
C174.2	Analyze performance of data mining algorithms on real world data sets using Weka, NetworkX tool.	Analyze (level 4)
C174.3	Compare the performance of different protocols by simulating various wired and wireless network scenarios in Python, Wireshark , 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	Model computer systems using Markov Chain Theory with Performance Evaluation Process Algebra (PEPA), and visualizing network performance	Analyze (level 4)

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.	Data Science Tools	Data analysis using WEKA tool	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	Performance Evaluation Process Algebra	Model computer systems using Markov Chain Theory and Perform Steady State Analysis, and Visualizing network performance using Open Source Tools	5

Evaluation Criteria

<i>Components</i>	<i>Maximum Marks</i>
Evaluation-1:	15
Lab Test-1:	20
Lab Test-2:	20
Evaluation-2:	15
Project, Attendance, Assignments:	30
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.	Unix and Shell Programming by B. M. Harwani, Oxford University Press, 2013
2.	Mastering Wireshark by Charit Mishra, Packt Publishing, 2016
3.	Mastering Linux Shell Scripting, A Practical Guide to Linux Command-line, Bash Scripting, and Shell Programming, 2nd Edition by Mokhtar Ebrahim, Andrew Mallett, Packt Publishing, 2018
4.	Modeling and Simulation in Python: An Introduction for Scientists and Engineers by Allen Downey, No Starch Press, 2023
5.	Practical Packet Analysis Using Wireshark to Solve Real-world Network Problems by Chris Sanders, No Starch Press, 2007
6.	Introduction to Network Simulator NS2 by Teerawat Issariyakul, Ekram Hossain, Springer, 2009
7.	Predictive Analytics Applications with WEKA by Shuzlina Abdul Rahman & Sofianita Mutalib, 2021
8.	Marc Greis Tutorial for the UCB/LBNL/VINT Network Simulator NS
9.	GPROF Tutorial – How to use Linux GNU GCC Profiling Tool
10.	The ns Manual, available at: isi.edu/nsnam/ns/doc/ns_doc.pdf

Detailed Syllabus
Lab-wise Breakup

Course Code	17M15CS123	Semester 9 th	Semester INTSUM2024 Session 2023-2024 Month from June to July, 2024
Course Name	IoT Systems Development Lab		
Credits	1	Contact Hours	2 Hours

Faculty (Names)	Coordinator(s)	Ms Amarjeet Kaur
	Teacher(s) (Alphabetically)	Ms Amarjeet Kaur Dr K.Rajalakshmi

COURSE OUTCOMES		COGNITIVE LEVELS
C181.1	Explain Node-RED IDE platform for IoT application development and demonstrate I/O nodes, flows, third party palettes, import/export of flows in Node-RED.	Understand (level 2)
C181.2	Develop user defined functional nodes and deploy it in Node-Red.	Apply (level 3)
C181.3	Analyze various IoT Communication protocols using APIs with Arduino and Raspberry Pi along with sensors and actuators.	Analyze (level 4)
C181.4	Apply and evaluate the characteristics of different IoT devices.	Evaluate (level 5)
C181.5	Design and develop IoT based applications for various challenges and problems related to Sustainable Development, e.g., energy and waste management, water conservation, clean energy, improving public health, sustainable urbanization, smart agriculture etc.	Create (level 6)

Module No.	Title of the Module	List of Experiments	CO
1.	Node-Red Installation and Use	Setup and Install Node.js and Node-RED as IDE platform for IoT application development.	CO1
2.		Demonstrate I/O nodes, flows, third party palettes, import/export of flows in Node-RED	CO1
3.		Develop Java Script based IoT applications using functional nodes , flows and dashboard on Node-RED platform	CO2
4.		Developing and implementation of user defined nodes for creating flows in Node-Red.	CO2
5.	Study and use of Arduino and Raspberry Pi, sensors and actuators.	Study and interface of Arduino and Rasberry Pi with different types of sensors and actuators	CO2
6.		Creation of various IoT based applications using Arduino and Rasberry Pi	CO3 , CO4

7.	Developing IoT based systems applications using Arduino and Raspberry Pi	Developing smart applications for various challenges and problems related to Sustainable Development, e.g., energy and waste management, water conservation, clean energy, improving public health, sustainable urbanization, smart agriculture etc.	CO5
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Evaluation Criteria

Components	Maximum Marks
Eval#1	15
Lab Test# 1	20
Eval#2	15
Lab Test# 2	20
Attendance	10
IoT System Development PBL	20
Total	100

Project based learning: Students form group of size 2-3 members. Each group will identify several real life issues in various thrust areas like healthcare, industrial, education, smart city, logistics, environment, governance and etc. Once problem has been identified, the group will analyze the problem and synthesize IoT system based solutions to the identified problem. Each group will apply different IoT based approaches such as smart sensor and heterogeneous devices. This approach will enhance skills of each student and increase the understanding of IoT systems in distributed applications. Moreover, candidate will gain the enough knowledge to provide the IoT solution to enhance the quality of life in human/organization. After this course, a student will able to undertake any work in this area in the industry or research.

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.	Internet of Things: Architecture and Design Principles, Raj Kamal, McGrawHill.
2	“Internet of Things: A Hands-on Approach”, by ArshdeepBahga and Vijay Madiseti
3	https://nodered.org/docs/getting-started
4.	https://www.arduino.cc/en/Tutorial/HomePage
5.	https://www.raspberrypi.org/documentation/

Course Description

Subject Code	22B12CS412	Semester: Summer 2024	Semester: DD9 Session: 2023 -2024 Month from: June to July 2024
Subject Name	Digital Forensics and Cyber Laws		
Credits	3-0-0	Contact Hours	3

Faculty (Names)	Coordinator(s)	Dr. Kapil Madan (62), Ms. Anuradha Gupta (128)
	Teacher(s) (Alphabetically)	Ms. Anuradha Gupta (128), Dr. Kapil Madan (62)

After the completion of the course, Students are able to

COURSE OUTCOMES		COGNITIVE LEVELS
C433-8.1	Summarize the concepts and categories of cybercrimes.	Understand Level (C2)
C433-8.2	Explain the different forms of digital forensic investigation methodology.	Understand Level (C2)
C433-8.3	Make use of digital evidence collection guidelines.	Apply Level (C3)
C433-8.4	Solve cybercrime cases with respect to Indian cyber laws and IT Act.	Apply Level (C3)
C433-8.5	Examine the various digital forensic tools in real-time scenarios.	Analyse 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	
Mid Term		30	
End Term		40	
TA		30 (Attendance-08, Class Quiz-10, Internal Assessment/Assignment -05, Project Based Learning - 07)	
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

Detailed Syllabus
Lecture-wise Breakup

Subject Code	22B12CS422	Semester: Even	Semester Summer 2024 Month from: June 2024 to July 2024
Subject Name	Cloud computing essentials: Azure and AWS		
Credits	3	Contact Hours	3-0-0

Faculty (Names)	Coordinator(s)	Dr. Kashav Ajmera, Mr. Sumeshwar Singh
	Teacher(s) (Alphabetically)	Dr. Kashav Ajmera, Mr. Sumeshwar Singh

COURSE OUTCOMES		COGNITIVE LEVELS
C434-7.1	Recall the fundamentals of Cloud Computing, its applicability and architecture.	Remember (level 1)
C434-7.2	Understand the architecture and services of AWS (Amazon Web Services), Azure and Google Cloud platforms.	Understand (level 2)
C434-7.3	Apply the AWS, Azure and Google cloud platform to solve the real-world problems.	Apply (level 3)
C434-7.4	Analyze the AWS, Azure and Google cloud platform to solve the real-world problems.	Analyze (level 4)
C434-7.5	Create the applications using appropriate cloud platforms.	Create (level 6)

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.	Buyya, Rajkumar et al. "Cloud Computing Principles and Paradigms." Wiley, 2011.
2.	Reagan, Rob. "Web Applications on Azure." <i>Apress</i> , 2017
3.	Moyer, Christopher M.. "Building Applications in the Cloud: Concepts, Patterns, and Projects." Pearson Education, 2011.

4.	Wilkins, Mark. "Learning Amazon web services (AWS): a hands-on guide to the fundamentals of AWS cloud". Addison-Wesley Professional, 2019
	Reference Books
5	Sosinsky, Barrie A.. "Cloud Computing Bible." (2010).
6.	Pace, Eugenio et al. "Developing Applications for the Cloud on the Microsoft Windows Azure Platform." (2010).
7	Reese, George. "Cloud Application Architectures - Building Applications and Infrastructure in the Cloud." (2009).
8	Diaz, Francesco and Roberto Freato. "Cloud Data Design, Orchestration, and Management Using Microsoft Azure." <i>Apress</i> (2018).

Detailed Syllabus
Lab-wise Breakup

Course Code	17M15CS121	Semester – M. Tech CSE/AIML	Semester Summer 2024 Month from: June 2024 to July 2024
Course Name	Cloud and Web Services Lab		
Credits	1	Contact Hours	2Hrs/Week

Faculty (Names)	Coordinator(s)	Dr. Kashav Ajmera, Mr. Sumeshwar Singh
	Teacher(s) (Alphabetically)	Dr. Kashav Ajmera, Mr. Sumeshwar Singh

COURSE OUTCOMES		COGNITIVE LEVELS
C179.1	Demonstrate Cloud and Web based Services using web tools and technologies.	Understand (level 2)
C179.2	Develop web based applications on various Cloud Platforms viz. AWS, GCP etc.	Apply (level 3)
C179.3	Develop web services-based applications by using various web-based tools, viz. REST, SOAP etc.	Apply (level 3)
C179.4	Develop Cloud based applications by using and integrating different services offered on various Cloud Platforms, viz. AWS. GCP etc.	Create (level 6)

Module No.	Title of the Module	List of Experiments	CO
1.	Development of Web Service Applications	Demonstration of Web services and Service oriented Architectures with simple web service implementations.	CO1
2.		Development of web service applications by using various web based tools, like REST, JSON, SOAP etc.	CO2
3.	Development of Cloud and Web Servicesbased application on Cloud Platforms	Develop Cloud based native applications on Amazon Web Services (AWS), Google Cloud Platform (GCP) available services.	CO3
4.		Develop Cloud based services and applications on various Cloud Platforms, viz. AWS. GCP, EC2, S3, RDS, Dockers, Containers, Compute etc.	CO4

Evaluation Criteria

Components	Maximum Marks
Lab Test# 1	20 marks
Lab Test# 2	20 marks
D2D work (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, 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.	Learning Amazon web services (AWS): a hands-on guide to the fundamentals of AWS cloud by Wilkins, Mark.
2	David Clinton, “Learn Amazon Web Services in a Month of Lunches”, MANNING, 2017
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.
5.	ArshdeepBahga, Vijay Madiseti, “Cloud Computing:A Hands-on Approach”, Universities Press, 2014
6.	https://aws.amazon.com/
7.	https://cloud.google.com/appengine/docs/
8.	https://www.w3.org/XML/
9.	Building applications in the cloud: concepts, patterns, and projects
10.	Cloud computing bible by Sosinsky, Barrie Shukla,G.D.

1. CO-PO and CO-PSO Mapping:

COs	PO 1	PO 2	PO 3	PSO1	PSO2
C179.1	1	1	2	2	1
C179.2	2	2	2	2	1
C179.3	2	1	2	2	2
C179.4	2	2	2	2	2
AVG.	1.8	1.5	2.0	2.0	1.5

2. CO-PO and CO-PSO Mapping (M. Tech- CSE) II sem:

COs	PO 1	PO 2	PO 3	PSO1	PSO2
C171.1	1 Basics of Cloud services demonstrated	1 Basic principles and architectures of Cloud model is demonstrated	2 Various Web Service types are demonstrated	2 Role of Web tools and Technologies are demonstrated	1 Various web based protocols are demonstrated
C171.2	2 Developing simple Web applications	2 Developing web applications using REST, SOAP etc.	2 Developing service oriented web applications using web service based tools.	2 Developing and Integrating real time applications using REST, SOAP, UDDI, WSDL etc.	1 Developing real life web service applications with updated protocols and tools.
C171.3	2 Developing simple applications on EC2 Instances on Amazon Web Services (AWS)	1 Developing and Integrating simple AWS based applications	2 Evaluation of instances on AWS, Elastic Compute Cloud (EC2) etc.	2 Developing Simple Storage Service (S3) based applications	2 Developing other AWS Service based applications, viz, Relational Database Service (RDS).Lambda etc.
C171.4	2 Developing Cloud Service applications on AWS, Elastic Compute Cloud (EC2), GCP	2 Creating and Developing AWS, Elastic Compute Cloud (EC2), GCP based simple real life applications	2 Creating Cloud based applications with database integration AWS and GCP Cloud platforms.	2 Creating more real life Cloud Service applications on AWS, EC2, GCP compute, platforms.	2 Developing Containers and Dockers based cloud service applications.
AVG.	1.8	1.5	2.0	2.0	1.5

(Prakash Kumar)
Course Coordinator