Course Type	Course Code	Name of the Course	L	T	P	Credits
DE	NCSD523	**Cloud Computing**	3	0	0	3

Course Objective

The course presents a top-down view of cloud computing, from applications and administration to programming and infrastructure. Its main focus is on parallel programming techniques for cloud computing and large scale distributed systems which form the cloud infrastructure. The topics include: overview of cloud computing, cloud systems, parallel processing in the cloud, distributed storage systems, virtualization, security in the cloud, and multicore operating systems. Students will study state-of-the-art solutions for cloud computing developed by Google, Amazon, Microsoft, Yahoo, VMWare, etc.

Learning Outcomes

· To learn how to use Cloud Services.
· Analyze the trade-offs between deploying applications in the cloud and over the local infrastructure.
· Deploy applications over commercial cloud computing infrastructures such as Amazon Web Services, Windows Azure, and Google App Engine.
· Program data intensive parallel applications in the cloud.
· Analyze the performance, scalability, and availability of the underlying cloud technologies and software.
· Identify security and privacy issues in cloud computing.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Introduction: [Overview of Distributed Computing Cloud introduction and overview Different types of cloud services Deployment models, Advantages and Disadvantages, Companies in the Cloud]	4	This section provides a brief introduction about cloud methodologies.
2	Infrastructure as a Service (IaaS): [Introduction, Virtualization, Virtual Machine Monitor (VMM/Hypervisor) , CPU Virtualization, Full Virtualization, Para Virtualization, Memory Virtualization, I/O Virtualization, Virtual Clusters and Resource Management]	6	The section encompasses the structure of Infrastructure required for cloud computing
3	Platform as a Service (PaaS): [From IaaS to PaaS, Introduction PaaS properties and Characteristics PaaS Techniques: File System, GFS, HDFS] Programming Models: [Map Reduce, BigTable, HBase] Hadoop schedulers: [Scheduling algorithms and Fair Queuing. Hadoop-Map Reduce job execution]	8	The section encompasses the structure of platform and supports the computing paradigms required for PaaS required for cloud computing
5	Software as a Service (SaaS): [Web Service, Services And Service-oriented Architecture, REST and Systems of Systems, Services and Web Services, Enterprise Multitier Architecture, Grid Services and OGSA, Applications and Web Portal]	7	The section encompasses the structure of softwareservicesrequiredforcloud computing

6	Security in Cloud Environment: [Cloud Computing Threats, Cloud attack life cycle, Security for Cloud Computing, Cloud Security Alliance and Mechanisms, Case study developments in Cloud environment.]	7	This section briefs about security paradigms required for cloud environment.
7	Cloud Networking Services and Service Platform Design: [Virtual Private Cloud Networking, High-Performance, Scalable Load Balancing, Cloud API Gateways, Global Content Delivery Networks. Cloud-Managed High-Performance Network Address Translation, Network Edge Connectivity, Reliable, Resilient, Low-Latency DNS Serving on the Cloud, Network Performance and Availability, Optimization on the Cloud]	7	The focus of this topic is to introduce students to scalable Cloud computing capabilities used to deploy virtual machines to clusters of machines for data analytics or traditional high-performance computing
7	Case Studies: Amazon EC2, Google App Engine, IBM Clouds, Microsoft's Windows Azure	3	This will discuss about case studies with suitable architectures
Total		42	

Text Books:

1. "Distributed and Cloud Computing" by Kai Hwang, Geoffrey Fox and Jack J. Dongarra, MK Publishers.
2. "Cloud Computing: Theory and Practice" by Dan C Marinescu, MK Publishers.
3. "Cloud Computing: A Hands-on Approach" by ArshdeepBahga and Vijay Madisetti, Universities Press.

Reference Books:

1. Raj Kumar Buyya, "Cloud Computing: Principles and Paradigms", Wiley Press.

2. Barrie Sosinsky, "Cloud Computing Bible", Wiley India.

3. BorkoFurht and Armando Escalante, "Hand Book of Cloud Computing", Springer.