Cerro Coso College

Course Outline of Record Report

10/12/2021

ITC282x : Cloud Architecture

General Information

Author:	• Valerie Karnes • Harper, Christopher • Hightower, Matthew • Villicana, David
Course Code (CB01) :	ITC282x
Course Title (CB02) :	Cloud Architecture
Department:	Business Information Technolog
Proposal Start:	Spring 2021
TOP Code (CB03) :	(0701.00) Information Technology, General
SAM Code (CB09) :	Clearly Occupational
Distance Education Approved:	Yes
Course Control Number (CB00) :	No value
Curriculum Committee Approval Date:	04/03/2020
Board of Trustees Approval Date:	05/07/2020
External Review Approval Date:	05/07/2020
Course Description:	This course is designed to prepare students for a career as a cloud architect. Students learn architectural principles and services of cloud platforms, and design and deploy highly scalable, fault-tolerant services. This course is aligned with AWS Cloud Architecture Associate Certification.
Submission Type:	The IT/Cyber Security Advisory Committee and labor market data reflected the need for a Cloud Computing certificate as the industry moves data to the cloud. No value
Author:	No value

Faculty Minimum Qualifications

Master Discipline Preferred:	• Computer Information Systems (Computer network installation, microcomputer technology, computer applications)
Alternate Master Discipline Preferred:	No value
Bachelors or Associates Discipline Preferred:	• Computer Information Systems (Computer network installation, microcomputer technology, computer applications) • Computer Science
Additional Bachelors or Associates Discipline Preferred:	• Computer Information Systems (Computer network installation, microcomputer technology, computer applications) • Computer Science

Course Development Options

Basic Skills Status (CB08)

Course is not a basic skills course.

Allow Students to Gain Credit by Exam/Challenge

Rationale For Credit By Exam/Challenge

No value

Course Support Course Status (CB26)

No value

Course Special Class Status (CB13)

Course is not a special class.

Allowed Number of Retakes

3

Retake Policy Description

No value

Grade Options

- Letter Grade Methods

Course Prior To College Level (CB21)

Not applicable.

Allow Students To Audit Course

Associated Programs

Course is part of a program (CB24)

Associated Program	Award Type	Active
Cloud Computing	Certificate of Achievement	Fall 2020 to Spring 2021

Transferability & Gen. Ed. Options

Course General Education Status (CB25)

No value

Transferability

Not transferable

Transferability Status

Not transferable

Units and Hours

Summary

Minimum Credit Units (CB07)	3
Maximum Credit Units (CB06)	3
Total Course In-Class (Contact) Hours	90
Total Course Out-of-Class Hours	72
Total Student Learning Hours	162
Faculty Load	0

Credit / Non-Credit Options

Course Credit Status (CB04)

Credit - Degree Applicable

Course Non Credit Category (CB22)

Credit Course.

Non-Credit Characteristic

No Value

Course Classification Status (CB11)

Credit Course.

Funding Agency Category (CB23)

No value

☐ Cooperative Work Experience Education Status (CB10)

☐ Variable Credit Course

Weekly Student Hours

	In Class	Out of Classs
Lecture Hours	2	4
Laboratory Hours	3	0
Activity Hours	0	0

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	54
Course In-Class (Contact) Hours	
Lecture	36
Laboratory	54
Activity	0
Total	90
Course Out-of-Class Hours	
Lecture	72
Laboratory	0
Activity	0
Total	72

Time Commitment Notes for Students

No value

Faculty Load

Extra Duties: 0

Faculty Load: 0

Units and Hours - Weekly Specialty Hours

Activity Name	Type	In Class	Out of Class
No Value	No Value	No Value	No Value

Pre-requisites, Co-requisites, Anti-requisites and Advisories

Prerequisite

ITC280 - Introduction to Cloud Computing

Students need to know the essentials of cloud computing. This includes being familiar with cloud infrastructure basics, common cloud terminology, and basic cloud economics.

Entrance Skills

Entrance Skills	Description
No value	No value

Limitations on Enrollment

Limitations on Enrollment	Description
No value	No value

Specifications

Methods of Instruction

Methods of Instruction	Instruction through examination or quizzing
Rationale	Students will complete quizzes and examinations within the courses (online and on ground). This will include short answer and multiple-choice questions. Example: Multiple-choice and essay questions covering all aspects of the course.
Methods of Instruction	Discussion
Rationale	Discussion: Students will participate to critically explore concepts and compare elements of the text, simulations or projects. The topics for discussion for the online or on-ground classes will be the same. Subjects for the discussion will include relevant topics to the reading material, weekly lab simulations, and projects. Example: Discuss use cases in which a serverless compute function would be better than setting up a server.
Methods of Instruction	Laboratory
Rationale	Hands-on Lab: Activities will reinforce the practical application of theories presented in the text. Labs will also provide insight and training into real-world tasks for Cloud architects. Example: Implement a security feature that will restrict access to hosts in an AWS cloud

	infrastructure. Online: Students will participate in weekly discussions. Students will post one individual initial posting per week and reply to a minimum of two classmates. The instructor will also participate in the board and the student replies. On-ground: Students will participate in class discussions with the instructor or/and fellow students.
Methods of Instruction	Lecture
Rationale	Weekly lecture notes are provided that include language to describe course concepts and further students' understanding and preparedness to work in a cloud-based environment. Students will also view PowerPoint presentations with content from each module.

Assignments

A. Chapter reading (Example: Reading the assigned chapters from the textbook based on the topics for the week).
B. Weekly step-by-step assignments (Example - Explain fundamental concepts related to selecting the appropriate services for a specific workload in the cloud).
C. Weekly application simulations assignments (Example: Secure a cloud infrastructure by implementing console security feature)

Methods of Evaluation	Rationale
Final Exam	Comprehensive Exam: A comprehensive exam in a proctored environment will evaluate a student's preparedness for the AWS Certified Solutions Architect - Associate exam.
Tests	Objective Exams: Objective exams will evaluate the student's comprehension of text material and prepare them for the AWS Certified Solutions Architect - Associate exam environment.
Homework	Hands-on simulations: Computer-based simulations/labs/activities will reinforce the practical application of theories presented in the text and their preparedness. Simulations will also provide insight and training into real-world tasks for IT Professionals. Labs/activities are evaluated by reviewing the steps/scores students take through the labs to demonstrate competency. Simulations will also provide insight and training into real-world tasks for Cloud Architects. For example, implementing a Serverless Architecture with AWS Managed Services. The simulation requires students to complete a series of tasks and submit their results which are scored on a rubric.
Participation	Discussions: Students will participate in discussions to critically explore concepts and compare elements of the text and computer based training. For example: Discuss best practices for implementing a Serverless Architecture.
Distance Education Description: how outcomes are evaluated	Assignments for the online course are in line and similar to the assignments that are offered on ground. The SLO's are assessed through a rubric and objective assignments such as discussion boards, exams, and homework.

Equipment

No Value

Textbooks

Author	Title	Publisher	Date	ISBN
Ritesh Modi				

Azure for Architects: Implementing cloud design, DevOps, IoT, and serverless solutions on your public cloud	Packt Publishing	October 20, 2017	978-1788397391

Other Instructional Materials

Description	AWS Academy Cloud Architecting
Author	AWS Academy
Citation	No value

Materials Fee

No value

Learning Outcomes and Objectives

Course Objectives

Describe how cloud adoption transforms the way IT systems work.

Describe the benefits of cloud computing, including benefits unique to major cloud providers.

Discuss how to design systems that are secure, reliable, high-performing, and cost efficient.

Describe principles to consider when migrating or designing new applications for the cloud.

Identify the design patterns and architectural options applied in a variety of use cases.

Define high availability, fault tolerance, and scalability.

Identify and discuss how to avoid single points of failure.

List common cloud services that have built-in fault tolerance or can be designed for fault tolerance.

Describe why load balancing is a key architectural component for cloud based applications.

Identify the benefits of Infrastructure as Code.
Describe how to leverage common cloud capabilities to support automation.
Create, manage, provision, and update related resources using common cloud management services.
Articulate the importance of making systems highly cohesive and loosely coupled.
Describe system coupling to support the distributed nature of applications built for the cloud.
Describe database services for storing and deploying web-accessible applications.
Compare structured query language (SQL) databases with NoSQL databases.
Describe how the AWS Well-Architected Framework improves cloud-based architectures.
Describe the business impact of design decisions.
Identify and describe cloud design principles and best practices.
Describe how to secure data at every layer in the application.
Describe the appropriate tools and services to provide security-focused content.
Select compute, storage, database, and networking resources to improve performance.
Evaluate the most important performance metrics for your applications.
Follow best practices to eliminate unneeded costs or suboptimal resources.
Troubleshoot common errors.
CSLOs

Compare common cloud services and design cloud based technical solutions for common IT challenges. Expected SLO Performance: 70.0

Identify and explain cloud design patterns and best practices. Expected SLO Performance: 70.0

Optimize technology infrastructure that has been migrated from an on-premise environment to a cloud platform. Expected SLO Performance: 70.0

Evaluate the performance metrics for applications and select computer, storage, database, and networking resources to improve performance. Expected SLO Performance: 70.0

Outline

Course Outline

1. Welcome to Cloud Architecting
    a. Course prerequisites, objectives, overview
2. Designing your environment
    a. Choosing a region
    b. Selecting availability zones
    c. Virtual Private Cloud (VPC)
    d. Dividing VPCs and subnets
    e. Default VPCs and default subnets
    f. Controlling VPC traffic
    g. Connecting multiple VPCs
    h. Integrating on-premises components
    i. VPC best practices
3. Designing for High Availability I
    a. Load balancing and fault tolerance
    b. High availability across regions
    c. Connections outside of Amazon VPC
4. Designing for High Availability II.
    a. Best practice – scalability
    b. Determining if scaling is needed
    c. Automatic scaling
    d. Scaling data stores
    e. AWS Lambda and event-driven scaling
5. Automating your Infrastructure
    a. Manual environment configuration
    b. Infrastructure as code on AWS
    c. Grouping resources in a template
    d. Resources not supported by AWS CloudFormation
6. Decoupling your infrastructure
    a. Loose coupling
    b. Loose coupling strategies
    c. Communicating easily and reliably among components
    d. Communicating with loose coupling and Amazon DynamoDB
    e. Amazon API Gateway
    f. Serverless architectures
    g. Decoupling examples
7. Designing web-scale media
    a. Storing web-accessible content with Amazon S3
    b. Caching with Amazon CloudFront
    c. Managing NoSQL databases
    d. Storing relational data in Amazon RDS
8. Well-Architected framework
    a. Introduction to the well-architected framework
    b. Pillars of the well-architected framework
    c. Well-architected design principles
9. Well-architected Pillar 1: Operational Excellence
    a. Principles of the operational excellence pillar
    b. Drive operational excellence

    c. Operational excellence pillar questions
10. Well-Architected Pillar 2: Security
    a. Principles of the security pillar
    b. Preventing common security exploits
    c. Securing data in CloudFront
    d. Encrypting data
    e. Authentication
11. Well-Architected Pillar 3: reliability
    a. Principles of the reliability pillar
    b. Making your infrastructure more reliable
    c. Reliability pillar questions
12. Well-Architected Pillar 4: Performance Efficiency
    a. Principles of the performance efficiency pillar
    b. Infrastructure efficiency improvements
    c. Performance efficiency pillar questions and best practice
13. Well-Architected Pillar 5: Cost Optimization
    a. Principles of the cost optimization pillar
    b. Optimizing the cost of your infrastructure
    c. Dedicated Instances and dedicated hosts
    d. Trusted advisor
    e. Optimizing costs with caching
    f. AWS cost calculation tools
    g. Cost optimization questions
14. Troubleshooting
    a. Troubleshooting steps
    b. AWS support options
15. Design patterns and sample architectures
    a. High-availability design patterns
    b. Stream processing example
    c. Sensor network data ingestion and processing example
    d. Application backend example
    e. Transcoding and serving video files example

Lab Outline

1. Architecture review and improvement
2. Making your environment highly available
3. Using auto-scaling with AWS lambda
4. Automating infrastructure deployment with AWS cloud formation
5. Decoupling your infrastructure
6. Implementing a serverless architecture with AWS managed services
7. Introduction to Amazon CloudFront
8. Multi-Region failover with Amazon Route 53
9. Final Lab - Scenario analysis, design, and implementation

Delivery Methods

Delivery Method: Please list all that apply -Face to face -Online (purely online no face-to-face contact) -Online with some required face-to-face meetings (“Hybrid”) -Online course with on ground testing -iTV – Interactive video = Face to face course with significant required activities in a distance modality -Other

- Face to face
- Online (purely online no face-to-face contact)
- Online with some required face-to-face meetings (“Hybrid”)

Rigor Statement: Assignments and evaluations should be of the same rigor as those used in the on-ground course. If they are not the same as those noted in the COR on the Methods of Evaluation and out-of-class assignments pages, indicate what the differences are and why they are being used. For instance, if labs, field trips, or site visits are required in the face to face section of this course, how

will these requirements be met with the same rigor in the Distance Education section? Describe the ways in which instructor-student contact and student-student contact will be facilitated in the distance ed environments.

All assignments in distance education courses (online, hybrid and iTV) of IT C282 are of the same rigor as those in the on-ground course, except that students in purely online sections will submit all of their assignments virtually. The use of industry-standard software and a simulation manual instructs students to complete a series of tasks and provides detailed documentation of their results to the instructor. The instructor reviews the student's results and provides feedback to the students on skill development and selection of the correct methods. The instructor can view students' step-by-step actions to provide feedback and guide their learning. The instructor does provide detailed feedback to students to guide their learning. Instructor evaluation of student work in distance education courses is the same as in the on-ground course, except that evaluation of student work in online is presented virtually. Instead of on-site lectures, hybrid and online courses use a variety of methods including, but not limited to videos, interactive simulations and written lecture notes. Students will interact weekly on topical discussions with a requirement to respond to their peers to encourage critical thinking and deeper level understanding.

Good practice requires both asynchronous and synchronous contact for effective contact. List the methods expected of all instructors teaching the course. -Learning Management System -Discussion Forums -Message -Other Contact -Chat/Instant Messaging -E-mail -Face-to-face meeting(s) -Newsgroup/Discussion Board -Proctored Exam -Telephone -iTV - Interactive Video -Other

- Discussion Forums
- Chat/Instant Messaging
- E-mail
- iTV - Interactive Video

Software and Equipment: What additional software or hardware, if any, is required for this course purely because of its delivery mode? How is technical support to be provided?

Students will be working within a virtual environment to prepare their assignments. VMware and/or Virtual Box will be used for these assignments. Partnerships with VMware provide students free use of their software.

Accessibility: Section 508 of the Rehabilitation Act requires access to the Federal government's electronic and information technology. The law covers all types of electronic and information technology in the Federal sector and is not limited to assistive technologies used by people with disabilities. It applies to all Federal agencies when they develop, procure, maintain, or use such technology. Federal agencies must ensure that this technology is accessible to employees and the public to the extent it does not pose an "undue burden". I am using -iTV—Interactive Video only -Learning management system -Publisher course with learning management system interface.

- Learning management system

Class Size: Good practice is that section size should be no greater in distance ed modes than in regular face-to-face versions of the course. Will the recommended section size be lower than in on-ground sections? If so, explain why.

The class size online is set to 45. On-ground sections will be limited to 30 students due to limitation on room size and equipment to perform the hands-on exercises.