MANIPAL UNIVERSITY JAIPUR

School of Computing and Information Technology

Department of Computer Science and Engineering
Course Hand-out

Cloud Infrastructure Services | CS 3241 | 3 Credits | 3 0 0 3

Session: Jul 23 – Dec 23 | Faculty: Priyank Singh Hada, Dr Dibakar Sinha, Ms. Vaishali Chauhan, Dr Rishav Dubey & Mr. Rakesh Kumar | Class: VI SEM Program Elective

A. **Introduction:** This course goals to discuss cloud computing infrastructure service model of cloud. The course is envisioned to offer the details on cloud infrastructure services typically aims to equip students with a comprehensive understanding of various aspects related to designing, implementing, managing, and optimizing cloud-based infrastructure.

B. **Course Outcomes:** At the end of the course, students will be able to

[CS3141.1] Summarize the Infrastructure Services in cloud computing.
[CS3141.2] Explain the security and access management of Cloud Infrastructure Services.
[CS3141.3] Demonstrate different types of cloud intrastate services using examples.
[CS3141.4] Demonstrate network services of cloud for the access of intrastate services.

C. **PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES**

[PO.1]. Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

[PO.2]. Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

[PO.3]. Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

[PO.4]. Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

[PO.5]. Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

[PO.6]. Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, and cultural issues and the consequent responsibilities relevant to the professional engineering practice

[PO.7]. Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

[PO.8]. Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practices.

[PO.9]. Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

[PO.10]. Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

[PO.11]. Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

[PO.12]. Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

[PSO.1]. Will be able to design, develop and implement efficient software for a given real life problem.

[PSO.2]. Will be able to apply knowledge of AI, Machine Learning and Data Mining in analysing big data for extracting useful information from it and for performing predictive analysis.

[PSO.3]. Will be able to design, manage and secure wired/ wireless computer networks for transfer and sharing of information.

D. Assessment Plan:

Criteria	Description	Maximum Marks
Internal Assessment (Summative)	Sessional Exam I	30
	In class Quizzes and Assignments , AWS academy course Certification, Activity feedbacks (Accumulated and Averaged)	30
End Term Exam (Summative)	End Term Exam (Open Book)	40
	Total	100
Attendance (Formative)	A minimum of 75% Attendance is required to be maintained by a student to be qualified for taking up the End Semester examination. The allowance of 25% includes all types of leaves including medical leaves.	
Make up Assignments (Formative)	Students who misses a class will have to report to the teacher about the absence. A makeup assignment on the topic taught on the day of absence will be given which has to be submitted within a week from the date of absence. No extensions will be given on this. The attendance for that particular day of absence will be marked blank, so that the student is not accounted for absence. These assignments are limited to a maximum of 5 throughout the entire semester.	
Homework/ Home Assignment/ Activity Assignment (Formative)	There are situations where a student may have to work in home, especially before a flipped classroom. Although these works are not graded with marks. However, a student is expected to participate and perform these assignments with full zeal since the activity/ flipped classroom participation by a student will be assessed and marks will be awarded.	

E. SYLLABUS

Pre-requisite(s): Fundamentals of Computers, Operating System, Application Software and System Architecture.

Cloud Concept Overview: Introduction to cloud computing, Advantages of cloud computing, Introduction to Amazon Web Services (AWS), Moving to the AWS Cloud – The AWS Cloud Adoption Framework (AWS CAF),Cloud Economics and Billing: Fundamentals of pricing, Total Cost of Ownership, AWS Organizations, AWS Billing and Cost Management, Technical support, AWS Global Infrastructure, AWS services and service category overview, Cloud Security: AWS shared responsibility model, AWS Identity and Access Management (IAM), Securing a new AWS account, Securing accounts, Securing data on AWS, Working to ensure compliance, Networking and Content Delivery: Networking basics, Amazon VPC, VPC networking, VPC security, Amazon Route 53, Amazon CloudFront, Compute: Compute services overview, Amazon EC2, Amazon EC2 cost optimization, Container services, Introduction to AWS Lambda, Introduction to AWS Elastic Beanstalk, Storage: Amazon Elastic Block Store (Amazon EBS), Amazon Simple Storage Service (Amazon S3), Amazon Elastic File System (Amazon EFS), Amazon Simple Storage Service Glacier, Database: Amazon Relational Database Service (Amazon RDS), Amazon DynamoDB, Amazon Redshift, Amazon Aurora.

F. TEXT BOOKS

1. AWS Academy Cloud Foundation
2. https://www.coursera.org/specializations/awsfundamentals?skipBrowseRedirect=true
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G. REFERENCE BOOKS

1. AWS Certified Cloud Practitioner Study Guide: CLF-C01 Exam by Ben Piper and David Clinton.
2. AWS Certified Cloud Practitioner (CLF-C01) Cert Guide|First Edition|By Pearson by Anthony J. Sequeira

H. Lecture Plan:

LEC NO	TOPICS	Corresponding CO	Mode of delivery	Mode Of Assessing CO
1-2	Introduction to cloud computing, Advantages of cloud computing	CS-3241.1	Lecture	Mid Term1. Quiz/ Assignment, End term
3	Introduction to Amazon Web Services (AWS)	CS-3241.1	Lecture	Mid Term1. Quiz/ Assignment, End term
4	Moving to the AWS Cloud – The AWS Cloud Adoption Framework (AWS CAF)	CS-3241.1	Lecture	Mid Term1. Quiz/ Assignment, End term
5	**Cloud Economics and Billing:** Fundamentals of pricing, Total Cost of Ownership	CS-3241.1	Lecture	Mid Term1. Quiz/ Assignment, End term
6-7	AWS Organizations, AWS Billing and Cost Management, Technical support	CS-3241.1	Lecture	Mid Term1. Quiz/ Assignment, End term
8-9	**AWS Global Infrastructure**, AWS services and service category overview	CS-3241.2, CS-3241.3, CS-3241.3	Lecture	Mid Term1. Quiz/ Assignment, End term
10	**Cloud Security:** AWS shared responsibility model	CS-3241.2, CS-3241.3, CS-3241.3	Lecture	Mid Term1. Quiz/ Assignment, End term
11	AWS Identity and Access Management (IAM)	CS-3241.2, CS-3241.3, CS-3241.3	Lecture	Mid Term1. Quiz/ Assignment, End term
12	Securing a new AWS account, Securing accounts, Securing data on AWS, Working to ensure compliance	CS-3241.2, CS-3241.3, CS-3241.3	Lecture	Mid Term1. Quiz/ Assignment, End term
13-15	**Compute:** Compute services overview, Amazon EC2, Amazon EC2 cost optimization, Container services	CS-3241.2, CS-3241.3, CS-3241.3	Lecture	Mid Term1. Quiz/ Assignment, End term
16-17	Introduction to AWS Lambda, Introduction to AWS Elastic Beanstalk	CS-3241.2, CS-3241.3, CS-3241.3	Lecture	Mid Term2. Quiz/ Assignment, End term
18-20	**Storage:** Amazon Elastic Block Store (Amazon EBS), Amazon Simple Storage Service (Amazon S3)	CS-3241.2, CS-3241.3, CS-3241.3	Lecture	Mid Term2. Quiz/ Assignment, End term
21-22	Amazon Elastic File System (Amazon EFS), Amazon Simple Storage Service Glacier	CS-3241.2, CS-3241.3, CS-3241.3	Lecture	Mid Term2. Quiz/ Assignment, End term
23-26	**Networking and Content Delivery:** Networking basics, Amazon VPC, VPC networking, VPC security	CS-3241.2, CS-3241.3, CS-3241.3	Lecture	Mid Term2. Quiz/

				Assignment, End term
27-29	Amazon Route 53, Amazon CloudFront	Lecture	CS-3241.3, CS-3241.3	Mid Term2. Quiz/ Assignment, End term
30-36	**Database:** Amazon Relational Database Service (Amazon RDS), Amazon DynamoDB, Amazon Redshift, Amazon Aurora.	Lecture	CS-3241.3, CS-3241.3	End Term Examination. Quiz/ Assignment, End term
Total No. of Lectures	**36**			

I. Course Articulation Matrix: (Mapping of COs with POs)

CO	STATEMENT	ATTAINMENT OF PROGRAM OUTCOMES THRESHOLD VALUE: 40%												ATTAINMENT OF PROGRAM SPECIFIC OUTCOMES		
		PO1	PO 2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CS-3241.4.1	Summarize the virtualization concepts in cloud computing	1	1						1	1	1		1	1		1
CS-3241.4.2	Explain the distrusted computing systems and algorithms	3	2						1	1	1		1	1		1
CS-3241.4.3	Understand the parallel processing frameworks.	2	2						1	1	1		1	1		1
CS-3241.4	List advancement in cloud computing models	1	1						1	1	1		1	1		1

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation