



## Sub Committee - Specialization for Curriculum Development

### Post Graduate/ Under Graduate

**Course Title:** Cloud Architectures and Security

**Course Code:**

**Number of Credits:** 4

**Level:** 3

**Learning Objective/Outcome (s):**

This subject gives students the skills and knowledge to understand how Cloud Computing Architecture can enable.

A general comparative study on different types of cloud architecture, The course on cloud security introduces the basic concepts of security systems and cryptographic protocols, which are widely used in the design of cloud security.

Analyze and understand the basics of cloud architecture

Evaluate cloud architecture in terms of comparative study on various cloud architecture available

Critique cloud architecture and various component in cloud architecture

**Pedagogy:**

Class Room

Case Studies

Lab Work

**Pre-learning:**

Server and Network resources

Knowledge software architectures and network architecture

Fundamental knowledge of networking

**Course Outline:**

Sr. No.	Topics	Hours
1	Introduction To Cloud Architecture: Introduction to Cloud Computing Architecture, private, public and hybrid cloud, Types of cloud architecture, Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public vs private clouds, role of virtualization in enabling the cloud, Business Agility: Benefits and challenges to Cloud architecture.	10

2	Server Architectures: Introduction to server , Stand-alone, blades, stateless, clustering, scaling, optimization, virtualization. Limitation of traditional server deployments; modern solutions. Applications; database, finance etc. Redundant Layer 2 and Layer 3 designs. Case studies	10
3	Data Centre Architectures: Network connectivity optimization evolution: Top of rack (TOR), end of rack (EOR), scale up vs scale up, solutions that reduce power and cabling. Data Centre standards; TIA/EIA-942. Structured cabling standards, fibre and copper cabling characteristics, cable management, bandwidth requirements, I/O connectivity.	10
4	Virtualized Data Center Architecture: Cloud infrastructures; public, private, hybrid. Service provider interfaces; Saas, Paas, Iaas. VDC environments; concept, planning and design, business continuity and disaster recovery principles. Managing VDC and cloud environments and infrastructures.	10
5	Storage Network Design: Architecture of storage, analysis and planning. Storage network design considerations; NAS and FC SANs, hybrid storage networking technologies (iSCSI, FCIP, FCoE), design for storage virtualization in cloud computing, host system design considerations.	8
6	Security Concepts: Introduction to cloud Security, Confidentiality, privacy, integrity, authentication, non-repudiation, availability, access control, defence in depth, least privilege, how these concepts apply in the cloud, what these concepts mean and their importance in PaaS, IaaS and SaaS. e.g. User authentication in the cloud; Cryptographic Systems- Symmetric cryptography, stream ciphers, block ciphers, modes of operation, public-key Cryptography, hashing, digital signatures, public-key infrastructures, key management, X.509 certificates, OpenSSL.	8
7	Cloud Computing Security Basic Terms and Concepts, Threat Agents, Cloud Security Threats. Cloud Security Mechanisms, Encryption, Hashing, Digital Signature, Public Key Infrastructure (PKI), Identity and Access Management (IAM), Single Sign, On (SSO), Cloud, Based Security, Groups, Hardened Virtual Server Images	4
	<b>Total</b>	<b>60</b>

### Books Recommended:

1. Gautam Shroff, "Enterprise Cloud Computing Technology Architecture Applications", Cambridge University Press; 1 edition, [ISBN: 978-0521137355], 2010.
2. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach" McGraw-Hill Osborne Media; 1 edition [ISBN: 0071626948], 2009.

4. Greg Schulz, "Cloud and Virtual Data Storage Networking", Auerbach
  - a. Publications [ISBN: 978-1439851739], 2011.
5. Cloud Computing Protected: Security Assessment Handbook (John Rhoton, Jan De Clercq, David Graves) ISBN: 9780956355621, 0956355625
6. Kevin Corbin, Ron Fuller, David Jansen, "NX-OS and Cisco Nexus
  - a. Switching: Next-Generation Data Center Architectures" Cisco Press; 1
  - b. edition [ISBN: 9781587058929], 2010.

**Suggested Assessment/ Evaluation Methods:**

- LAB Examination
- Case Studies
- Presentations

**Benchmarked against similar courses in other national/ international universities /organizations :**

S. No.	Name of the Course	Name of University where it is offered
1	Cloud Architecture Principles for IaaS	Stanford University, CA
2	Cloud Architectures	SRM University, Chennai
3	Cloud Security	SRM University, Chennai
4	Specialization: Cloud Computing-III Building Clouds and Services	Mumbai University

Name of Members					
Designation					
Org. / Inst.					
Signature					

Name of Experts					
Designation					
Org. / Inst.					
Signature					

Signature of Dean:

Date: