

Course Code	Course Title	Credits	Lectures /Week
USCS602	Cloud Computing and Web Services	2	3
<p>About the Course: The course "Cloud Computing and Web Services" provides an in-depth understanding of cloud computing fundamentals and web service technologies. Students will learn about different types of clouds, cloud deployment models, and cloud platforms. They will also explore key concepts of virtualization, security in cloud computing, and popular cloud computing platforms such as OpenStack and AWS. Through practical exercises and hands-on projects, students will gain the skills required to design, deploy, and manage cloud-based applications and services.</p>			
<p>Course Objectives:</p> <ul style="list-style-type: none"> • Understand the basics of cloud computing, including types of clouds, deployment models, and essential characteristics of cloud platforms. • Explore web services technologies such as SOAP and REST and understand their role in distributed computing and parallel computing. • Gain proficiency in utilizing virtualization technologies, including creating virtual machines and managing virtualized environments using tools like KVM and oVirt. • Explore and utilize popular cloud computing platforms such as OpenStack and AWS to architect, deploy, and manage cloud-based applications and services. • Learn about cloud security fundamentals, including confidentiality, integrity, availability, and secure development practices. 			
<p>Learning Outcomes:</p> <p>After successful completion of this course, students would be able to</p> <ul style="list-style-type: none"> • Demonstrate a comprehensive understanding of cloud computing concepts, including different types of clouds and their characteristics. • Implement and utilize web service technologies, such as SOAP and REST, to develop distributed and parallel computing applications. • Design, deploy, and manage cloud-based applications and services using popular cloud computing platforms such as OpenStack and AWS. • Apply secure development practices and implement cloud security policies to ensure the confidentiality, integrity, and availability of cloud software solutions. • Utilize virtualization technologies to create and manage virtualized environments, considering the benefits and drawbacks of virtualization. 			
Unit	Topics	No of Lectures	
I	<p>Cloud Computing Basics</p> <p>Web Services – Distributed Computing, Parallel Computing, WSDL structure, SOAP- Structure of SOAP Message (In JAX-WS), SOAP Messaging Architecture, SOAP Header, Client-side SOAP Handler, REST-What is REST? HTTP methods, Java API for RESTful Web Services (JAX-RS)</p>	15	

	Virtulization:- Characteristics of Virtualized Environments.. Pros and Cons of Virtualization. Virtualization using KVM, Creating virtual machines, oVirt - management tool for virtualization environment.	
II	<p>Introduction to Cloud Computing:</p> <p>Definition, Types of Clouds, Deployment of software solutions and web applications, Types of Cloud Platforms, Essential characteristics – On-demand self-service, Broad network access, Location independent resource pooling ,Rapid elasticity , Measured service, Comparing cloud providers with traditional IT service providers</p> <p>Cloud Computing Software Security fundamentals: Cloud Information Security Objectives, Confidentiality, Integrity, Availability, Cloud Security Services, Relevant Cloud Security Design Principles, Secure Cloud Software Requirements, Secure Development practices, Approaches to Cloud Software Requirement Engineering, Cloud Security Policy Implementation.</p>	15
III	<p>Cloud Applications</p> <p>CloudSim: Introduction to Simulator, understanding CloudSim simulator, CloudSim Architecture(User code, CloudSim, GridSim, SimJava) Understanding Working platform for CloudSim,</p> <p>OpenStack: Introduction to OpenStack, OpenStack test-drive, Basic OpenStack operations, OpenStack CLI and APIs, Tenant model operations, Quotas, Private cloud building blocks, Controller deployment, Networking deployment, Block Storage deployment, Compute deployment, deploying and utilizing OpenStack in production environments, Building a production environment, Application orchestration using OpenStack Heat</p> <p>AWS: Architecting on AWS, Building complex solutions with Amazon Virtual Private Cloud (Amazon VPC)</p>	15
<p>Textbook(s):</p> <ol style="list-style-type: none"> 1. Java Web Services Up and Running 2nd edition, Martin Kalin, O'Reilly (2013) 2. Pro Power Shell for Amazon Web Services, Brian Beach, Apress, 2014 3. Enterprise Cloud Computing Technology, Architecture, Applications, Gautam Shroff, Cambridge University Press, 2010 4. Mastering Cloud Computing, Rajkumar Buyya, Christian Vecchiola, S Thamarai Selvi, Tata McGraw Hill Education Private Limited, 2013 5. OpenStack in Action, V. K. CODY BUMGARDNER, Manning Publications Co, 2016 <p>Additional Reference(s):</p> <ol style="list-style-type: none"> 1. OpenStack Essentials, Dan Radez, PACKT Publishing, 2015 2 2. OpenStack Operations Guide, Tom Fifield, Diane Fleming, Anne Gentle, Lorin Hochstein, Jonathan Proulx, Everett Toews, and Joe Topjian, O'Reilly Media, Inc., 2014 3. https://www.openstack.org 		